COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

December 15, 2010

Ms. Mary Nichols, Chair
California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: Final Comments On CARB's October 28, 2010 Proposed Cap-and-Trade Regulation And Supporting Documents

Dear Ms. Nichols,

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all six companies owning cement manufacturing plants in California,[1] appreciates the opportunity to submit final comments on the California Air Resources Board ("CARB") Proposed Regulation to Implement the Cap-and-Trade Program and its supporting documents released on October 28, 2010.

Assembly Bill 32, the Global Warming Solutions Act of 2006 ("AB 32"), directs CARB to design all GHG emissions-reduction measures, including market-based compliance mechanisms, in a manner that minimizes leakage to the extent feasible.[2] In its current form, CARB's proposed cap-and-trade program fails to satisfy this statutory mandate, as summarized below:

- The California cement industry has a unique set of characteristics that places it at an extreme and disproportionately high risk of leakage under AB 32.
- The proposed cap-and-trade program does not minimize leakage, as it exposes facilities within vulnerable sectors in general and the cement industry in particular to costs that are not imposed on out-of-state competitors.[3]
- The proposed cap-and-trade program does not minimize leakage "to the extent feasible", as there are alternative policies that CARB is administratively, technically, and legally capable of implementing that will reduce the risk of leakage beyond levels achieved by the proposed approach.
- CARB has dismissed these alternative policies without justification.

[1] CSCME is composed of the following six California companies that own the ten cement plants in the state, of which eight are currently operating in the aftermath of the recent recession: CalPortland Company, Cemex, Inc., Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California Inc., and Texas Industries, Inc.

[2] Health & Safety Code ("HSC") § 38562(b)(8).

[3] CARB Draft Scoping Plan, pg. ES-7. (Referring specifically to the California cement industry, "To minimize leakage, in-state and imported products need to be subject to the same standards").

- CARB has not revealed any analysis or otherwise substantiated its assertion that the proposed regulation minimizes leakage to the extent feasible.

- CARB has employed an inadequate process in several respects, including a lack of due process, an impermissible delegation of CARB's responsibility to minimize leakage from indirect emissions, and a failure to establish an effective mechanism for monitoring leakage.

CSCME respectfully requests that CARB modify the Proposed Regulation to make it compliant with the requirement to minimize leakage. Specifically, CSCME requests that CARB adopt the following recommendations:

- Recommendation #1: Implement An Incremental Border Adjustment That Imposes Obligations On Imported Cement That Are Comparable To Those Placed On Domestic Manufacturers

- Recommendation #2: Revise The Output Factor So That Allowance Allocations And Compliance Obligations Are Based On The Same Level Of Output

- Recommendation #3: Establish Benchmarks Based Solely On The Average GHG Intensity Of Each Industry Or Product

- Recommendation #4: Allocate Allowances Directly To Leakage-Exposed Industries To Offset The Costs Associated With Higher Electricity Prices

- Recommendation #5: To The Extent Feasible, Establish Benchmarks Using Data That Pre-Date The Adoption Of AB 32

- Recommendation #6: Eliminate The Cap Adjustment Factor For Those Industries Deemed To Be Highly Exposed To Leakage

No legitimate purpose can be served by placing the highly leakage exposed cement industry at a competitive disadvantage to unregulated imports. Accordingly, CSCME encourages you to reconsider the Proposed Regulation in light of these comments and refine it to both meet the statutory requirement to minimize leakage and avoid engaging California in the self-defeating exercise of merely displacing, rather than reducing, global GHG emissions while imperiling the state's cement industry and the local communities that rely on it as a source of jobs and income. As in the past, CSCME welcomes the opportunity to work with CARB toward successful implementation of AB 32.

Sincerely yours,

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:

Linda Adams, California Environmental Protection Agency
Michael Gibbs, California Environmental Protection Agency
James Goldstene, California Air Resources Board

Susan Kennedy, California Governor's Office
Dan Pellissier, California Governor's Office
Kevin Kennedy, California Air Resources Board

FINAL COMMENTS ON CARB'S OCTOBER 28, 2010 PROPOSED CAP-AND-TRADE REGULATION & SUPPORTING DOCUMENTS

Submitted By:
The Coalition for Sustainable Cement Manufacturing & Environment

Submitted On:
December 15, 2010

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I. INTRODUCTION

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all six companies owning cement manufacturing plants in California,[1] appreciates the opportunity to submit final comments on the California Air Resources Board ("CARB") Proposed Regulation to Implement the Cap-and-Trade Program and its supporting documents released on October 28, 2010.

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- CARB has dismissed these alternative policies without justification.
- CARB has not revealed any analysis or otherwise substantiated its assertion that the proposed regulation minimizes leakage to the extent feasible.
- CARB has employed an inadequate process in several respects, including a lack of due process, an impermissible delegation of CARB's responsibility to minimize leakage from indirect emissions, and a failure to establish an effective mechanism for monitoring leakage.

Accordingly, CSCME respectfully requests that CARB modify the Proposed Regulation to make it compliant with the requirement to minimize leakage. Specifically, CSCME requests that CARB adopt the following recommendations:

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These modifications and refinements are essential both to meeting CARB's statutory requirement to minimize leakage and to avoiding the irreversible deterioration of the California cement industry and the local and other California communities that depend on it.

This comment letter is organized as follows.

- Section II discusses AB 32’s requirement to minimize leakage to the extent feasible and the importance of minimizing leakage in order to achieve AB 32's environmental objectives.

- Section III identifies several unique characteristics that place the cement industry at an extraordinarily and disproportionately high risk of leakage.

- Section IV addresses the more effective approaches to minimizing leakage that CARB failed to adequately consider .

- Section V discusses why CARB’s proposed approach to allowance allocation fails to minimize leakage in the industrial sector in general and the cement industry in particular.

- Section VI discusses CARB’s failure to explain how it will monitor leakage and the lack of due process in CARB’s notice and comment schedule.

- Section VII sets forth CSCME’s recommendations to minimize leakage to the extent feasible.

- Section VIII concludes.

In addition to these comments, CSCME attached Appendices addressing discrete issues referenced below and Exhibits that are copies of CSCME's submissions to CARB during the course of the regulatory development process. CSCME incorporates all of the Appendices and Exhibits herein by reference and expressly requests that they be included in the record and considered in making final revisions to the Proposed Regulation. The Appendices and Exhibits are listed at the end of these comments, and any specific references to portions of them in the comments below should not be viewed as a limitation on their continued and significant relevance as a whole to CARB in finalizing the Proposed Regulation.

II. CARB IS REQUIRED TO DESIGN ALL GHG EMISSIONS-REDUCTION MEASURES, INCLUDING A CAP-AND-TRADE PROGRAM, IN A MANNER THAT MINIMIZES LEAKAGE TO THE EXTENT FEASIBLE

AB 32 directs CARB to design all GHG emissions-reduction measures, including market-based compliance mechanisms, in a manner that "minimizes leakage" to the extent feasible.[4] Defining leakage as "a reduction in emissions of greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state,"[5] the California Legislature's intent is clear: CARB should design all regulations in a manner that avoids the self-defeating exercise of merely displacing, rather than reducing, GHG emissions. The Legislature's requirement to minimize leakage is underpinned by the rationale that GHGs are a global pollutant and, therefore, regulations that displace GHG emissions simply serve to undermine the primary policy objective (*i.e.*, reducing global concentrations of GHG emissions in the atmosphere) while imperiling the California economy.

CARB itself recognized the AB 32 requirement to "design measures to minimize leakage" and that "[m]inimizing leakage will be a key consideration when developing the cap-and-trade regulation."[6] CARB also acknowledged that failure to stem leakage would result in a serious policy failure: "While the exporting of California's emissions might reduce the environmental impacts in California and bring a reduction in co-pollutants (by reducing in-state production), it would not achieve a net reduction in emissions of GHGs, would likely lead to increased adverse environmental impacts outside of California, and would have negative effects on California's economy."[7] The Economic and Allocation Advisory Committee ("EAAC") stated even more succinctly, "Addressing leakage is crucial to achieving AB 32's environmental goals."[8]

Furthermore, referring specifically to the cement industry, CARB found that "[t]o minimize leakage, in-state and imported products need to be subject to the same standards."[9] Finally, the California Supreme Court has held that a statute mandating an agency to take action "to the extent feasible"

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[4] HSC 38562(b)(8)

[5] HSC § 38505(j); *see* Statement of Reasons at II-26.

[6] Proposed Scoping Plan at p. 31.

[7] CARB Appendix O at 378.

[8] CARB Appendix L at L30.

[9] CARB Draft Scoping Plan, pg. ES-7.

confers no discretion on that agency to ignore feasible actions that will aid the statute's stated purpose.[10]

The minimization of leakage in the cement industry, in particular, is critical to achieving AB 32's environmental objectives. More than 90 percent of California cement capacity and 100 percent of current cement production utilizes the most advanced technology available. Furthermore, California cement imports are typically shipped from distant Asian nations, resulting in substantial transportation-related GHG emissions. Consequently, a ton of cement produced and consumed in California *has a smaller GHG footprint than a ton of imported cement*. This fundamental point was correctly and succinctly summarized by CARB in the Draft Scoping Plan:

> *If GHG requirements were applied to California cement manufacturing facilities only, the cost of cement from those facilities would rise relative to imports, and imports could displace California production {sic}. Generally, California's cement manufacturing plants are more efficient than those that produce imported cement. California plants would decrease their GHGs produced, but increased imports would likely result in a net worldwide increase in GHG emissions. To minimize leakage, in-state and imported products need to be subject to the same standards.*[11]

Maintaining the California cement industry is also essential to preserving an affordable, reliable, and sustainable supply of cement to meet the state's need for public and private infrastructure, including projects CARB and the State are relying on to achieve AB 32's goals. Moreover, the state cannot afford to imperil existing and well-paying California jobs, such as those in the cement industry, while at the same time ignoring the associated economic losses to the local communities that depend on the significant revenue generated from such industries.

III. THE CALIFORNIA CEMENT INDUSTRY HAS A UNIQUE SET OF CHARACTERISTICS THAT PLACES IT AT AN EXTREME AND DISPROPORTIONATELY HIGH RISK OF LEAKAGE UNDER AB 32

Emissions leakage is a direct consequence of economic leakage — that is, the relocation of output, jobs, investment, and other economic activity to jurisdictions that do not face comparable GHG regulations. This can be viewed as the result of three critical risk factors:

- ***GHG Intensity:*** The risk of economic leakage arises when GHG regulations impose additional costs on domestic facilities that are not faced by all competitors.[12] The magnitude of the initial cost

[10] *Morris V. Williams*, 433 P.2d 697, 713 (Cal. 1967) (holding that a statute requiring, to the extent feasible, that any reductions to healthcare services be made in a proportional manner to all services, left the agency with no discretion to reject a feasible course of action that would have made service reductions proportional).

[11] CARB Draft Scoping Plan at ES-7.

[12] *See* CARB Appendix D at D-35 (presentation given by CARB staff member Mark Wenzel) ("The result of leakage would be less economic activity in California for no net environmental benefit."); CARB Appendix D at D-198 (CARB presentation, "Discussion of Emissions Leakage Issues In Cap-and-Trade") (Stating that producers in some

pressure is directly proportional to a facility's existing GHG intensity (e*.g.,* GHG emissions per dollar of value added).[13] Industries with higher GHG intensities, such as cement, will face proportionately higher cost pressures than those with a lower GHG intensity.[14]

- ***Scope of Abatement Opportunities:*** Regulated entities may reduce a portion of the initial cost pressures through direct abatement, with the extent of relief depending on the availability of technologically-feasible and cost-effective GHG abatement opportunities, as well as the speed with which they can be implemented. All else being equal, those industries, such as cement, with fewer cost-effective abatement opportunities will realize higher costs.[15]

- ***Exposure to Unregulated Competition:*** Regulated entities may be able to pass through any or all realized costs in the form of higher prices — effectively shifting the incidence of the "tax" downstream to consumers. A facility's ability to pass through such costs without experiencing adverse effects depends on a complex set of factors — most notably, the extent to which it competes with facilities that operate in less stringently regulated jurisdictions. All else being equal, those industries, such as cement, that are more exposed to unregulated competition will have less of an ability to pass through asymmetric costs to consumers.

Ultimately, if exposed to significant competition from unregulated jurisdictions, domestic facilities must choose between three unattractive options when dealing with their realized costs: (1) pass them through to consumers and suffer a loss of market share, (2) absorb them and experience a loss of earnings and eventual disinvestment, or (3) a combination of both. In any scenario, the result is the same: a transfer of output, jobs, investment, and other economic activity from inside the regulated jurisdiction to outside the regulated jurisdiction.[16]

California industries may not be able to pass costs of compliance with AB 32 through to customers “because their competitors that do not face similar costs do not have to increase their prices.”).

[13] According to CARB, emissions intensity is meant to serve as a proxy for compliance costs, and higher GHG intensity corresponds to higher leakage risk. *See* CARB Appendix K at K-14.

[14] *See* CARB Statement of Reasons at II-26 (“Without assistance, the competitiveness of industries that are both highly emissions intensive and trade exposed has the potential to be negatively affected relative to competitors that do not face similar GHG emission reduction requirements.”). *See also CARB* Appendix D at D-23 (Stating that “[t]he potential for leakage is higher in some sectors than others.”).

[15] *See* CSCME report, ”Building A Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry,” June 18, 2008, at 25 (summarizing the California cement industry’s primary challenges in adapting to a carbon-constrained world as: 1) relatively few cost-effective abatement opportunities, and 2) high potential for carbon leakage). Attached at **Exhibit 3**.

[16] *See* CARB Statement of Reasons at II-57-II-58 (discussing CARB staff’s intention to monitor the extent to which leakage is evident in certain industries that raise prices and lose market share to out-of-state producers). *See also* CARB Appendix K at K-4 (Stating that leakage “can precipitate a shift in demand away from goods produced in the implementing jurisdiction toward goods produced elsewhere.”). For the sake of brevity, the term "unregulated competitors" is used throughout. However, it should be noted that the risk of leakage may still exist if the competitor resides in a jurisdiction that has adopted GHG regulations that are less stringent and, therefore, less costly than those adopted in the domestic market.

The extent to which economic leakage translates into emissions leakage depends on a fourth risk factor: the differential between the GHG intensities of domestic and imported products, including the GHG emissions associated with transporting products to market.[17] At a minimum, the reduction in GHG emissions realized in the regulated jurisdiction due to decreased output will be partially offset by an increase in GHG emissions in the unregulated jurisdiction.[18] If, however, the unregulated competitor is significantly less efficient or located far from the domestic market, the total GHG footprint of the imported product may be higher than the domestically-produced product — resulting in a net *increase* in global GHG emissions within the industry.[19]

In short, the risk of emissions leakage is greatest within emissions-intensive, trade-exposed industries with relatively few cost-effective abatement opportunities and high differentials between the GHG intensities of domestic and imported products. As demonstrated below, the California cement industry exhibits precisely such characteristics.

A. Cement Manufacturing Has An Extraordinarily High GHG Intensity

According to CARB's analysis, the cement industry has a GHG intensity that far exceeds that of virtually any other California industry.[20] Specifically, the cement industry's GHG intensity is estimated to be 13,744 metric tons of CO_2-e per million dollars of value added — almost three times higher than CARB's "high" GHG intensity threshold and more than three times higher than the GHG intensity of the next most emissions-intensive industry (iron and steel mills). Put differently, given an average allowance price of $25 per ton of CO_2e and no allowance allocation, the California cement industry's compliance costs would equal approximately one-third of its value added.

[17] *See* CARB Appendix D at D-198 (April 13, 2009 CARB presentation) (stating that California producers in industries competing with unregulated producers may not be able to pass compliance costs on to customers). *See also* CSCME report, "Minimizing 'Leakage' Under Climate Change Proposals Affecting The California Cement Industry," October 23, 2007, at p.14 and Ex.4 (stating that importation of cement from China results in additional CO_2 emissions of 221 kilograms per metric ton from transportation alone, resulting in emissions at least 25% greater than California cement producers). Attached at **Exhibit 1**.

[18] *See* CARB Appendix D at D-610 (presentation of Mihoyo Fuji) (defining "industries at risk for leakage" as carbon emission intensive industries that are exposed to competition with regions with no carbon price).

[19] *See, e.g.,* CSCME letter to Professor Goulder and Members of the EAAC, December 14, 2009, at 3 (stating that even under the unrealistic assumption that emissions from production of cement in China are equivalent to those of California cement producers, imported cement from China would still result in 25% more emissions than cement produced and consumed in California due to transportation across the Pacific Ocean). Attached at **Exhibit 14**.

[20] *See* CARB Appendix K: Leakage Analysis, at K-15. *See also* CSCME letter to Secretary Linda Adams and Chairman Mary Nichols, September 2, 2010, at 2 ("As demonstrated during the August 24 meeting, CARB's own data indicate that the California cement industry has a GHG intensity that is more than twice as high as any other California industry and an order of magnitude higher than the vast majority of industries."). Attached at **Exhibit 22**.

B. California Cement Manufacturers Have Minimal Cost-Effective Abatement Opportunities

The cement industry has relatively few technologically feasible and cost-effective abatement opportunities, especially in comparison to other California industries.[21] Approximately 59 percent of the cement industry's direct GHG emissions are process emissions, which are an unalterable consequence of the chemical process required to convert limestone into cement clinker.[22] As stated by CARB,

> *"More than half of the emissions from clinker production result from chemical processes in the creation of the cement itself, with no direct method available for reducing the emissions intensity of this chemical process."*[23]

Put differently, in the absence of commercially viable Carbon Capture and Storage ("CCS") technology, only 41 percent of the industry's direct GHG emissions are potentially subject to reduction. Furthermore, as described in **Appendix A,** only a small fraction of that portion is likely to be subject to technologically feasible and cost-effective abatement measures.

C. Because Of Significant Competition From Imports, California Cement Manufacturers Cannot Pass Through Asymmetric Costs

As demonstrated in **Appendix B** and in multiple submissions to CARB over the past three years, the California cement industry is highly exposed to import competition.[24] The main factors contributing to this high exposure include:

- Cement is a fungible commodity that is sold primarily on the basis of price;
- California is an isolated regional market with deep water ports that are physically and economically accessible to cement imports from around the world, including distant Asian nations, such as China, which accounts for more than half of the world's cement production;[25]

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[21] *See* CSCME letter to Chairman Mary Nichols, July 9, 2010, at 2 ("Although cement manufacturers are always searching for additional methods to improve energy efficiency, the cement plants in California are already the most efficient plants in the United States and possibly the world, and therefore, there are few additional efficiency improvements that have yet to be implemented by California cement producers."), attached at **Exhibit 21**; CSCME letter to Chairman Mary Nichols, June 7, 2010, at 3 ("[H]igh energy prices and strong import competition has forced domestic manufacturers to remain on the leading edge of technology to improve energy efficiency . . . . [W]ith very limited low-cost GHG abatement opportunities within the [cement] industry's control, the industry does not have the opportunity to mitigate its GHG compliance cost -- therefore increasing its exposure to leakage."), attached at **Exhibit 20**.

[22] *See* CSCME letter to Susan Kennedy, October 20, 2010, at 2, attached at **Exhibit 23**.

[23] *See* CARB Appendix J: Allowance Allocation, at J-40.

[24] *See, e.g.*, CSCME report, "Building a Sustainable Future: Economic Growth, Climate Change, & the California Cement Industry," June 18, 2008, at 19-20, attached at **Exhibit 3**; CSCME letter to Chairman Mary Nichols, May 11, 2009, at 4 ("California's location on the Pacific Ocean makes it easily accessible to imports of all products and widens the geographic scope of markets, including the markets for products that are typically expensive to transport by land, such as cement."), attached at **Exhibit 12**.

- Overseas producers have a significant incentive to sell excess capacity at low prices because cement production facilities are enormous capital investments that must be operated continuously and at high utilization levels in order to spread high fixed costs over greater production.[26]

As discussed further in Section (IV)(C) of this comment letter, the California cement industry's high exposure to unregulated competition has been confirmed and documented by both quantitative and qualitative evidence, including analysis of industry-specific data and a rich history of antidumping rulings against foreign cement by the U.S. International Trade Commission ("ITC").

D. California Cement Has A Substantially Smaller GHG Footprint Than Imported Cement

For a variety of reasons, a ton of domestically produced cement will almost always have a smaller GHG footprint than a ton of cement produced elsewhere and transported to the California market for consumption: [27]

- More than 90 percent of California cement capacity and 100 percent of current production utilizes preheater-precalciner kilns — the most advanced and GHG efficient technology available.[28]
- Cement manufacturing requires substantial quantities of electricity, and the GHG intensity of electricity production in California is far lower than the GHG intensity of electricity production for major cement exporters to California.[29]
- The vast majority of imports originate from distant Asian nations, such as China and Taiwan — resulting in substantial transportation-related emissions.[30]

In fact, it is estimated that just the transportation emissions associated with shipping from Asia to California increases the GHG footprint of a ton of cement by *at least* 25 percent.[31] In its Draft Scoping

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[25] *See* CSCME letter to Chairman Mary Nichols, June 7, 2010, at 3 (Stating that because of California's coastal location and multiple deep water ports in all its major metropolitan markets "cement produced in Asia can reach the California market at a relatively low cost."), attached at **Exhibit 20**; CSCME report, "Building A Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry," June 18, 2008, at 19 ("A coastal state such as California has lower barriers to entry for distant suppliers compared to a typical inland cement market."), attached at **Exhibit 3**.

[26] *See* **Appendix B**.

[27] *See* CSCME letter to Susan Kennedy, October 20, 2010, at 1, attached at **Exhibit 23**; CSCME letter to Chairman Mary Nichols, October 20, 2010, at 1, attached at **Exhibit 24**.

[28] *See* CSCME report, "Building A Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry," June 18, 2008, at 11 (Estimating that "more than 95% of California cement is produced with preheater-precalciner technology, the most efficient technology."). Attached at **Exhibit 3**.

[29] *See* CSCME report, "The Role of Offsets In AB 32: The Cement Industry's Perspective," September 8, 2008, at 4 (stating that United States and California laws already make the California cement industry one of the cleanest, most heavily regulated, and energy efficient cement industries in the world). Attached at **Exhibit 7**.

[30] *See* CSCME report, "Building A Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry," June 18, 2008, at 15. Attached at **Exhibit 3**.

Plan, CARB similarly estimated that maritime emissions of 0.30 metric tons of CO_2 per metric ton of cement would need to be added to imported cement to appropriately account for its GHG intensity. Using 2006 data, CARB estimates that these transportation emissions correspond to one-third of the average GHG intensity of cement produced in California.[32]

E. The Cement Industry's Unique Combination Of Risk Factors Justifies A More Diligent, Precautionary, And Tailored Approach To Minimizing Leakage

As demonstrated by CARB's analysis of GHG intensity and trade intensity, many California industries exhibit one of the above leakage characteristics, and some exhibit two. Cement, however, is the only industry that exhibits all four characteristics. As expressed to CARB on multiple occasions, this unique combination of characteristics has a cumulative impact that results in a leakage risk far beyond that of all other California industries.[33] This extreme risk indicates that, consistent with the statutory requirements, the California cement industry merits a more diligent, precautionary, and tailored approach to minimizing leakage than that applied to other industries.

IV. CARB PROPOSES TO ADDRESS LEAKAGE SOLELY THROUGH ALLOWANCE ALLOCATION AND HAS DISMISSED MORE EFFECTIVE APPROACHES WITHOUT SUFFICIENT CAUSE OR JUSTIFICATION

CARB has described two generally accepted approaches to dealing with leakage: (1) the administrative allocation of allowance value to exposed industries and (2) the implementation of a border adjustment that imposes comparable costs on imported products. CARB suggests that it evaluated both of those approaches and concluded that "output-based free allocation is a superior approach for non-electricity goods because it does not face the considerable technical and legal difficulties that border adjustments face."[34] For these reasons, CARB proposes to address the risk of leakage in the industrial sector solely through the administrative allocation of allowance value.

A. CARB Dismissed The Use Of Border Adjustments To Address Leakage In The Industrial Sector Without Cause Or Justification

Although both CARB and EAAC recognize that border adjustments can be highly effective approaches for addressing leakage (EAAC considers it to be the best approach), CARB has rejected their use in the industrial sector. It cites two "legal and technical difficulties" for its decision:

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[31] *See* CSCME report, "Minimizing 'Leakage' Under Climate Change Proposals Affecting The California Cement Industry," October 23, 2007, at 14 and Exhibit 4. Attached at **Exhibit 1**.

[32] CARB Draft Scoping Plan, Appendix C, at C-106.

[33] *See, e.g.*, CSCME report, "Minimizing 'Leakage' Under Climate Change Proposals Affecting the California Cement Industry," October 23, 2007, attached at **Exhibit 1**; CSCME report, "Building A Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry," June 18, 2008, attached at **Exhibit 3**; CSCME report, "Tradable Performance Standards: A Policy Framework For Effectively, Efficiently, & Equitably Regulating GHG Emissions In The California Cement Industry," September 8, 2008, at 1, attached at **Exhibit 5**; CSCME letter to CARB Chairman Mary Nichols, January 11, 2010, attached at **Exhibit 17**.

[34] CARB Statement of Reasons at p. IV-8.

- The application of a border adjustment to interstate and international trade would face legal scrutiny under the Commerce Clause of the U.S. Constitution and World Trade Organization principles, and
- Goods are often traded several times before entering the California market, making it "exceedingly difficult" to determine the associated GHG emissions. [35]

CSCME has advised CARB in detail as to the legality of addressing cement imports through a border adjustment measure or similar instrument under both the U.S. Constitution and the World Trade Organization ("WTO") Agreements.[36] Legal counsel from both CARB and the California Attorney General's office confirmed that there are no legal impediments to adopting a border adjustment in the cement industry. Cement is particularly suited to a border adjustment because it has limited importation pathways and the immediate downstream use (concrete) is not typically imported or exported in California.[37] CARB itself has recognized that that there is now consensus that such a measure would not present legal difficulties,[38] yet it continues to cite such non-existent difficulties as reasoning for not implementing a measure to address imports.[39]

In addition, CARB cites the difficulty of tracing goods back to their source in order to determine associated GHG emissions.[40] This same issue, however, applies equally to the electric power sector, as it is virtually impossible to trace a given kilowatt-hour of electricity back to its origin, and electricity consumed in California is regularly sold across both state and international borders. The same issue also applies to the myriad of imported fuels that are covered by the Low Carbon Fuel Standard ("LCFS"). Despite these similar concerns, however, CARB has chosen to treat these goods differently by imposing obligations on imported electricity and fuel, but not manufactured goods.

B. CARB also dismissed, without cause or justification, a detailed proposal to combine allowance allocations and a border adjustment to provide maximum leakage protection

As explained to CARB and other stakeholders during the past several years,[41] the optimal approach to minimizing leakage in the California cement industry is to combine allowance allocations with an

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[35] CARB Statement of Reasons at IV-8.

[36] *See* CSCME paper, "Measures Under AB 32 To Prevent Leakage Are Consistent With The U.S. Constitution And WTO Obligations," May 25, 2010. Attached at **Exhibit 19**.

[37] *See* CSCME letter to Secretary Linda Adams and Chairman Mary Nichols, September 2, 2010, at 7. Attached at **Exhibit 22**.

[38] CARB Appendix K: Leakage Analysis, at K-33.

[39] CARB Initial Statement of Reasons at IV-8.

[40] CARB Appendix O: Functional Equivalent Document, at 378 ("Because goods are often traded several times before entering the California market, determining the associated GHG emissions could be exceedingly difficult.").

[41] *See, e.g.,* CSCME paper, "Tradable Performance Standards: A Policy Framework for Effectively, Efficiently, & Equitably Regulation GHG Emissions in the California Cement Industry," September 8, 2008, attached at **Exhibit 5**; CSCME letter to Chairman Mary Nichols, June 7, 2010, at 9-11, attached at **Exhibit 20**.

incremental border adjustment in a manner that imposes comparable costs on domestic manufacturers and importers.[42] This approach would be most effective in minimizing leakage for the following reasons:

- The allocation of allowance value helps to mitigate the downstream cost impacts and, therefore, reduces the risk of inter-industry leakage (*e.g.*, substitution of imported steel for domestically produced cement).
- The incremental border adjustment imposes comparable compliance costs on domestic and imported cement and, therefore, reduces the risk of intra-industry leakage (*e.g.*, substitution of imported cement for California produced cement).

A similar approach was included in proposed federal legislation last year. Passed by the U.S. House of Representatives in June 2009, the Waxman-Markey Bill (H.R. 2454) provided leakage-exposed sectors with output-based allowances corresponding to an industry's average GHG intensity. Furthermore, the bill envisioned a gradual phase-out of allowances along with a commensurate phasing in of a border adjustment for highly vulnerable industries. CARB, however, made no mention of this strong endorsement of a hybrid approach and there is no indication that it was evaluated or discussed in CARB's deliberations.

Working with a team of expert economists, international trade attorneys, and public policy advisors, CSCME designed a specific framework for minimizing the risk of leakage in the California cement industry that uses a combination of allowance allocation and border adjustments but does not run afoul of constitutional and WTO obligations. At the direction of CARB's Executive Officer, CSCME developed detailed regulatory language to implement the proposed framework.[43] CARB, however, disregarded CSCME's proposed approach and instead decided to utilize only allowance allocation to address the leakage issue. CARB did not offer any reasoned explanation or justification for its rejection of CSCME's approach, which is feasible and would have offered greater protection against leakage and greater ability to achieve the state's climate change objectives. CSCME has continued to provide CARB with information and analysis in relation to the application of AB 32 to imported cement, including how such an application could be readily integrated within the existing framework of the Proposed Regulation.[44]

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[42] *See* CSCME letter to Economic and Allocation Advisory Committee Chairman Larry Goulder, December 14, 2009, at 4 (Explaining CSCME's disagreement with the suggestion that "the use of allowance value and the implementation of a border adjustment are supplementary approaches."). Attached at **Exhibit 14**.

[43] *See* CSCME submission, "Draft Language for California Cement Industry Tradable Performance Standard," August 10, 2009. Attached at **Exhibit 11**.

[44] *See* CSCME paper, "Application of AB 32 To Imported Cement: Preventing Leakage And Facilitating Sectoral Cooperation," December 9, 2010. Attached at **Exhibit 25**.

V. CARB'S PROPOSED APPROACH TO ALLOWANCE ALLOCATION FAILS TO MINIMIZE LEAKAGE IN THE INDUSTRIAL SECTOR IN GENERAL AND THE CEMENT INDUSTRY IN PARTICULAR

To address the risk of leakage in the industrial sector, CARB is proposing to allocate allowance value according to an output-based benchmarking system.[45] Generally speaking, CSCME supports the distribution of allowance value through output-based benchmarking, which has the following desirable qualities:

- It provides consistent incentives to improve GHG efficiency.
- It does not penalize industry growth, assuming sufficient allowances are available.
- It rewards those facilities that have made greater investments in GHG efficiency relative to other facilities in the system.

CSCME also believes that, under certain conditions, the distribution of allowance value through output-based benchmarking can play a critical role in addressing the risk of leakage in emissions-intensive and trade-exposed industries, such as cement. With that said, due to a variety of factors, CARB's current version of output-based benchmarking fails to minimize leakage to the extent feasible. Indeed, as CSCME's submissions to CARB demonstrate, although it is possible to address leakage through the use of a benchmarking approach, CARB's proposed regulation fails to do this to the extent feasible, and CARB has provided no reasoned explanation for not adopting an approach that complies with its statutory mandate.

The conceptual centerpiece of CARB's proposed approach is the allocation formula:

$$A = O \times B \times a \times C$$

Where,

A = the quantity of allowances allocated to an industry in a given year

O = an entity's output

B = an industry GHG intensity benchmark

a = the transition and leakage assistance factor, which is based on an industry's leakage exposure

C *= the cap adjustment factor, which declines in proportion with the economy-wide cap.*[46]

Three general observations merit attention. First, the formula's multiplicative nature heightens the importance of correctly applying <u>each individual component</u>. Any error due to the misapplication of one

[45] *See* CARB Initial Statement of Reasons at II-27 ("The amount of free allowances distributed under this approach will vary with economic conditions.") and II-30 ("Staff proposes to use an updating output-based, free allocation methodology, combined with an emissions efficiency benchmark for allocating to industrial sources.").

[46] CARB Proposed Regulation § 95891 (p. A-78).

component (*e.g.*, an overly stringent benchmark or an incorrectly assessed assistance factor) will be multiplied throughout the formula — generating an error of similar proportion in the overall level of assistance. Furthermore, as illustrated by CARB's own analysis, the "margin of error" when applying each component is particularly small for those industries with extraordinarily high GHG intensities, such as cement.[47]

Second, only two parameters are required to correctly specify an output-based benchmarking approach to allowance allocation: (1) the output factor and (2) the allocation rate. CARB, however, has elected to decompose the allocation rate into three components: a benchmark factor, an assistance factor, and a cap adjustment factor. Only one of these factors (*i.e.*, the assistance factor) is systematically informed by CARB's assessment of an industry's leakage risk. Thus, CARB's approach cannot effectively minimize leakage to the extent feasible because only one-third of the allocation rate takes leakage risk into consideration.

Third, CARB's overall approach to allocating allowances is premised on the <u>relative</u> risk of leakage among California industries. If the absolute risk of leakage faced by one industry is significant, however, CARB will need to adopt an approach that is not only different than that for other industries, including those placed in the same "high" leakage risk category, but also is tailored to the magnitude and nature of risk faced by the industry. Under its current approach, CARB classifies almost half of all industrial facilities in the high leakage risk category and treats them virtually the same, despite substantial differences in leakage exposure. Absent a more customized approach for the cement industry, in particular, CARB's current framework will necessarily cause significant and irreversible leakage.

With these three general conceptual observations in mind, the following sections evaluate each component of the allowance allocation formula. Although many of our observations may be applicable to all industries covered under the output-based benchmarking framework, we place particular focus on the extent to which its implementation will not minimize leakage in the California cement industry.

A. The Output Factor

i) CARB appropriately defines output for the cement industry

A benchmark must be tailored to the unique characteristics of the industry to which it is being applied.[48] In the case of the cement industry, a key decision is the definition of "output" that forms the denominator of the benchmark. Several options exist, including: (1) cement clinker ("clinker"), (2) cement clinker plus mineral additives ("cement"), and (3) cement clinker plus mineral additives and

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[47] CARB conducts a hypothetical sensitivity analysis that demonstrates that "industries with higher emissions intensities are more sensitive to the effects of cost pass-through ability than industries with low or medium emissions intensities." An alternative way of stating this conclusion is that industries with higher emissions intensities are more sensitive to the effects of allowance allocation and any errors in its determination. *See* CARB Appendix K: Leakage Analysis, at K-30.

[48] *See* CARB Appendix K: Leakage Analysis, at K-32 ("[I]f the 'uniqueness' of each sector has to be taken into account, more qualitative, sector-by-sector analysis will be needed.").

supplementary cementitious materials ("cementitious"). CARB proposes to use cement — defined as clinker, gypsum, and limestone, and excluding supplementary cementitious materials ("SCMs") — as the output metric.[49] As suggested by the staff report, CSCME supports this decision.[50]

The exclusion of SCMs from the proposed cement industry benchmark is consistent with proposed benchmarks in other policy venues, including the European Union Emissions Trading System ("EU-ETS"). As discussed in EU-ETS documents, it is impossible to achieve an unbiased standard for the cement industry unless SCMs are excluded from the standard.[51] The benchmark proposed by CSCME adheres to the rationale behind the proposed EU-ETS standard, but is expanded slightly beyond clinker to include two other key components of cement, gypsum and limestone.

The proposed benchmark has several beneficial attributes:

(1) *Actionable:* The scope of the proposed benchmark includes those decisions that are directly within the cement manufacturer's control — namely, the production of clinker and the use of mineral additives.

(2) *Unbiased:* Like clinker, cement is a consistent, uniform, and unbiased standard. Furthermore, the exclusion of SCMs from the output metric is necessary to avoid severely and unfairly penalizing California cement manufacturers relative to their regional, national, or international counterparts, which would exacerbate the risk of leakage. Key SCMs (*e.g.*, fly ash and granulated blast furnace slag) are primarily produced east of the Mississippi River, and due to transportation costs and other logistical factors, economic access to these supplies tends to be highly localized. The use of a benchmark that excludes SCMs eliminates such biases.[52]

(3) *Equitable:* Cement is consistent with the vast majority of output from a cement manufacturing plant. For a variety of reasons, including economics and market structure, SCMs are not commonly blended directly at a cement manufacturing facility in California.[53] Rather, they are primarily blended with cement at concrete batch plants, with such blending highly dependent on the unique characteristics of the local market (*i.e.*, high market variability could favor one manufacturer over another that does not operate under similar market conditions). Consequently, this definition avoids competitive distortions among California cement producers and concrete batch plants.

[49] *See* CARB Appendix J: Allowance Allocation, at J-39.

[50] *See* CSCME letter to Chairman Mary Nichols, June 7, 2010, at 1, 8-9. Attached at **Exhibit 20**.

[51] *See* CSCME letter to Chairman Mary Nichols, June 7, 2010, at 8. Attached at **Exhibit 20**.

[52] For a detailed discussion of issues associated with increasing SCM blending in California, *see* CSCME report prepared by Wescott, Robert *et al.*, "Prospects for Expanding the Use of Supplementary Cementitious Materials in California," February 16, 2010. Attached at **Exhibit 18**.

[53] *Id.*

Furthermore, it is important to note that the cement metric combines multiple materials that are processed at different stages of the manufacturing process at different times. This presents two practical challenges if the output metric was simply based on tons of cement sold in a given year:

- Cement clinker may be manufactured at a facility in one year and ground with gypsum and limestone at the same facility in the subsequent year. This creates the potential for a significant mismatch between a facility's reported GHG emissions, which are primarily associated with the manufacture of clinker, and its reported cement output — resulting in artificial year-to-year variability in GHG intensity metrics.

- Cement clinker may be bought or sold, rather than being ground with gypsum or limestone at the producing facility. If this is not taken into account, those facilities that sell clinker would have an artificially low output and those that purchase clinker would have an artificially high output. This creates a perverse incentive to purchase imported clinker in order to lower GHG intensity metrics.

To address these concerns, CARB has proposed to base the cement metric on the level of clinker production at a particular facility and adjusting it based on the average level of gypsum and limestone used in the cement shipped from that facility in the same year. CSCME supports this approach as a sound and practical method for implementing a cement benchmark in a manner that avoids artificial variations in measured output and eliminates perverse incentives. Furthermore, we recommend that the following formula be used to implement CARB's proposed approach:

$$O = P\left(1 + \frac{G}{C} + \frac{L}{C}\right)$$

Where,

O = cement output in a given compliance year

P = clinker production in a given compliance year

G = gypsum consumption (i.e., ground) in a given compliance year

L = limestone consumption (i.e., ground) in a given compliance year

C = clinker consumption (i.e., ground) in a given compliance year

ii) CARB calculates allowance allocations using a lagging estimate of output, which will result in persistent and severe under-allocation to the cement industry

Ideally, the level of output used to determine a facility’s allowance allocations in a given year would correspond precisely to the level of output that generated its emissions obligations in that year. Under CARB’s proposed approach, however, facilities will be allocated allowances at the beginning of the compliance year based on an average level of output during previous years (*e.g.*, 2008-2010),[54] while

[54] *See* CARB Appendix J: Allowance Allocation, at J-34.

their emissions obligations will correspond to their actual level of output during the compliance year (*e.g.*, 2012). CARB makes no effort to "true up" these values ex-post in order to bring allowance allocations and compliance obligations into alignment.[55] A proposed "true up" approach is provided in **Appendix C**.

CARB's approach will, at best, result in a significant mismatch in timing between the generation of compliance obligations and the receipt of allowances. At worst, it will result in a persistent and severe under-allocation of allowances, especially within those industries that experience consistent output growth throughout the 2012-2020 timeframe. This dynamic is inconsistent with the statutory requirements and particularly concerning in the context of the recent recession, which substantially depressed output in many California industries during 2008-2010. The California cement industry was particularly hard-hit by the recession, with output falling by roughly half, and it is reasonable to expect that output will increase substantially throughout the 2012-2020 timeframe.

Indeed, as demonstrated in **Appendix D**, CSCME estimates that CARB's proposed approach is likely to result in $669 million in compliance costs to the California cement industry during 2012-2020, as compared to $358 million under a true-up method. Put differently, it is estimated that CARB's practice of calculating allowance allocation using a lagging estimate of output is likely to almost double the cement industry's compliance costs under AB 32. Looking across all three of the cement consumption scenarios examined, it is estimated that California cement manufacturers would receive allowances for 60-80 percent of their emissions under CARB's lagged output methodology during the vast majority of years. This stands in stark contrast to the effective allocation rate under a true-up method, which results in cement manufacturers receiving allowances equal to 90 percent of their direct emissions in 2012 and declining to 82.5 percent in 2020.

B. The Benchmark Factor

As identified by CARB, several issues must be considered when constructing a product-based benchmark: (1) product output units, (2) the stringency of the benchmark, (3) the scope of emissions, and (4) the data sample.[56] As described above, CSCME agrees with CARB that "cement" is the appropriate product output unit for the cement industry. The following sections discuss our concerns regarding the other three elements.

i) CARB's lowering of the benchmark for all industries is arbitrary, inequitable, and undermines its efforts to minimize leakage

A critical decision in the construction of a benchmark is determining its stringency. In its staff report, CARB states that "[s]taff's current thinking is that the targeted level of stringency would be created by

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[55] A "true up" refers to the practice of allocating allowances at the beginning of a compliance year based on projected output and adjusting those allowances after the compliance year once actual output is known (*i.e*., data for the compliance year is reported and verified). *See also* **Appendix C**.

[56] *See* CARB Appendix J: Allowance Allocation, at J-35.

evaluating each industrial sector's emissions intensity during a historical base period and targeting the benchmark to allocate 90 percent of this level per unit product."[57] For a variety of reasons, CSCME strongly disagrees with this approach of applying a uniform 10 percent "discount" to industry averages in order to form benchmarks.

First, the application of a 10 percent discount to construct the benchmark is in direct conflict with the AB 32 requirement to minimize leakage.[58] The discount virtually guarantees that the majority of, if not all, facilities in an industry, regardless of leakage exposure, will be placed in a net negative financial position at the beginning of the program and will face incremental compliance costs not borne by importers.[59] CARB's approach directly contradicts its statements that it has "designed the regulation to minimize leakage by placing covered entities on an equal footing with their non-covered competitors (both those that are out-of-state, and those that are below the threshold for inclusion in the program)"[60] and that its "method of allocation levels the playing field with out-of-state manufacturers," given that this cannot, in fact, be the case from using CARB's methodology.[61] The magnitude and impact of these costs will be greater for more emissions-intensive industries, such as cement, and it will only grow as the cap adjustment factor declines.[62]

Second, CARB suggests that the application of a 10 percent discount on an industry's average emissions intensity will result in a benchmark that is similar to "highly efficient, low-emitting facilities" in that sector.[63] This assertion is at best imprecise and at worst totally without merit. The extent to which the 10 percent discount reflects highly efficient, low-emitting facilities will depend on the distribution of emissions intensities within a given industry. For example, if there is a wide distribution of emissions intensities across facilities in a given industry, the 10 percent discount may result in slightly less than 50 percent of production being placed below the benchmark. If, however, there is a narrow distribution of emissions intensities across facilities in a given industry, the 10 percent discount may result in a benchmark that is well below the emissions intensity of even the most efficient producer. Simply put, the 10 percent discount ensures that less than 50 percent of production will be placed below the

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[57] *Id.*

[58] *See* CSCME letter to Susan Kennedy, October 20, 2010, at 2 (Stating that the proposed 10 percent discount is "an approach that counteracts effective leakage protection."), attached at **Exhibit 23**; CSCME letter to Chairman Mary Nichols, October 20, 2010, at 2 (Stating that the "proposed benchmark effectively undermines the other . . . elements that are intended to provide effective leakage protection."), attached at **Exhibit 24**.

[59] *See* CSCME letter to Chairman Mary Nichols, October 20, 2010, at 2 ("The majority, if not all, cement producers will incur significant compliance costs that will not be faced by imports, placing domestic cement at a competitive market disadvantage within the first year of the program."). Attached at **Exhibit 24**.

[60] CARB Statement of Reasons, at II-57.

[61] CARB Appendix O: Functional Equivalent Document, at 378.

[62] *Id.* (Stating that "the imbalance in favor of imports will grow due to the combined effect of the unachievable benchmark factor multiplied by the reduction of the cap adjustment factor.").

[63] CARB Appendix J: Allowance Allocation, at J-35.

benchmark, but it in no way ensures that it is either achievable or reflects the emissions intensity of highly efficient, low-emitting facilities.

Third, CARB's staff report offers no explanation of why staff believes that the benchmark stringency should reflect the emissions intensity of highly efficient, low-emitting facilities within each sector, much less how this furthers the goal of leakage minimization or another goal. CARB and other stakeholders have suggested that the discount will provide an "extra incentive" to abate. This is simply incorrect. As stated by EAAC, "the number of allowances a firm receives does not reduce incentives to abate emissions or to invest in new, low-emissions technologies."[64] In contrast, the discount does influence the extent to which those incentives are positive (*i.e.*, leakage reducing) or negative (*i.e.*, leakage enhancing). Simply put, the application of a 10 percent discount does not increase the incentive to abate, but it does enhance the risk of leakage in highly exposed industries.

Fourth, CARB's staff report provides no reasoned justification for why staff believes that 10 percent, in particular, is an appropriate level or even necessary.[65] It provides no insights into CARB's considerations when selecting the 10 percent value and presents no analysis demonstrating how it was calculated — suggesting that the number is unsupported and completely arbitrary.

Fifth, the application of the 10 percent discount from day one of the program is inconsistent with CARB's repeated statements that the allocation of allowances is intended to provide a transitional adjustment for leakage exposed industries.[66] By using an arbitrary number and applying it equally to all industries regardless of leakage exposure, CARB is guaranteeing that highly vulnerable industrial sectors, in particular cement, will immediately be subject to compliance costs, without any corresponding measure to ensure that the cost burden is shared by imports and without any analysis to show that such an immediate shock will not cause irreversible damage from the outset of the program. Rather than adopting a precautionary approach, CARB simply assumes that leakage will not occur, without any basis for its assumption.

ii) CARB's failure to include indirect emissions in the benchmark is likely to significantly increase the risk of leakage

Another critical decision in the construction of an industry benchmark is the scope of emissions included in the numerator — in particular, the decision to include or exclude indirect emissions. As recognized by CARB in the staff report, the risk of emissions leakage is a function of the net increase in total policy-

[64] Economic & Allocation Advisory Committee (March 2010). "Allocating Emissions Allowances Under a California Cap-and-Trade Program: Recommendations to the California Air Resources Board and California Environmental Protection Agency from the Economic and Allocation Advisory Committee" at 14.

[65] *See* CARB Appendix J: Allowance Allocation, at J-35.

[66] *See* CARB Initial Statement of Reasons at II-24, II-26, II-27, II-29; CARB Appendix J: Allowance Allocation, at J-18, J-19, and J-24.

related costs, including the costs associated with direct and indirect emissions.[67] The impacts associated with a unit increase in indirect costs, including those from electricity, are indistinguishable from a unit increase in direct costs — both increase leakage. Increases in electricity prices, in particular, are of paramount concern for many energy-intensive firms, including the cement industry. Indeed, it is estimated that electricity prices represent 10 percent of total costs and 20 percent of variable costs for California cement facilities.[68] Failure to offset these costs through policy design will result in increased leakage in cement and other industries.

Despite these concerns, CARB proposes to exclude indirect emissions from the benchmark. Rather, CARB envisions that leakage associated with indirect electricity emissions will be "reduced through compensation from distribution utilities that are given allowance value for the purpose of ratepayer protection."[69] In providing allowances to local distribution companies ("LDCs"), however, CARB imposes no requirements on the use of the associated value beyond the vague guidance that it be used "for the benefit of retail ratepayers."[70] From the perspective of leakage-exposed industries, this approach is flawed on a variety of levels, is not adequately explained, and (in any event) does not comply with the statutory requirements:

(1) There is significant uncertainty regarding if and to what extent exposed industries will receive allowance value from LDCs to help offset the costs associated with indirect emissions. This uncertainty increases the risk of leakage, especially in those industries in which electricity costs constitute a significant share of variable costs.

(2) Even if LDCs distribute allowance value to leakage-exposed industries, the efficient minimization of leakage and use of allowance value would require that this correspond to an industry's assessed leakage risk — that is, more exposed sectors receive greater levels of assistance than less exposed sectors. Given that its allowance allocation program for direct emissions requires it to perform precisely such a function, CARB seems much better positioned to effectively and efficiently distribute the allowance value associated with indirect emissions according to each industry's specific leakage risk.

(3) CARB's approach of allocating allowance value to LDCs is typically justified under the notion that it reduces administrative burden by avoiding the need to directly distribute allowance value to millions of individual residential and commercial consumers, who are not otherwise regulated as covered entities. However, such reasoning fails to hold in the case of industrial consumers, who are directly regulated under the cap-and-trade program.

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[67] This is directly recognized in CARB Appendix J: Allowance Allocation, at Figure J-5 and indirectly recognized by the inclusion of indirect emissions when assessing each industry's leakage risk.

[68] *See* Coito *et al.*, "Case Study of the California Cement Industry" (2005) at 7, available at: http://www.escholarship.org/uc/item/96f9m6qf?display=all#page-1 (link last visited December 5, 2010).

[69] *See* CARB Appendix J: Allowance Allocation, at J-32.

[70] *See* CARB Initial Statement of Reasons at II-28.

The Waxman-Markey bill provides a model for overcoming these challenges and effectively addressing the leakage impacts associated with indirect emissions. Similar to CARB's Proposed Regulation, Waxman-Markey allocates allowances to the electric power sector and imposes few restrictions on specifically how that allowance value must be deployed. Similar to CARB's Proposed Regulation, Waxman-Markey directly allocates allowances to leakage-exposed industries in the industrial sector for the purpose of leakage prevention according to an updating output-based benchmarking framework. Unlike CARB's Proposed Regulation, however, Waxman-Markey allocates allowances to leakage-exposed industries in the industrial sector to offset the costs associated with both their direct and indirect emissions.

Specifically, Waxman-Markey calculates allowance allocation as the sum of two components:

(1) Direct Carbon Factor: The direct carbon factor is conceptually similar to CARB's approach in the Proposed Regulation — that is, the product of a facility-specific output metric and an industry-specific per unit rate of allocation. CARB expands on this concept in several respects, including reductions in the per unit rate of allocation via an industry-specific "assistance factor" and a uniform "cap adjustment factor".

(2) Indirect Carbon Factor: The indirect carbon factor, which currently does not have a conceptual counterpart in CARB's Proposed Regulation, is calculated as the product of a facility's annual output (*e.g.*, ton of cement) by its "electricity emissions intensity factor" (*e.g.*, CO_2-e per kWh) and an industry-specific "electricity efficiency factor" (kWh per ton of cement). The result is similar to an updating output-based benchmarking system, both of which provide a reasonable basis for allocating allowances in a manner that preserves appropriate incentives to abate.

Recognizing the potential for "double compensation" with respect to indirect emissions, Waxman-Markey directs the Administrator to adjust a facility's indirect carbon factor to avoid compensating it for costs that were not incurred because allowances were used upstream to its benefit. This adjustment could be performed by modifying a facility's "electricity emissions intensity factor" to reflect the GHG-related costs that it incurred per the ratemaking process. CARB could perform precisely such a function by requiring data from electric power distributors on the GHG intensity of electricity supplied and the distribution of GHG costs across ratepayer classes. Such data could be provided by electric power distributors in an annual report as a requirement of receiving allowance allocations. Through this approach, CARB would avoid actively inserting itself into the ratemaking process while also ensuring that each industry is treated in a manner consistent with both its realized indirect emissions costs and assessed leakage risk.

iii) CARB unlawfully delegates its duty to minimize the leakage associated with indirect emissions to another state agency

CARB’s delegation of the responsibility for regulating indirect emissions costs in leakage-exposed sectors to the California Public Utilities Commission (“PUC”) is unlawful because CARB has essentially abdicated its responsibility under AB 32 to minimize leakage in adopting regulations to reduce GHG emissions. AB

32 directs *CARB*, not PUC, to "adopt greenhouse gas emission limits and emission reduction measures by regulation to achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions."[71] AB 32 further provides that in adopting those regulations, CARB must "to the extent feasible … minimize leakage" and consider many other factors.[72] In contravention of that command, CARB has delegated its responsibility under AB 32 to minimize leakage to PUC, and it has done so without providing PUC with any direction as to how to achieve AB 32's command.

California courts have routinely held that state agencies may not delegate decision-making authority that has been specifically tasked to a particular agency. "When the Legislature has made clear its intent that one public body or official is to exercise a specified discretionary power, the power is in the nature of a public trust and may not be exercised by others in the absence of statutory authorization."[73] California courts "honor the important principle that the administrative body charged with responsibility for a particular determination must *itself* examine and ultimately decide the question."[74] This rule makes sense. It promotes transparency and democratic accountability when an agency is tasked with making important decisions that have far-reaching economic and environmental consequences. Moreover, legislatures delegate decision-making authority to agencies possessing often highly-technical expertise in the subject matter being regulated. Re-delegation of that authority to another agency or third party defeats the legislature's purpose of invoking the original agency's specialized expertise in making difficult policy determinations.[75]

The California delegation doctrine is consistent with principles recognized and applied by federal courts.[76] For example, it is well-established that a federal agency may not delegate its statutory responsibility to consider the environmental effects of its actions under the National Environmental Policy Act ("NEPA") to another agency or other third party.[77] Such a delegation is impermissible because Congress "did not establish environmental protection as an exclusive goal" in enacting NEPA.[78] Instead,

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[71] HSC § 38562(a).

[72] HSC § 38562(b)(2), (8).

[73] *Coleman v. San Francisco*, No. CPF-08-508129, 2009 WL 3070871, at *4 (Cal. App. 1st Dist. 2009) (collecting cases).

[74] *Voices of Wetlands v. California State Water Resources Control Bd*., 69 Cal. Rptr. 3d 487, 525 (Cal. Ct. App. 2007) (emphasis added).

[75] *See San Francisco Fire Fighters Local 798 v. San Francisco*, 133 P.3d 1028, 1034 (Cal. 2006) (recognizing that judicial review of agency decisions is limited due, in part, to the legislative delegation of authority to the agency and the "expertise of the agency within its scope of authority"); *Schwartz v. Poizner*, 113 Cal. Rptr. 3d 610, 616 (Cal. Ct. App. 2010) (same); *Divers' Envtl. Conservation Org. v. State Water Res. Control Bd.*, 51 Cal.Rptr.3d 497, 501 (Cal. Ct. App. 2006) (same).

[76] *See Vineyard Area Citizens For Responsible Growth, Inc. v. Rancho Cordova*, 150 P.3d 709, 717 (Cal. 2007) (holding, consistent with federal law, that agency action must be supported by substantial evidence).

[77] *See e.g., Gerber v. Norton*, 294 F.3d 173, 185-86 (D.C. Cir. 2002); *Idaho v. I.C.C.*, 35 F.3d 585, 595-96, (D.C. Cir. 1994); *Calvert Cliffs' Coordinating Comm., Inc. v. U. S. Atomic Energy Comm'n*, 449 F.2d 1109, 1122-23 (D.C. Cir. 1971); *Anacostia Watershed Soc. v. Babbitt*, 871 F. Supp. 475, 483-84 (D.D.C. 1994).

[78] *Calvert Cliffs'*, 449 F.2d at 1112.

"it desired a reordering of priorities, so that environmental costs and benefits will assume their proper place along with other considerations" and will be *weighed by the agency taking the action* against the important objectives of the action in question.[79]

The same is true of AB 32, which purports to "achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions" but also requires CARB, "to the extent feasible," to minimize leakage and to consider myriad other factors in adopting regulations.[80] Similarly, NEPA requires the agency to assess "the particular economic and technical benefits of planned action" and then to weigh those benefits "against the environmental costs," considering "alternatives … that would affect the balance of values."[81] "The point" of this analysis "is to ensure that, with possible alterations, the optimally beneficial action is finally taken."[82]

The responsibility to conduct this balancing analysis, under NEPA or AB 32, cannot be delegated to another agency or third party.[83] "Such agencies, without overall responsibility for the particular … action in question" will not, and indeed cannot, properly balance all of the factors that the statute, be it NEPA or AB 32, mandates be considered.[84] Instead, "[t]he only agency in a position to make such a judgment is the agency with overall responsibility for the proposed … action — the agency to which NEPA [or AB32] is specifically directed."[85]

Moreover, even if a delegation of authority were permitted, CARB has not acted consistently with its statutory obligations because it has failed to provide any direction or guidance to PUC on how to exercise the authority that CARB has attempted to delegate. CARB has thus not provided any assurances that the statutory requirements will be properly and successfully implemented. The PUC does not have CARB's regulatory expertise and cannot be expected to devise an emissions program to minimize leakage. CARB's delegation of authority is thus an abdication of responsibility and a failure to comply with the statutory command.

iv) CARB uses a data sample for establishing benchmarks that does not fully recognize historic investments in GHG efficiency or fully reward early action

Another critical issue in the construction of a benchmark is the choice of the data sample, including both the timeframe and the geographic scope. In establishing the benchmark for the California cement

79 *Id.*

80 HSC § 38562(b).

81 *Calvert Cliffs' Coordinating Comm., Inc.*, 449 F.2d at 1123.

82 *Id.*

83 *See Gerber v. Norton*, 294 F.3d at 185-86 ("When a statute requires an agency to make a finding as a prerequisite to action it must do so.").

84 *Calvert Cliffs'*, 449 F.2d at 1123.

85 *Id.*

industry, CARB proposes to use California data from the 2009 Mandatory Reporting Rule (“MRR”).[86] CSCME strongly disagrees with this approach for several reasons.

First, by using California data, the benchmark will not fully recognize historic investments that California cement manufacturers have made in GHG efficiency relative to their out-of-state competitors. Indeed, the use of state data could effectively penalize the domestic cement industry if, as currently planned, California links its cap-and-trade program with other members of the Western Climate Initiative ("WCI") and such members fail to adopt California's benchmark when allocating allowances to their cement industries.

Second, by using 2009 data, the benchmark will not fully reward early action that the California cement industry has taken since the adoption of AB 32. CSCME strongly disagrees with CARB's characterization that early action entails reductions in GHG emission <u>relative to one's peers</u>.[87] On the contrary, early action is a well established public policy principle intended to encourage reductions in GHG emissions after the adoption of legislation and prior to its implementation, irrespective of actions taken by others during this timeframe. Although CARB's output-based benchmarking approach rewards those who have taken early actions *relative to their peers*, it fails to reward those who have taken early actions that were *matched by their peers* — that is, it effectively penalizes those who happen to operate within an industry that collectively pursued early actions. To correct for this bias, CARB should, whenever possible, strive to establish benchmarks using data that pre-dates the adoption of AB 32.

CSCME has provided CARB with comprehensive, complete, and high quality GHG emissions data for the national cement industry in 2006, which were collected by the Portland Cement Association based on the World Business Council for Sustainable Development protocols. CARB has demonstrated confidence in this data source by relying on it to construct its historical emissions inventory.

C. The Assistance Factor

The assistance factor in the allocation formula is informed by CARB's assessment of each industry's leakage risk. In performing this assessment, CARB evaluates each industry's GHG intensity and trade exposure, with the combination of these two factors determining an industry's designation as being at a "high", "medium", or "low" risk of leakage.[88] Based on this assessment, CARB assigns each industry an assistance factor that corresponds to its leakage risk.

[86] CARB Appendix J: Allowance Allocation, at J-35.

[87] In its staff report, CARB states that "the need to recognize early actors who have already reduced GHG emission levels <u>relative to their peers</u> (emphasis added) has been clearly articulated by California decision-makers." In support of its statement, CARB cites both AB 32 and a letter from Governor Arnold Schwarzenegger — neither of which suggest that early action is a relative concept. *See* Appendix J: Allowance Allocation, at J-29 and J-30, Footnote 31.

[88] *See* CARB Appendix K: Leakage Analysis, at K-15.

CSCME strongly supports the concept of differentiated assistance that is based on an objective assessment of each industry's leakage risk. Indeed, we believe that effectively minimizing leakage requires that this concept be extended beyond the assistance factor and applied throughout the allowance allocation formula.[89]

CSCME also agrees with CARB's assessment that the cement industry is at a high risk of leakage and that an assistance factor of 1.0 throughout the 2012-2020 timeframe is appropriate and necessary.[90] Nevertheless, CARB's leakage analysis can be improved in several respects to yield a more accurate and robust assessment of each industry's leakage risk. Finally, we believe that such refinements will bring the cement industry's extreme leakage exposure into better focus and highlight the need to consider this extreme exposure in all aspects of the allowance allocation formula.

i) CARB's approach to classifying industries based on relative GHG intensity lacks an appropriate measure of proportionality and scale

The point-of-departure for CARB's leakage assessment is to identify and classify each industry's GHG emissions intensity. As noted by CARB, emissions intensity serves as a proxy for compliance costs — that is, sectors with higher emissions intensities are likely to face higher compliance costs under the cap-and-trade program.[91] As also noted by CARB, leakage risk is likely to be continuously increasing in emissions intensity.[92] Due to "the excess administrative burden and technical difficulties," however, CARB asserts that allowances could not be distributed as a continuous function of emissions intensity.[93] Although CARB fails to identify the precise nature of the "excess administrative burden" and "technical difficulties," it concludes that it is generally more convenient to establish discrete categories along the emissions intensity continuum.

The accuracy and usefulness of establishing discrete categories depends critically on the selection of "thresholds" that define where one classification ends and another begins. In performing this task, CARB relies solely on the identification of "natural break points" in emissions intensities.[94] This is a useful step in the process of establishing thresholds, as it ensures that the difference between industries on either side of the threshold is sufficiently large to warrant differentiated treatment. It is equally important, however, that the difference is not so large that the resulting classification grossly distorts the relative circumstances of the two industries. Indeed, an usually large difference between two

[89] *See* CSCME letter to Susan Kennedy, October 20, 2010, at 2 ("As we discussed at the meeting, it is also important to realize that any uniform adjustment across all industries has a disproportionately higher impact on compliance costs for those industries with high emission intensities, effectively diluting the level of leakage protection."). Attached at **Exhibit 23**.

[90] *See* CARB Appendix A: Proposed Regulation Order, at Table 8-1, p.A-76.

[91] CARB Appendix K: Leakage Analysis, at K-14.

[92] *Id.*

[93] *Id.*

[94] *Id.* at K-15.

industries might indicate that more than one break point is warranted or, stated differently, one or more (unpopulated) categories should be inserted between them to maintain a sense of proportionality.

CARB's practice of relying solely on natural break points to establish GHG intensity thresholds presents precisely such a problem. Specifically, CARB concludes that there is a natural break point between the GHG intensities of "Cement Manufacturing" (13,744 tons of CO_2-e per million dollars of value added) and "Iron & Steel Mills" (4,148 tons of CO2-e per million dollars of value added).[95] However, the difference in the GHG intensities of these two industries alone is 9,596 tons of CO_2-e per million dollars of value added. To put this into perspective, consider that this difference is more than twice as large as the entire range that defines the "medium" category (1,000-4,999 tons of CO_2-e per million dollars of value added) and more than ten times larger than the range that defines the "low" category (100-999 tons of CO2-e per million dollars of value added).

As with any "data mining" exercise, the results produced from CARB's use of natural break points must be subjected to tests of reasonableness and consistency with the fundamental purpose of the exercise (*i.e.*, accurately approximating the continuum of GHG intensities by defining a discrete set of categories). CARB's current classification system suggests that it did not subject its results to such scrutiny and indicates that CARB should insert at least one additional GHG intensity classification between the cement industry and the next most emissions-intensive industry, with the associated leakage assistance differentiated accordingly.[96]

Ultimately, such an adjustment would add a sense of proportionality to CARB's current classification system while preserving its use of natural break points. This would, in turn, enhance the accuracy of the classification system and enable CARB to better identify those industries that have a disproportionately higher exposure to GHG costs and, consequently, may require a more diligent, precautionary, and tailored approach to leakage minimization.

ii) CARB substantially underestimates the trade intensity of the California cement industry and, by extension, misclassifies it as "moderately" trade exposed

In assessing the risk of leakage, CARB analyzes, in addition to GHG intensity, the extent to which industrial sectors could pass through compliance costs based on the level of trade exposure (or intensity) for each industry.[97] According to CARB's analysis, the trade intensity of the national cement industry, as measured by the volume of trade as a share of domestic consumption, is 16 percent — placing it within

[95] *Id.*

[96] *See* CSCME letter to Secretary Linda Adams and Chairman Mary Nichols, September 2, 2010, at 3 (discussing CSCME proposal to add an additional category of “extraordinary GHG intensity” for industries exceeding a threshold of 9,000 tons of CO_2e per million dollars of value added). Attached at **Exhibit 22**.

[97] CARB Appendix K: Leakage Analysis, at K-16 to K-28.

CARB's "medium" trade intensity category.[98] This national trade intensity, however, severely underestimates the degree of import competition in California.[99]

As a general matter, one might logically expect the California cement industry to be far more trade exposed than the national cement industry.[100] Due to its low value to weight ratio, cement is rarely shipped significant distances by truck or rail, which substantially reduces the geographic scope and trade exposure for inland markets.[101] Cement, however, is relatively cheap to transport by water, which substantially expands the geographic scope and trade exposure of coastal markets, such as California.[102] This effect is amplified by the fact that California's location on the Pacific Ocean exposes it to imports from China, which produces more than 50 percent of the world's cement, is the world's largest cement exporter,[103] and has excess capacity of approximately 600 million tons (or 160 times the peak imports of cement from China in 2006).[104]

As demonstrated in **Appendix E**, which uses industry-specific data to adjust for deficiencies in CARB's methodology, the California cement industry's average trade intensity (41 percent) is estimated to be almost twice as high as the U.S. cement industry's trade intensity (23 percent) when measured on an "apples-to-apples" basis. Specifically, the California cement industry's trade intensity during 2003-2008 is estimated to be approximately 41 percent — more than twice as high as CARB's assessment of its trade intensity (16 percent) and well beyond CARB's "high" threshold (19 percent). Although the uniqueness of the data may preclude CARB from performing a similar analysis on all other industries, CARB cannot ignore this clear and convincing evidence when assessing the cement industry's trade exposure, especially given the acknowledged limitations of its current approach.

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[98] CARB Appendix K: Leakage Analysis, at K-28.

[99] *See* CSCME letter to Chairman Mary Nichols, May 11, 2009, at 5 (stating that imports accounted for over 40% of California's cement consumption during 2006), attached at **Exhibit 12**; CSCME letter to Economic and Allocation Advisory Committee Chairman Larry Goulder, December 14, 2009, at 2 (same), attached at **Exhibit 14**.

[100] Although this is likely to be true for many California sectors, this bias is particularly pronounced in the cement industry.

[101] *See* **Appendix B**, at 8-9 (discussing the ITC's findings that the California market is a distinct, regional market that is isolated from the rest of the U.S. market and that California cement producers compete almost exclusively with imports).

[102] *See* CSCME letter to Chairman Mary Nichols, June 7, 2010, at 3 ("Maritime transportation of cement is significantly less expensive than overland transportation. Therefore, cement produced in Asia can reach the California market at a relatively low cost."). Attached at **Exhibit 20**.

[103] *See* CSCME report, "Minimizing 'Leakage' Under Climate Change Proposals Affecting The California Cement Industry," October 23, 2007, at 14 and Exhibit 4 (stating that China accounts for over half of California's cement imports). Attached at **Exhibit 1**.

[104] *See* **Appendix B**, at 12.

iii) CARB ignores critical qualitative evidence in determining the trade exposure of the California cement industry, including nearly two decades of antidumping rulings

CSCME supports the use of trade exposure metrics in evaluating cost pass-through ability.[105] As CARB has noted, trade exposure is an imperfect indicator of cost pass-through ability. Nonetheless, its flaws are only exceeded by the practical limitations and technical challenges associated with all other potential metrics. Accordingly, to satisfy the requirements of AB 32, it is important that trade exposure data be supplemented with credible and compelling qualitative evidence where appropriate.[106]

Consistent with this principle, we note that the California cement industry's extreme vulnerability to imports is evidenced by nearly two decades of antidumping rulings by the ITC.[107] In support of these rulings, economists at the ITC analyze public and confidential firm-level data on price, market share, and profit — precisely the information that CARB would need to make a complete and accurate assessment of cost pass through ability. Again, it would be unreasonable for CARB to ignore this evidence in its assessment of the cement industry's trade exposure, especially given the known limitations of its current approach.

As explained in detail in the attached **Appendix B**, the ITC has pointed to several conditions that contribute to the particular vulnerability of the California cement industry to injury by imports. Specifically, it found that:

- The cement industry is "highly capital intensive,"[108]
- High fixed costs in the cement industry "provide significant incentive to the Japanese producers to sell their additional excess product even at low costs in order to meet their fixed costs,"[109]
- Cement imports benefit from the fact that cement is "a fungible product, with domestically produced product and imported product being readily interchangeable"[110] and, as a result, "price is an important factor in purchasing decision."[111]

[105] *See* CSCME letter to Chairman Mary Nichols, June 7, 2010, at 6. Attached at **Exhibit 20**.

[106] *See* CARB Appendix K: Leakage Analysis, at K-17 ("However, since the trade share metric is not an ideal tool, ARB staff has attempted to identify the issues that arise from relying only on trade share, so that future analyses may address these shortcomings.") and ("The Paper emphasizes the importance of supplemental qualitative analyses when trade share is used due to the uncertain indication of cost pass-through ability").

[107] *See* **Appendix B.** This significant history of ITC rulings establishes that the fear of leakage negatively impacting California cement producers is not hypothetical. The ITC has found that California cement producers were injured by imports, and that there are numerous deep water cement import terminals in place that could easily allow imported cement to displace California cement. *Id.* at 4-5, 8-9.

[108] *See* **Appendix B** at 5 (quoting *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Review), USITC Pub. 3856 (May 2006)).

[109] *See* **Appendix B** at 6 (quoting *Gray Portland Cement and Cement Clinker from Japan, Mexico, and Venezuela*, Inv. Nos. 303-TA-21 (Review) and 731-TA-451, 461, and 519 (Review), USITC Pub. 3361 (October 2000)).

- As a result of the relatively low value-to-weight ratio of cement and the limitation this places on shipments over land, "the market for cement tends to be regional in nature."[112]
- The California cement industry's significant vulnerability to imports results from the fact that if "the import market share is significant, this substitution effect tends to lower domestic prices as domestic producers reduce their own prices to meet import competition, in an effort to maintain sales volume and market share."[113]

Furthermore, it is important to recognize that, as a direct consequence of the above mentioned ITC rulings, substantial import duties were imposed on several major trading partners, including Mexico and Japan. As a result, historical trade exposure data on the national, regional, and state levels are likely to understate the true vulnerability of the California cement industry going forward.

Finally, it is important to acknowledge that, regardless of an industry's existing trade exposure, the imposition of carbon prices has the potential to fundamentally restructure international trading patterns. This is particularly true for emissions-intensive industries, such as cement, where total carbon costs exposure under reasonable allowance price assumptions could very easily be upwards of 40 percent of value added.

iv) Given the weight of both quantitative and qualitative evidence, CARB should reclassify the California cement industry as "highly trade exposed"

In summary, the weight of both quantitative and qualitative evidence conclusively demonstrates that the California cement industry has a high trade exposure, faces a high degree of competition from unregulated entities, and has extremely limited cost pass-through ability.[114] Accordingly, CSCME recommends that CARB incorporate this evidence into its determination of the cement industry's trade exposure and place it within the "highly" trade exposure category. Although CARB has already designated the cement industry as "highly" leakage exposed, such a designation does not account for the fact that the cement industry's leakage risk is far beyond that of any other California industry's assessed risk. In short, the combination of high trade intensity and high GHG intensity creates an

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[110] *See* **Appendix B** at 6 (quoting *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Review), USITC Pub. 3856 (May 2006)).

[111] *See* **Appendix B** at 8 (quoting *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Review), USITC Pub. 3856 (May 2006)).

[112] *See* **Appendix B** at 9 (quoting *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Review), USITC Pub. 3856 (May 2006)).

[113] *See* **Appendix B** at 11 (quoting *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Final) USITC Pub. 2376 (April 1991)).

[114] *See* CSCME report, "Building A Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry," June 18, 2008, at 25 (stating that the California cement industry has relatively few cost-effective abatement opportunities and a high potential for carbon leakage). Attached at **Exhibit 3**.

extremely high risk of leakage for the California cement industry and justifies additional measures to minimize leakage in implementing AB 32.

D. The Cap Adjustment Factor

The cap adjustment factor is designed to reduce the per-unit allowance allocation rate to industrial sources in concert with the overall decline in the cap. Specifically, CARB has proposed a cap adjustment factor that declines in equal increments from 1.0 in 2012 to 0.85 in 2020. With respect to the cement industry, however, CARB has also proposed a differentiated cap adjustment factor due to the presence of significant process emissions that cannot be directly reduced or abated. The differentiated cap adjustment factor for the cement industry declines in equal increments from 1.0 in 2012 to 0.925 in 2020.

i) The concept of a cap adjustment factor is fundamentally incompatible with CARB's mandate to minimize leakage to the extent feasible

As stated in previous comment letters,[115] the concept of a cap adjustment factor is fundamentally incompatible with CARB's mandate to minimize leakage to the extent feasible. By reducing the per-unit allowance allocation rate for all industries, regardless of their assessed leakage risk, the cap adjustment factor unnecessarily and arbitrarily exposes industrial sources to net compliance costs that will not be faced by unregulated competitors. In public workshops and other venues, CARB has expressed the view that the cap adjustment factor represents the "equity" portion of the allocation formula. Although a uniform cap adjustment factor undoubtedly treats all industries equally, it fails to treat them equitably or appropriately given AB 32's mandate by virtue of not reflecting their assessed leakage risk or ability to pursue cost-effective abatement opportunities.[116] It is exceedingly difficult to envision how this approach is compatible with the objective of minimizing leakage.

ii) In the event that CARB does not eliminate the cap adjustment factor, a differentiated cap adjustment factor for the cement industry is justified

Alternatively, if CARB does not eliminate the cap adjustment factor from the allowance allocation framework, CSCME strongly supports the modified cap adjustment factor for the cement industry. As previously mentioned, approximately 59 percent of the California cement industry's direct GHG emissions are process emissions, which are technically infeasible to directly reduce in the absence of carbon capture and sequestration technology.[117] The cement industry would need to decrease fuel-

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[115] *See, e.g.,* CSCME letter to Chairman Mary Nichols, June 7, 2010, at 9, attached at **Exhibit 20**; CSCME letter to Secretary Linda Adams and Chairman Mary Nichols, September 2, 2010, at 6-7, attached at **Exhibit 22**.

[116] *See* CSCME letter to Secretary Linda Adams and Chairman Mary Nichols, September 2, 2010, at 6 ("By not reflecting each industry's assessed leakage risk, the concept of a uniform CAF is incompatible with the stated policy objective and statutory requirement to minimize leakage to the extent feasible."). Attached at **Exhibit 22**.

[117] *See* CSCME letter to Susan Kennedy, October 20, 2010, at 2. Attached at **Exhibit 23**.

related emissions at more than twice the rate of virtually all other industries in order to "keep pace" with a uniform cap adjustment factor, avoid substantial carbon costs, and reduce the risk of leakage.

CARB has appropriately and justifiably modified the cap adjustment factor for the cement industry to reflect the fact that process emissions limit the scope of its technologically-feasible and cost-effective abatement opportunities. As a technical matter, however, CARB's proposed cap adjustment factor does not reflect this limited scope as precisely as it might. Rather than simply reducing the decline by half, CARB should calculate the cap adjustment factor as a weighted average between process emissions and combustion emissions, with the former receiving a factor of 1.0 and the latter receiving a factor equal to the general cap adjustment for that year. With this small revision, the cement industry's cap adjustment factor values would more precisely conform to the underlying policy rationale.

E. The Cumulative Impact Of Factors

Ultimately, the extent to which CARB's proposed approach minimizes leakage will depend on the cumulative impact of the four components discussed above. CARB's proposed approach virtually guarantees that every industry, regardless of its leakage exposure, will immediately be placed at a competitive disadvantage, with the magnitude corresponding to at least 10 percent of its GHG compliance obligations. This cost disadvantage could, however, be substantially larger depending on the extent to which indirect emissions costs are reduced through compensation from distribution utilities — a policy mechanism that remains largely undefined in the proposed regulation.

For the cement industry, the proposed regulation could result in an immediate competitive disadvantage to imports equal to as much as 16 percent of its GHG compliance obligations. CSCME is confident that such a disadvantage would result in the immediate displacement of domestic production by imported product from unregulated competitors — resulting in a net increase in global GHG emissions. Ultimately, such compliance costs will result in a shift of consumption to imported cement, which faces no AB 32 emissions reduction costs and is more emissions-intensive than California-produced cement.[118] The consequence will be a textbook policy failure marked by an increase in global GHG emissions, the decimation of the California cement industry, and the decline of the local communities that depend on it as a source of jobs and income.[119]

The fact that CARB's proposed approach will impose costs on California cement producers that will not be faced by importers is beyond question. To the extent that CARB believes that this approach is consistent with the mandate to minimize leakage, it is logical to presume that staff believes that such costs are insufficient to induce leakage. As demonstrated in **Appendix F**, however, CARB's economic

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[118] *See* CSCME letter to Susan Kennedy, October 20, 2010, at 1 ("[A] ton of cement produced in California will always be cleaner than a ton of cement shipped to California from outside of the United States."). Attached at **Exhibit 23**.

[119] *See* CSCME report, "Building A Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry," June 18, 2008, at 3-4 (stating that cement production and related industries employed more than 100,000 California workers in 2008). Attached at **Exhibit 3**.

analysis does not evaluate the leakage impacts of AB 32 in any manner — a glaring omission that has been criticized by several policy experts and economists, including those on the Economic & Allocation Advisory Committee ("EAAC").[120] In the absence of such analysis, CARB cannot confidently or convincingly state that its proposed approach is consistent with its mandate to minimize leakage to the extent feasible.[121]

VI. OTHER ISSUES

A. Monitoring Leakage

As stated in various comments to CARB, CARB's cap-and-trade program should cover imported cement as of January 1, 2012 in order to minimize leakage and ensure that climate change objectives of AB 32 are not undermined. At this point, it is unclear whether CARB will move forward with extending obligations under AB 32 to imported cement.

In its Statement of Reasons, CARB states that it will monitor the leakage situation and will "examine" mechanisms such as a border adjustment or changes to the allowance distribution system should it find that leakage is occurring.[122] CARB, however, does not detail how it will conduct such monitoring. In addition, CARB does not incorporate any placeholder for such a program into the regulation itself.

CSCME urges CARB to direct staff to develop a specific provision in the text of the Proposed Regulation or in a related rulemaking that develops an effective monitoring mechanism with specific triggers for the adjustment of the current approach to minimizing leakage in the event initial indicators show that leakage is occurring. It is critical that any monitoring mechanism provide for immediate intervention to respond to indications that leakage is occurring. For a capital intensive industry like cement, any delay in adjusting the program to address leakage will cause irreversible damage that cannot be remedied with a border adjustment or other measure imposed "after-the-fact" when market share has been seriously eroded and recovery is no longer feasible.

CSCME will continue to work with CARB on the development of an appropriate border adjustment and, in any event, urges CARB to work cooperatively with industry to develop a monitoring mechanism that can be incorporated into the regulations or other appropriate instrument.

B. Due Process

CSCME objects to the prejudicial manner in which CARB both established the comment period for the Proposed Regulation and scheduled the concomitant CARB meeting for its adoption. CARB stated that

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[120] *See* CARB Appendix N: Leakage Analysis.

[121] *See* CSCME letter to Chairman Mary Nichols, October 20, 2010, at 2 ("The 10% discount factor is arbitrary and bears no relation to the cement industry's assessed leakage risk or its constraints (e.g., the presence of substantial and irreducible process emissions) in attaining such a target through technologically-feasible and cost-effective abatement options). Attached at **Exhibit 24**.

[122] CARB Initial Statement of Reasons at II-58.

comments will be accepted through December 15 at noon, and that the public hearing to consider adoption of the Proposed Regulation will begin less than 24 hours later, at 9:00 a.m. on December 16. It is well-settled that "[o]ne purpose of the [Administrative Procedure Act] is to ensure that those persons or entities whom a regulation will affect have a voice in its creation."[123] The schedule CARB set forth virtually ensures that neither CARB members nor staff will have the opportunity to review all submitted comments prior to the hearing. Based upon the volume and complexity of the Proposed Regulation and supporting documentation, CARB's approach violates fundamental due process principles and is inconsistent with the California Administrative Procedure Act ("APA").

The APA requires a state agency to publish the date "by which comments submitted in writing must be received . . . in order for them to be considered by the state agency before it adopts amends, or repeals a regulation."[124] To the extent CARB members and staff will not be able to consider all comments prior to the December 16 meeting, CARB's promulgation of its Proposed Regulation would not be in substantial compliance with the APA and thus would have no legal effect.[125] Again, it is worth noting that the schedule CARB has laid out allows fewer than 24 hours for consideration of comments that are filed on its December 15 deadline. In *State Water Resources Control Board v. Office of Administrative* Law, a California Court of Appeal found that 15 days, although a short period of time to consider comments from interested parties, was not so short as to render the task impossible.[126] In contrast, it is impossible for CARB to give adequate consideration in one afternoon to comments on a proposed regulation that will affect virtually every sector of the California economy.

VII. CSCME RECOMMENDS THE FOLLOWING FEASIBLE MODIFICATIONS THAT WILL REDUCE LEAKAGE BEYOND LEVELS ACHIEVED BY THE PROPOSED REGULATION

- Recommendation #1: Implement An Incremental Border Adjustment That Imposes Obligations On Imported Cement That Are Comparable To Those Placed On Domestic Manufacturers

- Recommendation #2: Revise The Output Factor So That Allowance Allocations And Compliance Obligations Are Based On The Same Level Of Output

- Recommendation #3: Establish Benchmarks Based Solely On The Average GHG Intensity Of Each Industry Or Product

- Recommendation #4: Allocate Allowances Directly To Leakage-Exposed Industries To Offset The Costs Associated With Higher Electricity Prices

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[123] *Tidewater Marine Western, Inc. v. Bradshaw*, 927 P.2d 296, 303 (Cal. 1996); *see also Armistead v. State Pers. Bd.*, 583 P.2d 744, 747 (Cal. 1978).

[124] Gov't Code § 11346.5(a)(15).

[125] *Grier v. Kizer*, 268 Cal. Rptr. 244, 249 (Cal. Ct. App. 1990) (citing *Armistead* for the proposition that a regulation lacks legal effect unless it was enacted in substantial compliance with the APA).

[126] *State Water Res. Bd. v. Office of Admin. Law*, 16 Cal. Rptr. 2d 25, 30 (Cal. Ct. App. 1993).

- Recommendation #5: To The Extent Feasible, Establish Benchmarks Using Data That Pre-Date The Adoption Of AB 32.

- Recommendation #6: Eliminate The Cap Adjustment Factor For Those Industries Deemed To Be Highly Exposed To Leakage

VIII. CONCLUSION

AB 32 directs CARB to design all GHG emissions-reduction measures, including a cap-and-trade program, in a manner that minimizes leakage to the extent feasible. The Legislature's requirement to minimize leakage is underpinned by the compelling rationale that GHGs are a global pollutant and, therefore, regulations that result in the displacement of GHG emissions, rather than their net reduction, will simply serve to undermine the primary policy objective (*i.e.*, reducing global concentrations of GHG emissions in the atmosphere).

The risk of leakage is particularly high in the California cement industry. This risk is not hypothetical — it is supported by a preponderance of both quantitative and qualitative evidence demonstrating that the cement industry has a unique combination of known risk factors, including an extraordinarily high GHG intensity, a lack of cost-effective abatement opportunities, significant competition from out-of-state competitors, and a substantially smaller GHG footprint relative to imports. This extreme risk requires, consistent with AB 32's statutory mandate, that the California cement industry receive a more diligent, precautionary, and tailored approach to minimizing leakage than that applied to other industries.

Despite its statutory requirement, the compelling public policy rationale that underpins it, and the clear threat of leakage in the California cement industry, CARB has a proposed a cap-and-trade program that fails to minimize leakage to the extent feasible, as summarized below:

- The proposed cap-and-trade program fails to minimize leakage, because it exposes facilities within vulnerable industries in general and the cement industry in particular to costs that are not imposed on out-of-state competitors.
- The proposed cap-and-trade program does not minimize leakage "to the extent feasible," because there are alternative policies that CARB is administratively, technically, and legally capable of implementing that will reduce the risk of leakage beyond the level achieved by the proposed approach.
- CARB has dismissed these alternative policies without justification.
- CARB has not revealed any analysis or otherwise substantiated its assertion that the proposed regulation minimizes leakage to the extent feasible.
- CARB has employed an inadequate process in several respects, including a lack of due process, an impermissible delegation of CARB's responsibility to minimize leakage from indirect emissions, and a failure to establish an effective mechanism for monitoring leakage.

No legitimate purpose can be served by placing the highly leakage exposed cement industry at a competitive disadvantage to unregulated imports. Accordingly, in light of these comments, CSCME encourages you to revise the Proposed Regulation both to meet the statutory requirement to minimize leakage and to avoid engaging California in the self-defeating exercise of merely displacing, rather than reducing, global GHG emissions while imperiling the state's cement industry and the local communities that rely on it as a source of jobs and income.

LIST OF APPENDICES

LIST OF EXHIBITS

1.	October 23, 2007	Minimizing "Leakage" Under Climate Change Proposals Affecting the California Cement Industry
2.	May 14, 2008	Comments on the Economic Modeling of AB 32
3.	June 18, 2008	Building a Sustainable Future: Economic Growth, Climate Change, & the California Cement Industry
4.	August 22, 2008	Technical Support Document: Fuel Switching from Coal to Natural Gas California Portland Cement Association
5.	September 8, 2008	Tradable Performance Standards: A Policy Framework for Effectively, Efficiently, & Equitably Regulating GHG Emissions in the California Cement Industry
6.	September 8, 2008	The Application of Anti-Leakage Measures in the California Cement Sector to Achieve AB 32's Climate Change Objectives
7.	September 8, 2008	The Role of Offsets in AB 32: The Cement Industry's Perspective
8.	December 10, 2008	California Cement Industry's Comments on the Proposed Scoping Plan
9.	February 6, 2009	Comments on the ARB Mandatory Reporting Regulations for Identifying Emissions as Biomass Emissions in Reports
10.	February 13, 2009	California Cement Industry's Comments on the AB 32 Administrative Fee Regulation
11.	August 10, 2009	Draft Language for California Cement Industry Tradable Performance Standard
12.	May 11, 2009	CSCME letter to Chairman Mary Nichols
13.	November 23, 2009	Reconciling TPS With Cap-and-Trade: An Inside-The-Cap Approach
14.	December 14, 2009	CSCME letter to Professor Larry Goulder and Members of the Economic Allocation Advisory Committee ("EAAC")
15.	December 15, 2009	CSCME follow-up comments via email on EAAC report
16.	January 9, 2010	California Cement Industry's Comments on the Economic and Allocation Advisory Committee's ("EAAC") January 2 and 7, 2010 Draft Reports
17.	January 11, 2010	CSCME letter to Chairman Mary Nichols
18.	February 16, 2010	Prospects for Expanding the Use of Supplementary Cementitious Materials in California
19.	May 25, 2010	Measures Under AB 32 To Prevent Leakage Are Consistent With The U.S. Constitution And WTO Obligations
20.	June 7, 2010	CSCME letter to Chairman Mary Nichols

21.	July 9, 2010	CSCME letter to Chairman Mary Nichols
22.	September 2, 2010	CSCME letter to Secretary Linda Adams and Chairman Mary Nichols
23.	October 20, 2010	CSCME letter to Susan Kennedy
24.	October 20, 2010	CSCME letter to Chairman Mary Nichols
25.	December 9, 2010	Application Of AB 32 To Imported Cement: Preventing Leakage And Facilitating Sectoral Cooperation

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LIST OF APPENDICES

Appendix A

KEYBRIDGE
RESEARCH

December 14, 2010

Memorandum for the Coalition for Sustainable Cement Manufacturing & Environment

From: Keybridge Research, Dr. Robert F. Wescott & Mark W. McNulty

Subject: Critique of CARB's Compliance Pathway Analysis

I. Introduction

As part of its efforts to implement a reasonable and effective cap on California emissions, CARB has attempted to project likely emissions reductions and abatement strategies for those industries regulated under AB 32. Ideally, these abatement projections would be based on dynamic macroeconomic modeling and detailed industry data, given that assumptions regarding industries' compliance pathways and achievable emissions reductions are used to justify the cap's level and its rate of decline throughout the policy period.

However, CARB's forecasts regarding feasible industrial abatement strategies and emissions reductions are not based on reasonable or verifiable assumptions. Instead, CARB relies on the simplistic assumption that output, among other industry characteristics, remains unchanged from 2006 levels over the next decade.

Even assuming that industry demand and output do in fact remain constant at 2006 levels through 2020, CARB's analysis makes other questionable assumptions regarding the cement industry's abatement potential. Specifically, its compliance pathway analysis concludes that 90% of the industry's emissions reductions will come from just two sources: increased alternative fuel use and higher blending rates of supplementary cementitious materials ("SCMs").[1] However, it is unlikely that these abatement strategies will provide the extensive emissions reductions CARB envisions, due to a variety of technological factors, consensus price estimates, and specific market characteristics that CARB's analysis has failed to take into account.

II. Abatement Strategy #1: Alternative Fuels

CARB's compliance pathway analysis suggests that alternative fuel use will play a major role in reducing cement industry emissions, based on projections that alternative fuels will present a feasible and affordable abatement opportunity. CARB estimates that increased alternative fuel use will cost $36 per ton of CO_2 avoided. It is unclear how CARB derives this estimate, in part because they do not identify their key assumptions but also because the $36 per ton estimate represents a combination of estimates of multiple fuel switching strategies. Some of these strategies have been shown to be far from cost-effective at reasonable carbon prices while others may be cost-effective even in the absence of carbon prices:

[1] CARB estimates that the majority of the remaining emissions reduction potential is achieved by replacing all remaining long dry kilns with PH/PC kilns. There is only one long dry kiln in California, which is currently not operating.

- An economy-wide study conducted by Stanford's Precourt Institute and a cement industry specific study conducted by ENVIRON place the costs of fuel switching from coal or pet coke to natural gas well above $100 per ton of CO_2 avoided.[2,3] CARB's estimate of the costs associated with this particular strategy is unclear. Of the three sources that it lists as the basis for its assumptions, one is not publicly available, while the remaining two do not discuss the costs of fuel switching to natural gas.

- On the other hand, fuel switching to biomass or waste tires may be cost-effective at reasonable carbon prices, but the viability of those strategies is highly dependent on the local availability of those fuels and on other environmental regulations. Climate regulation is likely to drive higher demand -- and thus higher prices -- for the already limited sources of biomass fuels. Additionally, the expanded use of other biofuels, such as sludge and waste tires, faces several non-market barriers, including environmental permitting processes that are often driven more by poorly informed public perceptions than by scientific fact. Until such impediments are removed, CARB should not assume that these are feasible carbon mitigation strategies for the cement industry.[4]

Even if one assumes, as CARB has, that these strategies are viable, it is still unclear how CARB arrived at its conclusion that this mix of strategies could be achieved for a net cost of $36 per ton of CO_2 avoided. The lack of specificity and transparency makes it impossible to determine how CARB derived its overall capital cost estimates. Regarding fuel costs, CARB's calculations *imply* that cement plants could lower their variable fuel costs by about $12 million per year by transitioning from the 2006 fuel mix to one in which 27% of the mix is shifted from coal, coke, and fuel oil to natural gas, tires, and biomass. However, CARB's estimated savings is highly dependent on its fuel price assumptions, which are also not enumerated in its analysis.

Based on fuel price projections in the U.S. Energy Information Agency's ("EIA") 2010 Annual Energy Outlook – the most commonly used source of energy price forecasts – it is difficult to imagine a scenario in which such cost savings could be realized. Specifically, the EIA projects that the price of natural gas will be roughly twice as high as the price of coal in 2020 (measured on a per Btu basis), indicating that fuel switching from coal or coke to natural gas would likely result in a cost increase, not cost savings.

In order to achieve the savings projected by CARB, these additional costs would have to be more than offset by savings associated from switching to tires and biomass fuel. According to the attached analysis, even if one assumes that biomass and tire derived fuels have no variable costs, CARB's estimated net cost savings cannot be realized.[5]

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[2] Sweeney, James. *A Cost-effectiveness Analysis of AB 32 Measures: Presentation at CARB Economic Analysis Technical Stakeholder Working Group Meeting on Cost Effectiveness of AB 32 Implementation*. June 3, 2008

[3] ENVIRON International Corp. *Technical Support Document: Fuel Switching from Coal to Natural Gas*. August 22, 2008.

[4] This hurdle has been expressed on many occasions and acknowledged by CARB staff, including an October 28, 2008 meeting between CARB staff and CSCME.

[5] U.S. EIA estimates the industrial price of biomass in California to have ranged from $2.50 to $2.80 per mmBtu in 2005-2008. See State Energy Data System. No publicly available data source could be found for the price of tires.

III. Abatement Strategy #2: Supplementary Cementitious Materials

In addition to fuel switching, CARB assumes that an increased use of SCMs will account for almost half of the cement industry's emissions savings over the next decade, via reduced cement clinker production. However, several substantive issues with CARB's assumptions and analysis suggest that its projections are either inaccurate or overly optimistic:

- CARB mistakenly divides cement production (11.6 MMT) by industry emissions (10 MMT CO_2e) to calculate the cement industry's emissions intensity. Given that the actual formula for emissions intensity is emissions divided by output, the cement industry's emissions intensity should be 0.862 tons CO_2e per ton cement, rather than CARB's calculated 1.16 tons CO_2e per ton cement. CARB uses the incorrect 1.16 emissions intensity value in all subsequent calculations, invalidating many of its results and estimates.
- CARB assumes that "there are no GHG emissions associated with SCM blending" (F-28) – an assumption that fails to recognize the considerable energy used to process and transport fly ash and other SCMs. Transportation emissions could be significant, given that there are no local sources of SCMs in California.[6]
- A more fundamental issue with CARB's analysis is the extreme and unsubstantiated assumption that increased SCM usage will reduce domestic cement production on a one-for-one basis. CARB provides no justification as to why it assumes that SCMs totally displace domestic production, as opposed to cement imports or some mix of the two sources. In the absence of specific evidence about this dynamic, a more reasonable approach would be to assume that increased SCM usage reduces the volume of both domestic cement production and cement imports in proportion to their existing or historic market shares. In any event, CARB's assumption is likely to result in a significant overestimation of the in-state GHG reductions due to SCM substitution.

IV. Conclusion

CARB's estimates of achievable, cost-effective emissions reduction opportunities in the cement sector rely on a key miscalculation and a number of highly questionable assumptions. This has led to a significant overestimation of the industry's potential to reduce GHG emissions. A more careful analysis of the industry's emissions reduction opportunities should be done and CARB should avoid basing critical GHG policy decisions on the conclusions of the current analysis.

[6] Wescott et al. (2009) Prospects for Expanding the Use of Supplementary Cementitious Materials in California.

Appendix A: Fuel Switching Cost Analysis

CARB estimates that California cement producers can reduce carbon emissions by switching from coal, pet coke, and fuel oil to natural gas, tires, and biomass, at a net cost of $36 per ton of CO_2e avoided. It is unclear how this estimate is derived as CARB's analysis does not list most of its assumptions. Two intermediate calculations that are included in the analysis are:

- The annual capital costs of achieving this fuel mix are $32 million
- The annual GHG reductions as a result of achieving this fuel mix total 550,000 tons CO_2e

Given these estimates, the annual capital costs per ton of CO_2e avoided equal:

$32,000,000 / 550,000 MTCO₂e = $58.18

In order to calculate a net cost of $36 per ton, it appears that CARB must be estimating fuel cost savings of $22.18 per ton of CO_2e avoided.

The analysis summarized in Table 1 uses the same fuel mix assumptions specified by CARB in order to estimate fuel cost differentials. It assumes fossil fuel price projections from the EIA's 2010 Annual Energy Outlook and it varies the price of biofuels and tires because no fuel price projections were available for those fuels. The analysis concludes the following:

- If the cost biomass and tires are assumed to equal $2.80 per mmBtu, the average industrial price of biomass in California in 2008, then fuel costs are estimated to be $25.49 higher if the industry adopts the fuel mix assumed by CARB rather than the fuel mix used in 2006.
- Under any biomass and tire derived fuel price assumptions above $1.20 per mmBtu, there would be no fuel cost savings. Instead, fuel switching would lead to increased fuel costs.
- Even when assuming <u>no cost</u> for biomass and tire derived fuels, this analysis estimates only $19.15 in fuel cost savings – less than the savings of $22.18 presumably estimated by CARB.

Table 1. Alternative Analysis of Fuel Cost Savings

Energy Source	Price	Emissions Factor	Base Fuel Mix: Cost	Base Fuel Mix: Emissions	Fuel-Switch Fuel Mix: Cost	Fuel-Switch Fuel Mix: Emissions	Abatment Cost of Fuel Switching: vs. Coal	vs. Coke	vs. Fuel Oil
	$/mmBtu	*Ton CO2/ mmBtu*	*$/Ton Clinker*	*Ton CO2/ Ton Clinker*	*$/Ton Clinker*	*Ton CO2/ Ton Clinker*	*$/Ton CO2 Avoided*		
Coal	$3.24	0.093	$8.38	0.242	$6.29	0.182			
Coke	$2.31	0.102	$1.77	0.078	$0.90	0.040			
Fuel Oil	$7.76	0.079	$0.51	0.005	$0.00	0.000			
Natural Gas	$7.76	0.054	$1.96	0.014	$4.53	0.032	$115.90	$113.54	$0.00
Scenario 1: Biomass and Tire Derived Fuel Prices Equal 2008 Industrial Biomass Price for California									
Tires	$2.80	0.068	$0.59	0.014	$2.18	0.0531	-$17.60	$14.41	n/a
Biomass	$2.80	0	$0.02	0	$0.54	0	-$4.73	$4.80	n/a
Total	n/a	n/a	$13.23	0.353	$14.44	0.3059	**$25.49**		
Scenario 2: Biomass and Tire Derived Fuel Prices Required for Breaking Even									
Tires	$1.20	0.068	$0.25	0.014	$0.93	0.0531	-$81.60	-$32.65	n/a
Biomass	$1.20	0	$0.01	0	$0.23	0	-$21.94	-$10.88	n/a
Total	n/a	n/a	$12.89	0.353	$12.89	0.3059	**$0.00**		
Scenario 3: Biomass and Tire Derived Fuel Prices Equal $0									
Tires	$0.00	0.068	$0.00	0.014	$0.00	0.053	-$129.60	-$67.94	n/a
Biomass	$0.00	0	$0.00	0	$0.00	0	-$34.84	-$22.65	n/a
Total	n/a	n/a	$12.63	0.353	$11.72	0.306	**-$19.36**		

Source: Keybridge Research Calculations. Coal and natural gas price assumptions represent the 2020 projections for industrial energy prices in the Pacific Census Region as given in the U.S. Energy Information Administration's *2010 Annual Energy Outlook*. Fuel Oil Prices were assumed to be equivalent to natural gas prices. Fuel oil is used to start up some cement kilns. Natural gas can be used as an alternative for this purpose and therefore it was assumed that fuel oil has the same price as natural gas. Prices for the pet coke are not provided in the AEO and were instead derived from EIA's Electric Power Monthly. The current price estimate for pet coke used in the electric power sector in the Pacific Census Region was used but was assumed to grow in 2010-2020 at the same rate as coal prices. Kiln efficiency in both scenarios was assumed to be 3.89 mmBtu/ton of clinker, a number derived from the Portland Cement Association's U.S. and Canadian Labor-Energy Input Survey 2009. Emissions factors are from CARB GHG Emissions Inventory.

Appendix B

U.S. INTERNATIONAL TRADE COMMISSION DETERMINATIONS DEMONSTRATE THAT CALIFORNIAN CEMENT PRODUCERS ARE HIGHLY VULNERABLE TO IMPORTS THAT ENJOY A COST ADVANTAGE

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A. Cement Is A Price Sensitive Commodity Sold In A Global Market

Cement is a price sensitive, globally-traded commodity that has been subject to many international trade remedy actions brought by adversely affected domestic producers in numerous countries. In the United States, the administering authorities have repeatedly found that imports of unfairly-traded cement have injured domestic producers in cases dating back more than forty years. These investigations include the following:

- Portland cement, other than white, nonstaining Portland cement, from Belgium (1961)
- Portland cement, other than white, nonstaining Portland cement, from Sweden (1961)
- Portland cement, other than white, nonstaining Portland cement, from Portugal (1961)
- Portland cement, other than white, nonstaining Portland cement, from the Dominican Republic (1963)
- Gray Portland cement and clinker from Mexico (1990)
- Gray Portland cement and clinker from Japan (1991)
- Gray Portland cement and clinker from Venezuela (1992)

In addition, the domestic industry filed petitions alleging material injury in other cases, including the following:

- Portland cement, other than white, nonstaining Portland cement, from Canada (1960)
- Portland cement, other than white, nonstaining Portland cement, from Dominican Republic (1962)
- Portland cement, other than white, nonstaining Portland cement, from Mexico (1976)
- Portland Hydraulic Cement from Canada (1978)

- Portland Hydraulic Cement from Australia and Japan (1983)
- Portland Hydraulic Cement and Cement Clinker from Colombia, France, Greece, Japan, Mexico, the Republic of Korea, Spain, and Venezuela (1986)

Producers in many other countries also have been injured by imports of cement, resulting in numerous international trade remedy proceedings, including the following:

- Argentina – Portland cement from Spain (1995)
- Argentina – Portland cement from the Federal Republic of Germany (1996)
- Ecuador – Grey Portland cement from Mexico (1997)
- European Union – Grey Portland cement from Belarus (2001)
- European Union – Grey Portland cement from Ukraine (2001)
- European Union – Grey Portland cement from Russia (2002)
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- Lithuania – Grey Portland cement from Ukraine (2001)
- Lithuania – Grey Portland cement from Russia (2002)
- Lithuania – Grey Portland cement from Belarus (2003)
- Philippines – Grey Portland cement from various countries (2001)
- Taiwan – Portland cement from the Republic of Korea (2002)
- Taiwan – Portland cement from the Philippines (2002)

In sum, cement is a price sensitive commodity that is traded throughout the world. The drive to export is manifest in the numerous trade actions seeking relief from lower-priced imports and the increased volume of sales those imports garner by underselling domestic producers.

B. U.S. International Trade Commission Investigations Of The Cement Industry Include Ones Focused On The California Region

In the performance of its statutory mandate, the U.S. International Trade Commission ("ITC") has conducted detailed examinations of the nature of the cement industry, the conditions of competition governing the sale of cement, and the impact of imports on the domestic industry's performance and investment. Domestic producers in the California region are particularly vulnerable to price competition from imports. The California region has been the subject of study by the ITC since 1983[1] and particularly so since the investigations that led to antidumping duty orders against imports of gray Portland cement and cement clinker from

[1] *Portland cement, other than white, nonstaining Portland cement, from Australia and Japan*, Inv. Nos. 731-TA- 108 and109 (Final), USITC Pub. 1440 (1983).

Mexico (1990)[2] and from Japan (1991).[3] The order on imports from Japan remains in place to this day, and the ITC has conducted two five-year "sunset" reviews that focused on imports into the California region and the likely impact of increased imports.[4] The Commission will conduct its third five-year sunset review of imports from Japan into California beginning in May 2011.

C. ITC Investigations Illuminate The Leakage Problem

The following sections of this Appendix detail the in-depth findings by the ITC (and those of similar agencies in other countries) that establish the immutable facts regarding the production, distribution, and sale of cement, and which require recognition in the context of GHG regulation and the prevention of leakage. In sum, cement production facilities are enormous capital investments that must be operated continuously and at high utilization levels in order to spread high fixed costs. Domestic and imported cement are highly substitutable, making price the focus of sales negotiations. Providing imports with even a small implicit cost advantage shifts the relative competitiveness of domestic production and imports in the California market so that import volume will increase at the expense of domestic production. Shifting cement sales to imports not subject to GHG regulation and increasing GHG emissions

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[2] *Gray Portland Cement and Cement Clinker from Mexico*, Inv. No. 731-TA-451 (Final), USITC Pub. 2305 (August 1990) ("*Cement from Mexico*"), cited extracts attached as **Exhibit 1**; Antidumping Duty Order, 55 Fed. Reg. 35443 (August 30, 1990).

[3] *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Final) USITC Pub. 2376 (April 1991) ("*Cement from Japan*"), cited extracts attached as **Exhibit 2**; Antidumping Duty Order, 56 Fed. Reg. 21658 (May 10, 1991).

[4] *Gray Portland Cement and Cement Clinker from Japan, Mexico, and Venezuela*, Inv. Nos. 303-TA-21 (Review) and 731-TA-451, 461, and 519 (Review), USITC Pub. 3361 (October 2000) ("*Cement from Japan, Mexico, and Venezuela, First Review*"), cited extracts attached as **Exhibit 3**; *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Review), USITC Pub. 3856 (May 2006) ("*Cement from Japan, Second Review*"), cited extracts attached as **Exhibit 4**.

due to ocean transportation are effects contrary to the intent of the CARB's mandate for GHG regulation.

II. CEMENT PLANTS ARE SINGLE-USE, HIGH-FIXED-COST FACILITIES THAT MUST OPERATE AT HIGH CAPACITY UTILIZATION LEVELS IN ORDER TO MINIMIZE UNIT COSTS AND ACHIEVE PROFITABILITY

Cement production plants are enormous, dedicated facilities,[5] leading the ITC to routinely find that "the cement industry is highly capital intensive."[6] Because of the industry's high fixed costs, production facilities must operate at high capacity utilization levels in order to maximize the return on investment and facilitate future capital expenditures.[7] Low capacity utilization levels make cement plants uneconomic to operate.[8]

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[5] For example, a new cement plant's annual capacity would not be less than 1 million tons and the plant would cost in excess of $350 million. Moreover, "cement facilities generally cannot be used to produce other products." *Cement from Japan, Second Review* at 9.

[6] *Cement from Japan, Second Review* at 20; *see Cement from Japan, Mexico, and Venezuela Review* at 35.

[7] *Cement from Japan, Mexico, and Venezuela Review* at 35. "{A}s production increases and approaches the limits of capacity unit costs would decline." *Gray Portland Cement and Cement Clinker from Japan*, Inv. No. 731-TA-461 (Remand), USITC Pub. 2657 (June 1993) ("*Cement from Japan Remand*") at 4, cited extracts attached as **Exhibit 5**. Similarly, as noted by Taiwanese cement producers, the capital-intensive cement industry "has to maintain production to allocate high investment on fixed assets." Hearing Minutes in Final Injury Investigation, *Portland Cement and of its Clinker from Philippines and South Korea* (May 9, 2002), cited extracts attached as **Exhibit 6**.

[8] Demand for cement "tends to be cyclical in nature." *Cement from Japan, Second Review* at 19. During periods of high demand, "relatively high levels of profitability are needed to justify investments and capital expenditures." *Cement from Japan, Mexico, and Venezuela Review* at 41. "It was generally conceded that, due to the capital intensive nature of cement and the effects of the business cycle on cement that operating income margin levels should be relatively high compared to a non-capital intensive industry." *Cement from Japan* at 58 (Separate Views of Commissioner Rohr). "Because all cement producers have good and bad times dependent upon demand in their local markets, firms must...earn higher returns on capital in the good times to offset lesser or negative returns on capital in the bad times in order to obtain long-term return on investments." *Cement from Mexico* at 55 (Views of Commissioner Lodwick).

In competitive cement markets, producers have a strong incentive to sell as much cement as possible as long as the price of the last unit sold exceeds the marginal cost of producing that unit.[9] The ITC has recognized that foreign producers (such as Japanese producers found to be dumping cement in California), like U.S. producers, operate under an imperative to maintain high capacity utilization rates.[10] As stated by the Commission, "the high fixed costs faced by cement producers provide significant incentive to the Japanese producers to sell their additional excess product even at low costs in order to meet their fixed costs."[11]

III. CEMENT IS A FUNGIBLE PRODUCT THAT IS SOLD BASED ON PRICE

A. Imported Cement And Domestic Cement Are Highly Interchangeable

All cement sold in California "generally conforms to the standards established by the American Society for Testing and Materials (ASTM)."[12] Thus, cement is "a fungible product, with domestically produced product and imported product being readily interchangeable."[13] In

[9] *Cement from Japan, Second Review* at II-3, quoting Japanese Cement Committee response to Notice of Institution at 6-7.

[10] "For both the imported and domestic products, the production process for gray Portland cement is standardized, with no significant technological advances since the original investigation in 1989-91." *Cement from Japan, Second Review* at I-12.

[11] *Cement from Japan, Mexico, and Venezuela Review* at 45.

[12] *Cement from Japan, Second Review* at I-10; *id.* at 19. "The fact that all cement generally conforms to the standards established by the American Society for Testing Materials (ASTM) also suggest that the products are excellent substitutes." *Cement from Mexico* at 64 (Views of Commissioner Lodwick).

[13] *Cement from Japan, Second Review* at I-14; *see Cement from Japan, Mexico, and Venezuela Review* at 32. Cement is routinely found by national antidumping authorities to be a commodity product. As recently found by the investigating authority in Jamaica in a case involving cement from the Dominican Republic, "{a}n examination of the physical and chemical characteristics revealed that the domestically produced goods appear to be identical to or closely resembling the investigated products based on the technical industry standards, composition and physical characteristics." *Ordinary Portland (Grey) Cement from the Dominican Republic*,

the investigation of the California region, nearly all purchasers have reported to the ITC that U.S.-produced cement and imported cement are used in the same applications.[14] "Purchasers tend to be indifferent to the source of a fungible product . . . ."[15] Moreover, cement is sold primarily in bulk form without distinctive packaging or labeling, making domestic and imported cement indistinguishable and highly substitutable.[16] Thus, the ITC has recognized that all gray Portland cement sold in the California market, whether domestically-produced or imported, exhibits no significant distinctions between cement from different sources in terms of quality, delivery, marketing, or terms of sale.[17]

B. Competition For Sales Is Based On Price

Given that there is little or no brand consciousness and little or no loyalty to any particular supplier, the prices offered by all suppliers in the competitive regional markets of the United States are dictated by competition based almost exclusively on price. In the ITC's investigations, purchasers have ranked price as the most important purchase factor by far, with

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Jamaica Case No. AD-01-2010, Preliminary Determination, Statement of Reasons (September 13, 2010) at 6, cited extracts attached as **Exhibit 7**.

[14] *See Cement from Japan, Second Review* at 19.

[15] *Cement from Japan* at 17 n.34.

[16] *Cement from Japan, Second Review* at I-14-I-15, quoting Response of Domestic Producers to Notice of Institution at 7.

[17] *See Cement from Japan* at 3-4. This also is not unique to California. As noted by the Taiwanese investigating authority in a case involving cement from the Philippines and South Korea, "the domestic product and imported product are highly fungible, in terms of product quality, packaging, sales target," making it a highly "price sensitive" product. *Portland Cement and of its Clinker from Philippines and South Korea* (Final Report) (June 13, 2002), Chinese original and translation extract attached as **Exhibit 8**.

quality ranked as a distant second.[18] Thus, the Commission has frequently noted that "cement is a fungible commodity, which competes largely on the basis of price."[19] Moreover, only a small price differential is usually sufficient to induce customers to shift suppliers, whether domestic or foreign.[20]

IV. CEMENT'S TRADE EXPOSURE MUST BE ASSESSED ON A REGIONAL, NOT A NATIONAL, BASIS

In its investigations, the ITC must determine whether an industry is materially injured or threatened with material injury by reason of unfairly traded imports. In almost all cases, the ITC makes its assessment on a national basis. The one exception is cement. In twelve of its thirteen antidumping investigations of cement imports, the ITC has made its determination on a regional

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[18] *Cement from Japan, Second Review* at II-8 (Table II-1); *see id.* at II-7 ("in the first review, when gray Portland cement purchasers were asked to list the three most important factors considered when choosing a supplier, price was ranked first most often by a wide margin. Quality and availability were ranked second most often, and price and availability were ranked third most often.").

[19] *Cement from Japan* at 30; *Cement from Japan, Second Review* at 19 ("price is an important factor in purchasing decisions"); *Cement from Japan, Mexico, and Venezuela Review*, at 32 (same).

[20] "In a product such as cement, however, even small levels of underselling must be considered significant." *Cement from Japan* at 64 (Separate Views of Commissioner Rohr); *see Cement from Japan, Second Review* at I-14-I-15, quoting Response of Domestic Producers to Notice of Institution at 7; *Cement from Japan, Mexico, and Venezuela Review* at 39 n.238 (a cost savings of "$3 per ton is substantial, particularly for a highly-substitutable, price-sensitive product, such as cement"). As noted in a Jamaican investigation of cement imports from Indonesia, "{i}n absolute terms, a price differential of 1.06 percent does not suggest significant price undercutting," but information from "verification visits" to the parties indicated that, "in relative terms, small variations in cement prices may be significant, as cement is typically purchased in large quantities and so even a small price differential may represent a significant saving to the consumer." *Ordinary Portland Grey Cement from Indonesia*, Jamaica Case Ref.: AD-01-2002, Statement of Reasons (July 2, 2002) at 16, cited extracts attached at **Exhibit 9**. Thus, the Jamaican administering authority likewise has found that "cement is a product for which small differentials in price can have a significant impact on sales." *Ordinary Portland Grey Cement from the People's Republic of China*, Jamaica Case Ref.: AD-01-2003, Statement of Reasons (June 14, 2004) at 43, cited extracts attached at **Exhibit 10**.

basis.[21] Cement competes in separate regions because the relatively low value-to-weight ratio of cement and relatively high transportation costs limit the distances to which cement is shipped over land. As a result, "the market for cement tends to be regional in nature."[22]

The ITC's analysis of trade patterns has led it to conclude that California is one such region. California producers sell all or almost all of their cement production in California, and producers in other states sell virtually none of their production in California.[23] As a result, the California cement market is isolated from the rest of the U.S. market, and California cement producers compete almost exclusively with imports. California possesses deep water ports with terminals to receive cement imports in Long Beach, Redwood City, Richmond, Sacramento, San Diego, Stockton, and Wilmington.[24] Of the cement produced in California and cement imported into California, approximately 95 percent is sold within 300 miles of the production facility or import terminal.[25] Accordingly, competition between domestic production and imports in California is intensified by the geographic locus of competition.

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[21] In the one case that was not based on a regional analysis – *Portland Hydraulic Cement and Cement Clinker from Colombia, France, Greece, Japan, Mexico, the Republic of Korea, Spain, and Venezuela*, Inv. Nos. 731-TA-356-363 (Preliminary), USITC Pub. 1925 (1986) – the petitioner "noted that cement was produced and sold in a series of regional markets, but argued that regional markets were all being injured by imports and therefore injury could be assessed on a national basis." *Cement from Japan* at 16 n.32.

[22] *Cement from Japan, Second Review* at 19, *see id.* at 9 and I-5 n.13; *Cement from Japan, Mexico, and Venezuela Review* at 32 (same); *Cement from Japan* at 16-17 ("high transportation costs tend to make the areas in which cement is produced and marketed isolated and insular").

[23] *Cement from Japan Remand* at 2.

[24] *See* **Exhibit 11** (providing a list of deepwater terminals, their owners, and their respective storage capacities); *see Cement from Japan, Second Review* at II-4 (referencing large import terminals situated on deep-water ports in California).

[25] *Cement from Japan* at A-11. The Commission found in the most recently completed review of the antidumping order on cement imports from Japan that the majority of producer

V. THERE IS A HIGH LIKELIHOOD THAT INCREASED IMPORTS WILL REPLACE DOMESTIC PRODUCT IF THEY HAVE A COST ADVANTAGE DUE TO THE IMPROPER IMPLEMENTATION OF AB 32

A. Foreign Cement Producers Would Promptly Exploit Any Cost Advantage That Results From Implementation Of AB 32

To optimize domestic industry performance and the effectiveness of GHG regulation, imports should serve as a complement to domestic production in California and not prevent California producers from maintaining high utilization rates. Due to the imperative to "maintain and maximize capacity utilization in order to be profitable, the existence of significant unused capacity gives {foreign} producers the incentive to substantially increase their exports."[26] Moreover, foreign producers that rely on exports to maintain high levels of production possess the incentive to maintain shipments to California even in a declining demand environment, particularly if shipments to alternative export markets are impeded by depressed demand or increased competition from other countries.[27] Moreover, the significant investment in import terminals in California facilitates a rapid increase in import volume.[28]

Faced with higher costs resulting from GHG regulation, domestic producers would either have to raise prices and lose market share to lower priced imports or forgo price increases and

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shipments within California "were shipped to customers within 200 miles of the manufacturing plant and the majority of importer shipments within the region were shipped to customers within 200 miles of the port of entry." *Cement from Japan, Second Review* at 9

[26] *Cement from Japan, Second Review* at 22.

[27] As noted by the ITC, maintaining high capacity utilization rates due in part to reliance on export markets creates an incentive for foreign producers to shift at least some of their exports to California in light of increasing competition among foreign cement producers in third-country markets. *Cement from Japan, Second Review* at 22.

[28] *Cement from Japan* at 37 n.100. *See* Exhibit 10 (list of import terminals).

suffer lower profits in an effort to maintain market share.[29] A loss in market share and subsequent decrease in capacity utilization "would be particularly harmful in this capital intensive industry."[30] Domestic producers are required to match prices offered by importers or lose sales on a ton-by-ton basis.[31] Matching the lower import price, however, inevitably causes domestic producers to suffer price depression, price suppression, and lower profits.[32]

In sum, because the cement industry is both capital intensive and produces a commodity product, providing a cost/price advantage in the market permits imports to increase market share, effectively reducing revenues to cover fixed costs and impairing the domestic industry's capability to invest over the long term.[33]

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[29] *See Cement from Japan* at 42.

[30] *Cement from Japan, Second Review* at 25; *see Cement from Japan, Mexico, and Venezuela Review* at 40-41, 45-46.

[31] *See Cement from Japan, Second Review* at I-14-I-15. Failure of the domestic industry to match LTFV import prices "would result in large drops in domestic output and contribution profits." *Cement from Mexico* at 65 (Views of Commissioner Lodwick).

[32] "When the import market share is significant, this substitution effect tends to lower domestic prices as domestic producers reduce their own prices to meet import competition, in an effort to maintain sales volume and market share." *Cement from Japan* at 41. Generally, imports have the greatest impact on domestic prices when they are available in significant volumes, when consumers are unwilling to purchase significantly more of the product even if the prices go down, and when consumers view the imported and like product as close substitutes. Under such circumstances, a decrease in the price of the import is likely to result in direct substitution of the import for the domestic like product, rather than increased overall purchases of the product." *Id.*; *see Cement from Mexico* at 63 (Views of Commissioner Lodwick).

[33] *See Cement from Mexico* at 54, 65 (Views of Commissioner Lodwick).

B. Foreign Producers Possess Substantial Available Capacity To Immediately Increase Exports To California

Cement consumption in California peaked in 2005 at just over 15 million metric tons.[34] Consumption declined by approximately 1 million metric tons from 2005 to 2006, and continued to decline thereafter, falling to 9.4 million metric tons in 2008. Current Californian production capacity is more than sufficient to entirely meet Californian demand. *See* Exhibit 11.

Since 2000, the largest source of imported cement has been China. Imports from China peaked in 2006 at 3.6 million metric tons.[35] Imports from China have declined since 2006, as have worldwide exports from China. Even though cement consumption in China and Chinese cement production continue to increase, available capacity in China has greatly exceeded Chinese consumption since 2006. The decline in exports from China has merely exacerbated the amount of excess capacity in China, which totals approximately 600 million tons, or more than 160 times the 2006 peak volume of imports from China into California.[36] Obviously, just the available capacity in China alone is sufficient to easily replace all Californian production. Providing Chinese and other foreign producers with a cost advantage over Californian producers will necessarily result in the replacement of cement produced in California with imports, which are available in essentially unlimited quantities.

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[34] Cement consumption in California for the period 1994 through 2008 (the most recent year for which data is available) is calculated and presented in **Exhibit 12**.

[35] Data on cement imports into California is presented in **Exhibit 13**.

[36] Data on China's capacity, production, consumption, and exports published by the *International Cement Review* is provided in **Exhibit 14**. Data from Chinese sources, including the China Cement Association, indicate that available capacity is even greater than stated by the *International Cement Review*. *See* **Exhibit 15**.

EXHIBIT 1

GRAY PORTLAND CEMENT AND CEMENT CLINKER FROM MEXICO

Determination of the Commission in Investigation No. 731-TA-451 (Final) Under the Tariff Act of 1930, Together With the Information Obtained in the Investigation

USITC PUBLICATION 2305

AUGUST 1990

United States International Trade Commission
Washington, DC 20436

II. The Business Cycle and Conditions of Competition.

Section 771(7)(C)(iii) of the Tariff Act of 1930 as amended by the Omnibus Trade and Competitiveness Act of 1988 requires the Commission to evaluate the relevant economic factors "within the context of the business cycle and conditions of competition that are distinctive to the affected industry." [4] With respect to the cement and cement clinker industry in the southern tier region, I find the conditions of competition important to my analysis of this case. The cement industry is both capital intensive and produces a "commodity product." In such a commodity market in which producers have high fixed costs, a foreign producer's efforts to increase market share through LTFV pricing affects the prices and/or output of the domestic industry, effectively reducing the contribution profit of the domestic industry and impairing the domestic industry's capability to invest over the long term.

I have also considered the business cycle within the cement industry, but I am not persuaded by petitioners' argument that the cycle within the industry is sufficiently predictable to be of great use in my analysis. Thus, I do not believe that simply examining the return on assets earned by domestic producers, leads me to the conclusion that there is material injury to the domestic industry by reason of the dumped imports. Demand for cement is derived from the activity of the construction industry, an industry that faces boom and bust periods depending upon local business conditions. [5] In this case, the southern tier region includes several submarkets that have faced differing economic conditions over the period of investigation, such as the

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[4] 19 U.S.C. § 1677 (7)(C)(iii).

[5] Report at Table 4; Economic Memorandum, INV-N-084 at 12.

development boom in southern California and the bust in Texas. [6] It is most difficult to define a broad regional business cycle for a regional industry that is comprised of a number of submarkets with their own independent and often unpredictable business cycles.

Because all cement producers have good and bad times dependent upon demand in their local markets, firms must, as the petitioners suggest, earn higher returns on capital in the good times to offset lesser or negative returns on capital in the bad times in order to obtain adequate long-term return on investments. [7] Moreover, since it is difficult to determine exactly where a single local producer is in its business cycle, it is even more difficult to determine where an entire regional industry is in its business cycle, if one exists.

Although there may be independent business cycles and changing conditions in local markets in the southern tier region, the over-all consumption trend within the regional industry may not manifest any peaks or valleys that typically are characteristic of a business cycle. Data collected regarding apparent consumption reveal little change from 1986 through 1989 for the southern tier region. [8] Accordingly, the condition of the regional industry, discussed below, should be considered in the context of relatively stable demand in the southern tier market.

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[6] See Japan Report at Table 6 and Mexican Cement Preliminary Report at Table 5; Mexican Cement Tr. at 69.

[7] Tr. at 20.

[8] Report at Table 5. Between 1986 and 1989 apparent consumption increased by approximately 2 percent.

unwilling to purchase significantly more of the product even if the prices of these goods go down, and when consumers view the imported and like product as close substitutes. Under such circumstances a decrease in the price of the import is likely to result in direct substitution of the import for the domestic like product, rather than in increased overall purchases of the product. When the import market share is significant, this substitution or threat to substitute tends to lower domestic prices, as domestic producers reduce prices to meet import competition in order to maintain their domestic sales volumes.

In this case, the evidence on all three of these considerations is consistent with the existence of significant price and sales effects on the domestic like product due to LTFV imports of cement from Mexico and Japan. First, the amount of cement demanded is unlikely to increase in response to a change in price. The demand for cement is derived from the demand for concrete, which in turn depends on the demand for construction. Portland cement accounts for a relatively small portion of the cost of most construction projects,[44] and there appear to be no good substitutes for cement in the production of concrete.[45] Second, as discussed above, the import penetration levels for Mexican and Japanese cement are significant and increasing. Third, imports from Mexico and Japan are highly substitutable with domestically produced cement and non subject imports. Both domestic and Mexican cement are used for the same application, the production of concrete,

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[44] Report at Economic Memorandum, Inv-N-084 at 12.

[45] Report at A-74 to A-75. Some U.S. producers reported that flyash and slag may be used as a partial substitute for cement as an admixture in the production of concrete. However, flyash can only be used for certain applications, and in most cases could only replace portland cement in approximately 10-15 percent of applications. Id.

and are sold through the same channels of distribution. [46] The fact that all cement generally conforms to the standards established by the American Society for Testing Materials (ASTM) also suggests that the products are excellent substitutes. [47] Under these circumstances, then, the conditions are present for LTFV imports in the market to lower domestic prices or market share. [48]

The ability of subject cement imports to increase their penetration levels is possible by lowering their prices which effectively lowers prices in the entire market. Domestic producers can attempt to hold on to their market share by matching subject import price declines. The drop in average cement prices in the region supports a finding that significant and increasing subject cement imports from Mexico and Japan did indeed have a price depressing effect on the domestic cement market in the Southern tier during the period of investigation. The drop in non-subject import market share also supports a finding of price depression as non-subject importers appear to have been unwilling to match lower U.S. market prices and have simply reduced their import volumes. [49] Thus, the record evidence as a whole supports the conclusion that the LTFV imports have depressed prices received by the domestic industry to a significant degree. [50]

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[46] Economic Memorandum, INV-N-084 at 11.

[47] Report at A-6.

[48] See New Steel Rails from Canada, Inv. No. 701-TA-297 (Final), USITC Pub. 2217 (September 1989) (Dissenting Views of Commissioner Seeley G. Lodwick) at 238-239.

[49] No evidence suggests that non-subject imports faced rising factor costs or had other export opportunities causing them to withdraw from the U.S. market.

[50] 19 U.S.C. (7)(C)(ii)(I) & (II). The law requires a consideration of both significant underselling and whether the LTFV imports had caused price depression or "prevented increases, which otherwise would have occurred, to a (continued...)

C. Impact of the Subject Imports on the Domestic Industry.

I find that the volume of imports and their effect on prices in the cement industry in the southern tier have caused material injury to domestic producers based primarily upon their effects on the financial condition of the regional industry.

The cumulated LTFV imports' effects on the prices of producers in the southern tier region have adversely affected the income-related indices discussed above, such as profits, cash flows and return on investments, and thus, the domestic industry's ability to invest.[51] Domestic cement producers, faced with LTFV import price competition have dropped their prices in an effort to maintain their output volumes and capacity utilization levels in order to minimize the drop in their contribution profits to their high fixed costs. This maintains production, shipment, and employment levels, but severely impacts the industry's financial indicators. Failure of the domestic industry to match LTFV import prices would result in large drops in domestic output and contribution profits.

Taken as a whole, the record evidence supports the conclusion that the regional industry has been materially injured by cumulated LTFV imports of cement and is consistent with the requirement that a high proportion of producers within the region must be adversely affect by the subject

[50](...continued)
significant degree," to evaluate "the effect of imports of such merchandise on prices."

[51] The record in this investigation reveals that some firms have curtailed planned investment. Report at Appendix F.

EXHIBIT 2

GRAY PORTLAND CEMENT AND CEMENT CLINKER FROM JAPAN

Determination of the Commission in Investigation No. 731-TA-461 (Final) Under the Tariff Act of 1930, Together With the Information Obtained in the Investigation

USITC PUBLICATION 2376

APRIL 1991

United States International Trade Commission
Washington, DC 20436

VIEWS OF COMMISSIONER SEELEY G. LODWICK AND COMMISSIONER DON E. NEWQUIST

On the basis of the information gathered in this final investigation, we determine that an industry in the United States is materially injured by reason of imports of gray portland cement and cement clinker from Japan that the Department of Commerce has determined are sold in the United States at less than fair value (LTFV). 1/ 2/

Termination Request 3/

As a preliminary matter, before addressing the issues in this case, we believe it necessary to dispose of a procedural matter. On February 13, 1991, counsel on behalf of respondents in this investigation filed a request to terminate the investigation based on petitioners' alleged lack of standing. 4/ Counsel for petitioners opposed the request.

The request asserts that the Commission has the authority to terminate an investigation for lack of standing, and in this case should do so. 5/ In our view, the request is unfounded, and must be denied. Because of the

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1/ Material retardation is not an issue in this investigation and will not be discussed.

2/ Commissioner Newquist notes that the factors which led to his decision not to participate in Inv. No. 731-TA-451, Gray Portland Cement and Cement Clinker from Mexico, are not implicated in this investigation.

3/ Commissioner Rohr concurs in this discussion. See Separate Views of Commissioner David B. Rohr, which follow.

4/ Counsel for respondent Onoda Cement Co., Ltd. filed a letter supporting the request on February 14, 1991.

5/ Although styled a "request," the document is effectively a motion to terminate for lack of standing. There is no provision in the Commission's rules for such a motion, even if styled a request, and as a general matter, "motions" are discouraged in title VII practice. Consequently, although we considered the request earlier, and made our decisions concerning it, we dispose of the request at this time.

relative importance of the issue raised by the request, pending litigation concerning this issue, the fact that standing issues are raised increasingly often before the Commission in title VII investigations, and the need to, if possible, dispose of the issue with finality, we include a discussion of the matter.

Respondents argue that the statute permits the Commission to conduct antidumping investigations only where petitioners have filed "on behalf of" the industry at issue, that petitioners in this case have not met their statutory burden to demonstrate majority support for their petition 6/, and that the Commission and Department of Commerce jointly and severally have an affirmative obligation to ensure that petitioners are acting on behalf of the subject industry. Respondents argument is based in part on the Court of International Trade's decision in Suramerica de Aleaciones Laminadas, C.A. v. United States, 746 F. Supp. 139 (1990), appeal pending. Respondents maintain that lack of standing is a "fundamental defect" going to the heart of the Commission's jurisdiction over an ongoing investigation, and may be raised at any time during an investigation.

Petitioners assert that the appropriate forum for respondents' request is Commerce, that the request is in any event untimely 7/, that the Commission

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6/ Respondents make further arguments based on the facts of this case. Because we conclude that the Commission has no authority to make standing determinations or grant respondents' request, we do not discuss those arguments.

7/ Petitioners note that the facts on which the request is based were known before the deadline for filing such challenges with Commerce had passed in this case, and that the Suramerica case relied on by respondents had been decided before that deadline passed.

of their production of the like product to customers within that region; (2) demand within the region must not be supplied, to any substantial degree, by U.S. producers of the like product located elsewhere; (3) there must be a concentration of the unfairly traded imports within the region.

In the preliminary phase of this investigation, we adopted a different approach, whereby we determine whether a regional market exists based on the two "market isolation" factors identified in the statute, (subsections (i) and (ii)), and then as a second step, consider whether imports are concentrated in any regional market so defined. 31/ Effectively, import concentration is thus a condition precedent to analysis of material injury (or threat thereof) to a regional industry.

As a general matter, the Commission has found in past investigations that "appropriate circumstances" exist for the Commission to engage in a regional industry analysis of domestic cement production. 32/ Gray portland cement and clinker has a low value-to-weight ratio and is fungible. 33/ Thus, high transportation costs tend to make the areas in which cement is produced

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31/ Japan Preliminary at 61-62 (Views of Commissioner Newquist); id. at 23 (Commissioner Lodwick, concurring).

32/ In all but one of the Commission's prior investigations of cement a regional analysis was used. See Report at A-3, Table 1. In the 1986 cement case, Portland Hydraulic Cement and Cement Clinker from Colombia, France, Greece, Japan, Mexico, the Republic of Korea, Spain and Venezuela, Invs. Nos. 731-TA-356-363 (Preliminary), USITC Pub. 1925 (1986), the regional industry issue was not raised by the parties. The petitioner in the that case noted that cement was produced and sold in a series of regional markets, but argued that regional markets were all being injured by imports and therefore injury could be assessed on a national basis.

33/ See Report at A-11-A-13.

and marketed isolated and insular. 34/ While these prior decisions are not binding precedent, the same considerations apply in this investigation.

This case raises the question of how the Commission is to choose among possible regions which satisfy the market isolation criteria for a regional industry. 35/ In a case such as this, where the choice is between a larger region and a smaller region within the larger region (*i.e.* the entire State of California or Southern California), we find it appropriate to consider market isolation factors beyond those found in the statute, including changes in shipment patterns, shipments between the smaller region and the remainder of the larger region, and market or commercial realities in the smaller region and the remainder of the larger region, to determine which of the two possible regions is more appropriate.

34/ *Id*. Purchasers tend to be indifferent to the source of a fungible product, and unwilling to pay high transportation costs to source from a more distant producer.

35/ Generally speaking, with distinctly separate regions, the likelihood of sufficient import concentration in each region to allow a finding of material injury is unlikely. This is the case unless consideration of the concentration of imports is based solely on relative market penetration, in which case more than one region could conceivably satisfy both the market isolation factors and the import concentration requirement. In such a case, a determination that there is material injury to one or more separate regional industries by reason of imports from a single country would be possible. Indeed, this is the argument originally made by petitioner in the *Mexican Cement* investigation. Because we beleive the concentration requirement is intended to address the potential unfairness of imposing national antidumping (or countervailing) duties based on injury to only a regional subset of domestic producers. We are troubled by the possible results which could flow from consideration of concentration of imports solely based on relative market penetration. *See* *Japan Preliminary* at 62-64 (Views of Commissioner Newquist) Nonetheless, the legislative history does allow consideration of relative market penetration in considering whether imports are sufficiently concentrated to warrant analysis of material injury on a regional industry basis. S. Rep. 249, 96th Cong., 1st Sess. 83 (1979); H.R. Rep. 317, 96th Cong., 1st Sess. 73 (1979).

imports compete with each other and with like products of the domestic industry in the United States market. 84/

Imports are to be cumulated if they meet three criteria: (1) they must compete with other imported products and with the like domestic product; (2) they must be marketed within a reasonably coincidental period; and (3) they must be subject to investigation. 85/ In addition, the Commission may cumulate imports subject to a recent final order. 86/ The issue in such cases is whether the final order is sufficiently "recent" that the unfairly traded imports which resulted in imposition of the order are continuing to have an effect on the domestic industry, or whether the order is sufficiently removed in time that LTFV imports entered prior to date of the order no longer have a continuing injurious impact on the domestic industry.

The imports from Mexico which enter Southern California compete with the subject imports from Japan and the domestic like product. As the Commission has frequently noted, cement is a fungible commodity, which competes largely on the basis of price. Imports from Mexico and Japan have been simultaneously present in the California market during the period of investigation. Imports

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84/ 19 U.S.C. § 1677(7)(C)(iv).

85/ See 19 U.S.C. § 1677(7)(C)(iv); H.R. Rep. No. 1156, 98th Cong., 2d Sess. 17 (1984) (which contains the language not contained explicitly in the statute, pertaining to "reasonably coincident" imports). Chaparral Steel Co. v. United States, Slip Op. 89-1338-1339 (Fed. Cir. April 17, 1990, rehearing denied, Order of May 29, 1990. See also, e.g., Certain Cast-Iron Pipe Fittings from Brazil, the Republic of Korea and Taiwan, Invs. Nos. 731-TA-278, 279, 280 (Final) USITC Pub. 1845 (May 1986) at 7, n. 28, aff'd, Fundicao Tupy, S.A. v. United States, 678 F. Supp. 898 (1988), aff'd , 859 F.2d 915 (Fed. Cir. 1988) (adopting the decision of the lower court).

86/ Chaparral Steel Co. v. United States, Slip Op. 89-1338-1339 (Fed. Cir. April 17, 1990), rehearing denied, Order of May 29, 1990; Industrial Nitrocellulose from Yugoslavia, Inv. No. 731-TA-445 (Final), USITC Pub. 2324 (Oct. 1990).

The Commission may consider other factors it deems relevant, but must explain why they are relevant. 95/ The Commission may take into account information concerning other causes of harm to the domestic industry, but it is not to weigh causes, 96/ and the imports need only be a cause of material injury. 97/

A. The volume of imports

The volume of cumulated imports from Japan and Mexico into the Southern California region increased by 135 percent from 1986 to 1989, from 934,000 tons to 2.2 million tons, before declining by seven percent in 1990 to 2.0 million tons. 98/ Imports of clinker dropped to zero in 1987 and succeeding years, from 108,000 tons in 1986. 99/

Thus, there has been a significant increase in the absolute volume of subject imports during the period of investigation. 100/ As a share of regional apparent consumption, subject imports from Japan and Mexico increased significantly throughout the period of investigation, from 13.1 percent in

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95/ 19 U.S.C. § 1677(7)(B).

96/ S. Rep. No. 249, 96th Cong. 1st Sess. 57-58, 74 (1979).

97/ LMI-La Metalli Industriale, S.p.A. v. United States, 13 CIT ___, Slip Op. 89-46 (April 11, 1989) at 31; Citrosuco Paulista, S.A. v. United States, 12 CIT ___, 704 F. Supp. 1075, 1101 (1988).

98/ Report at A-60, Table 28.

99/ Report at A-61, Table 29.

100/ With regard to respondents' contention that Japanese imports have played a "complementary" role in the market, satisfying demand that could not be met by the domestic industry, we note that the significant investment in import terminals by Japanese producers and exporters of cement suggest rather the establishment of a permanent presence in the market, indicating to us that this is no longer the case. Further, it appears that the presence of LTFV imports has increased the extent to which domestic producers have had to make sales outside the Southern California region.

supports petitioners' argument that the relative prices of imports have had a significant adverse effect on domestic prices.

The conditions of competition in the cement industry in Southern California further support our conclusion that LTFV imports have suppressed and depressed prices in Southern California. 113/ Generally, imports have the greatest impact on domestic prices when they are available in significant volumes, when consumers are unwilling to purchase significantly more of the product even if the prices go down, and when consumers view the imported and like product as close substitutes. Under such circumstances, a decrease in the price of the import is likely to result in direct substitution of the import for the domestic like product, rather than increased overall purchases of the product. When the import market share is significant, this substitution effect tends to lower domestic prices as domestic producers reduce their own prices to meet import competition, in an effort to maintain sales volume and market share.

This case presents just such circumstances, supporting our conclusion that LTFV imports have had significant adverse sales and price effects on domestic producers. Demand for cement is derived from demand for concrete, which in turn depends on the demand for construction. 114/ Portland cement represents a relatively small portion of the cost of most construction

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113/ Commissioner Lodwick notes that the record at the final stage of this investigation reaffirms his conclusions reached at the preliminary stage concerning conditions of competition in this market as a basis for an affirmative determination. Japan Preliminary at 23-29; See also Views of Commissioner Lodwick in New Steel Rails from Canada, Inv. No. 731-TA-422 (Final), USITC Pub. 2217 at 235, for a more detailed discussion of conditions that support claims of significant effects of LTFV imports on domestic prices.

114/ Report at A-14, A-62.

projects 115/, and there appear to be no good substitutes for cement in the production of concrete. 116/ Thus, the amount of cement demanded is unlikely to increase in response to a change in price. Market penetration of Japanese and Mexican imports is significant and increased significantly during the period of investigation. Imports from Japan and Mexico are highly substitutable for the domestic like product, as well as for non-subject imports and each other. 117/ In addition, we note that as the industry's capacity utilization increased, prices declined in the Southern California market, contrary to what would be expected in the absence of LTFV imports. 118/ In the circumstances of this case, suitable competitive conditions for LTFV imports to have a price suppressing and depressing effect are present.

LTFV imports can achieve increases in market share by selling at lower prices, which effectively lowers prices throughout the market for a fungible good such as cement. Domestic producers are faced with either forgoing market share, or lowering prices to compete in an effort to maintain market share. The decline in cement prices in the region, and the increasing market share of

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115/ Memorandum INV-O-064 at 17.

116/ Report at A-63 & n.52.

117/ Memorandum INV-O-064 at 15-17. Imports of both Japanese and Mexican cement are used for the same application, in the production of concrete, and are sold through the same channels of distribution. The fact that all cement generally conforms to the standards established by the American Society for Testing Materials (ASTM) also indicates that imported product cement is an excellent substitute for domestically produced cement.

118/ See Figure 1, Petitioners' Preliminary Conference Exhibit 6, indicating that, from 1975 to 1979, as regional consumption and domestic capacity utilization increased, average shipment values also increased, while from 1985 to 1989, as regional consumption and domestic capacity utilization increased, average shipment values declined.

14 percent.[30] Using the percentage of production data, I note that significant percentages of regional production were accounted for by producers who exceeded these arithmetic averages in each year, specifically, producers accounting for 61 percent of regional production exceeded the arithmetic average in 1986; 39 percent in 1987; 53 percent in 1988; 68 percent in 1989; and 69 percent in 1990. I interpret this data to mean that the performance of the industry as revealed in the traditional aggregate is being pulled down significantly by the weak performance of producers who do not account for the bulk of regional production.

In order to provide a better picture of the operating performance of the industry using the operating income margin as an indicator of performance, I examined the performance of the industry at two additional levels of performance. I looked closely at the arguments of the parties to determine the appropriateness of these levels. It was generally conceded that, due to the capital intensive nature of cement and the effects of the business cycle on cement that operating income margin levels should be relatively high compared to a non-capital intensive industry. Much of the argument focussed on how much higher such levels should be. Estimates by the parties ranged from as low as around 10 percent to as high as above 40 percent.

Several factors have led me to determine that it is appropriate to look at the performance of this industry at the 13 percent and 17.5 percent operating income margin levels. I note that these numbers bracket the arithmetic averages revealed in the traditional Commission data. Second, I note that these represent levels 2 to 3 times higher than the operating income margins I often see in title VII cases.

The estimates calling for higher levels, in excess of 20 percent appear to me to be based on inappropriate comparisons between Commission and public data and between different industries. For example, Commission estimates of operating income margins tend to be more conservative than much publicly available data which usually are calculated on a cash flow basis, and hence treat depreciation differently than does the Commission. Further, cement

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[30] Table 12, Report at A-33.

levels also likely to be injurious in the future, even if they do not substantially increase.

The volume of imports and import penetration level, while providing support for a finding of a causal connection between the imports and the condition of the industry, either in the present or in the future, are only one factor in an analysis of causation, which might be further supported or contradicted by other evidence, particularly information relating to price, which is a factor to be considered in making a threat determination under item (IV). Generally domestic prices follow the pattern that I have already observed existed, that is, a downward trend in price from 1986 through 1988 with firmer and increasing prices in 1989 and 1990.

Japanese prices, according to our producer and importer questionnaire data remained steady, significantly below the domestic prices until 1988 when they too dropped, preserving the margins of underselling that had existed. The data show some slight variations based on location, but the general patterns are similar for all three Southern California locations investigated by the Commission. Purchasers' questionnaires show fewer instances and smaller levels of underselling, as would be expected. I note that in a product such as cement, however, even small levels of underselling must be considered significant.

Apart from our statistical data, the responses the Commission obtained from purchasers of cement provide clear support for both the importance of price in this market and for the negative price impact which Japanese cement has had in the market. Most cement purchasers indicated that price was one, if not the most, important factor in their purchasing decision, and it appears that most that did not are vertically integrated with primary cement producers. Exactly half of the respondents to our purchasers questionnaires indicated that Japanese cement was available at a lower delivered price than domestic cement.[41]

Item (VII), other demonstrable adverse trends, on the list of threat factors is a catch-all for other factors and conditions of trade that will affect the future impact of imports. A factor which seems significant is the involvement of Japanese interests in acquisitions or

[41] Report at A-69.

Commerce investigated sales during the period December 1, 1989, through May 31, 1990. Commerce examined U.S. sales of cement from Japan totaling * * * short tons with a total adjusted net value of $* * *. Of this, * * * percent, by volume and by value, were found to be sold at LTFV.[14]

The Domestic Market

The regional character

Because of the low value-to-weight ratio and the fungible character of cement, transportation costs are an important limiting factor on its shipment. Approximately 95 percent of U.S. producers' portland cement shipments in the United States are to customers located within 300 miles of the production site. The following tabulation presents the distribution of U.S. producers' shipments of portland cement, by distances, for the Southern California region and the State of California in 1990 (in percent):

Miles shipped	Southern California region	State of California
0-99.........	49.4	49.6
100-299......	45.1	45.8
300-499......	***	***
500 or more..	***	***

[1] * * *.

Importers of cement from Japan located in the Southern California region and the State of California shipped more than 95 percent of their cement within a 300-mile radius of their terminals in 1990. The following tabulation presents the distribution of shipments of portland cement by importers of cement from Japan by distance shipped in 1990 (in percent):

Miles shipped	Southern California region	State of California
0-99.........	***	***
100-299......	***	***
300-499......	***	***
500 or more..	***	***

[1] * * *.

[14] See letter from Francis J. Sailer, Deputy Assistant Secretary for Investigations, Import Administration, United States Department of Commerce, to Lynn Featherstone, Director, Office of Investigations, United States International Trade Commission, Mar. 26, 1991.

EXHIBIT 3

Gray Portland Cement and Cement Clinker From Japan, Mexico, and Venezuela

Investigations Nos. 303-TA-21 (Review) and
731-TA-451, 461, and 519 (Review)

Publication 3361 **October 2000**

U.S. International Trade Commission

Washington, DC 20436

U.S. International Trade Commission

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Address all communications to
Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

U.S. International Trade Commission

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Gray Portland Cement and Cement Clinker From Japan, Mexico, and Venezuela

Investigations Nos. 303-TA-21 (Review) and
731-TA-451, 461, and 519 (Review)

Publication 3361 **October 2000**

Commission's application in an affirmative threat determination.[176] In these reviews, the parties disagreed on how the "all or almost all" standard should be applied in a five-year review.[177]

C. Conditions of Competition

In evaluating the likely impact of the subject imports on the domestic industry, the statute directs the Commission to consider all relevant economic factors "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[178] The following conditions of competition in the gray portland cement and cement clinker industry are relevant to our determination.

Gray portland cement is a fungible, commodity product, with domestically-produced product and imported (subject and non-subject) product readily interchangeable.[179] Price is an important factor in purchasing decisions.[180] Due to cement's relatively low value-to-weight ratio, U.S. inland transportation costs account for a relatively large share of the delivered price of gray portland cement and are a limiting factor on the distances to which cement is shipped.[181] As a result, the market for gray portland cement tends to be regional in nature.[182]

Demand for gray portland cement in the Southern Tier and the California regions has increased substantially since the original investigations and during the period of review. In the Southern Tier region, apparent consumption increased by 30.7 percent from 1989 to 1999 and by 19.3 percent from

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[176] In affirming the Commission's affirmative threat determination on remand in Japanese Cement, the Mitsubishi Materials court stated:

> This Court does not need to determine, however, whether the Commissioners' analysis in this regard was sufficient to satisfy the all or almost standard because their use of aggregate data in this case was appropriate. The factors supporting imminent threat to all or almost all of the industry are based on industry conditions common to each and every domestic producer in the Southern California market.

918 F. Supp. at 427 (CIT 1996).

[177] Domestic Producers contended that "[w]here the Commission's analysis is prospective -- as in a threat case or a sunset review -- there is no basis whatsoever for conducting a plant-by-plant analysis. . . .[since] the Commission does not need to make a 'separate determination regarding current material injury.'" Domestic Producers' Response to Commission Questions at 60-65. In contrast, Mexican Respondents - CEMEX and GCCC maintained that the "counter-factual nature of a sunset review makes an aggregate analysis particularly susceptible to disguising anomalies that examination of individual plant information would otherwise highlight" and that a plant-by-plant analysis is required of all or almost all producers in a regional industry sunset review. Mexican Respondents -- CEMEX and GCCC's Response to Commission Questions at 41-44. The Japanese respondents contended that operational differences between the different producers compels "the Commission to examine the data on both a plant-by-plant and aggregate basis." Japanese Respondents' Prehearing Brief at 30-33; Japanese Respondents' Response to Commission Questions at 8.

[178] 19 U.S.C. § 1675a(a)(4).

[179] CR at I-26 - I-27, I-33, and II-27 - II-28; PR at I-23 - I-24, I-28, and II-14 - II-15. All cement generally conforms to ASTM standards.

[180] CR at II-26; PR at II-14. More than half of responding purchasers ranked price as the most important factor in purchasing decisions.

[181] CR at I-15, II-1, V-1, and Table 1-2; PR at I-13, II-1, V-1, and Table 1-2. Average inland transportation costs per ton nearly double if cement in either of the two regions is shipped from 100-199 miles compared with less than 100 miles. Id. at Table I-2. Conversely, ocean freight transportation is relatively inexpensive and does not result in substantial additional costs for shipping further distances.

[182] CR/PR at II-1.

nonsubject cement.[198] Producers in both regions are in the process of increasing, or have plans to increase, production capacity in both regions. Expansions generally take from three to five years from planning to production.[199] We recognize that all announced expansion plans will not necessarily be completed and have considered that those in the construction phase, generally two years in duration, are more certain of completion than those in the planning or permitting phases. In the next two years alone, over 5 million short tons in production capacity is expected to come into service in the Southern Tier region and about *** short tons in the California region.[200]

The gray portland cement and cement clinker industry is highly capital intensive. Because of the industry's high fixed costs, production facilities must operate at high capacity utilization rates in order to maximize return on investment. The Southern Tier regional producers' capacity utilization for cement grew from 75.1 percent in 1989 to 92.6 percent in 1999.[201] The California regional producers' capacity utilization for cement grew from 84.1 percent in 1990 to 95.5 percent in 1999.[202] Gray portland cement facilities generally cannot be used to produce other products.[203]

A substantial amount of the cement industry in both regions is owned by large international corporations. About half of the regional operations have changed ownership since the original investigations, with the share of foreign ownership increasing substantially.[204] During the period of review, foreign ownership accounted for 63 percent of Southern Tier production capacity and 65 percent of California production capacity as opposed to roughly 50 percent in each region during the original investigations.[205] Similar to the original investigations, most imports of gray portland cement and cement clinker are controlled by U.S. producers and their affiliated foreign producers.[206] Overall, 13 of the 23 Southern Tier producers reported imports of cement and cement clinker, mostly from non-subject sources, during the period of review.[207] Southern Tier regional producers with foreign affiliations owned or controlled 38 of the total 44 import terminals in the region; 19 of these terminals were owned by producers affiliated with Mexican producers and one import terminal was affiliated with a Japanese producer.[208] Finally, there is a significant degree of vertical integration between regional cement producers and the downstream ready-mix concrete operations. The share of regional producers' gray

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[198] CR at I-53.

[199] CR at I-35; PR at I-29, and Tr. at 73-74 and 98-99. The permitting process can take as long as two and a half years for approvals and the construction phase takes two years, with construction for some projects completed in separate phases. Id.

[200] CR at I-35 and Table I-7; PR at I-29 and Table I-7. Additional production capacity announced by Southern Tier regional producers by year are: *** in 2004. Additional production capacity announced by California regional producers by year are: *** short tons in 2003. CR/PR at Table I-7.

[201] CR/PR at Table I-1A.

[202] CR/PR at Table C-6 and Japan Cement, USITC Pub. 2376 at A-36, Table 7.

[203] CR at II-7; PR at II-4.

[204] CR at I-39; PR at I-32.

[205] CR at I-34; PR at I-28-29, and Questionnaire responses. By comparison, in 1989, foreign ownership accounted for approximately 47 percent of Southern Tier production capacity and 53 percent of California production capacity. CR at I-34; PR at I-28-29 and Table I-1A, Questionnaire responses, and USITC Pub. 2376 at Table 7.

[206] CR at I-46; PR at I-38.

[207] CR at I-53; PR at I-42.

[208] CR/PR at Table I-9. Of the 19 import terminals affiliated with Mexican producers, 14 terminals were considered active. California regional producers with foreign affiliations owned or controlled 6 of the total 7 import terminals in the region; 4 of these terminals were owned by producers affiliated with Mexican producers and one import terminal was affiliated with a Japanese producer. Id.

The pricing data collected in this review do not give clear evidence of patterns of underselling or overselling, though the data do indicate that some underselling occurred, even with the orders in place and the substantial increases in demand during the period of review.[234] While prices generally increased slightly during the period of review, an increase in prices, and possibly even a substantial one, would have been likely due to the substantial increases in demand from 1997-1999.[235]

We find that without the discipline of the antidumping duty order, there is a substantial likelihood that Mexican cement would be priced aggressively in the Southern Tier market in order to gain market share. The likelihood of price depression or suppression in this market is accentuated by the substantial excess capacity in Mexico. The high fixed costs faced by cement producers provide significant incentive to the Mexican producers to sell their additional excess product even at low costs in order to meet their fixed costs. Moreover, increasing Mexican imports have been subject to high cash deposit rates under the order; in their absence Mexican imports could be priced significantly lower in the United States, including the Southern Tier region.[236] Mexican producer CEMEX has indicated that it likely would substitute Mexican imports for the large volumes of non-subject imports that it has imported into the Southern Tier region with the order in place.[237] Such a substitution would allow CEMEX to lower its prices in the Southern Tier region to reflect decreases in transportation costs for Mexican imports compared to those for more distant non-subject sources.[238] Conversely, the regional domestic industry's capacity expansion projects, and the resultant increase in supply, is likely to increase price sensitivity in the market.

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[234] Subject imports from Mexico undersold domestic product in 71 months and oversold domestic product in 85 months. Price comparisons of Mexican and domestic product were only possible in four markets -- Phoenix, AZ, Tuscon, AZ, Albuquerque, NM, and San Diego, CA. Subject imports from Mexico predominately undersold the domestic product in the Phoenix, AZ market (36 of 39 months), with consistent underselling from August 1998 to March 2000, and had mixed underselling in the Tuscon, AZ market (20 of 39 months). The predominant underselling in the Arizona market where subject imports from Mexico face competition with two domestic producers, California Portland and Phoenix Cement, even with the order in place, provides an indication of the likely pricing patterns for subject imports from Mexico if the order is revoked. Tr. at 177 (CEMEX official acknowledged excess capacity at CEMEX's Hermosillo plant, which supplies customers in Arizona). Moreover, in Albuquerque, NM, where the subject imports compete with a regional producer owned by a Mexican producer, subject imports undersold the domestic product in 15 of 39 months. Subject imports from Mexico consistently oversold the domestic product in the San Diego market. CR/PR at V-8 and Tables V-4, F-15, F-16, F-17, and F-18.

[235] CR at V-7; PR at V-5.

[236] In reaching our conclusion on likely price effects, we have weighed all the pertinent evidence on price and taken into account Commerce's duty absorption finding on Mexico, although we note respondents' argument that a recent CIT decision calls into question the validity of Commerce's duty absorption findings with respect to transition orders. 65 Fed. Reg. 13943 (March 15, 2000); see also Issues and Decisions Memo for the Administrative Review of Gray Portland Cement and Clinker from Mexico -- August 31, 1997 through July 31, 1998 from Richard W. Moreland to Robert S. LaRussa, Assistant Secretary for Import Administration, dated March 15, 2000 at 47 and 48; 65 Fed. Reg. at 41050 (July 3, 2000); see also Issues and Decisions Memo for the Sunset Review of Gray Portland Cement and Cement Clinker from Mexico; Final Results from Jeffrey A. May to Troy H. Cribb, Acting Assistant Secretary for Import Administration, dated June 27 at 8-15; SKF USA, Inc. v. United States, 94 F. Supp.2d 1351 (CIT 2000), remand aff'd, Slip Op. 00-101 (CIT, Aug. 18, 2000). However, we do not rely on the duty absorption findings in making our determination that significant effects are likely upon revocation of the order.

[237] Tr. at 154 (Clyburn).

[238] Tr. at 172 and 175. CEMEX stated that it would realize a cost savings of $3 per ton if it were to replace the cement imports from China that it is currently selling in the United States with cement from Mexico if the antidumping duty order were removed. Id. The difference of $3 per ton is substantial, particularly for a highly-substitutable, price-sensitive product, such as cement. These reduced transportation costs provide CEMEX with the flexibility to lower its price for cement imports from Mexico in the U.S. market without reducing its profit margins.

For the foregoing reasons, we find that revocation of the antidumping duty order on gray portland cement and cement clinker would be likely to lead to significant underselling by the subject imports of the domestic like product in the Southern Tier region, as well as significant price depression and suppression, within a reasonably foreseeable time.

3. Likely Impact

In the original investigation, the Commission found material injury by reason of subject imports due to the volume of imports, the relatively high market penetration, and the effect of the dumped imports on prices.[239] The Commission particularly noted the effects of the dumped imports on the condition of the regional industry and that it examined the record pertaining to individual producers in the region.[240]

We find that the likely significant volume of subject imports would adversely impact the regional industry if the antidumping duty order is revoked. The order appears to have had a beneficial effect on the regional industry's performance. The condition of the regional industry has improved since imposition of the order. While production capacity in the Southern Tier region increased by less than five percent from 1989 to 1999, regional production increased by almost 30 percent for the same period.[241] Thus, the regional producers' capacity utilization has increased from 75.1 percent in 1989 to 92.6 percent in 1999.[242] However, while regional producers' shipments in absolute terms have increased since the original investigation, the increases for these shipments during the period of review have not been at the same rate as the substantial growth in apparent consumption in the Southern Tier region.[243] Therefore, the regional industry's share of apparent consumption in the Southern Tier declined, from 75.6 percent in 1997 to 65.1 percent in 1999.[244] The regional industry's market share in 1999 was lower than its market share of 69.7 percent in 1989.[245] The strong demand for gray portland cement during the period of review has contributed to the regional industry's positive financial performance. The regional industry's operating income margin was 5.6 percent in 1989 as compared to 29.0 percent in 1997, 30.5 percent in 1998, and 32.4 percent in 1999.[246] Based on the industry's recent overall performance, we do not find that the regional industry is currently in a vulnerable state.

As discussed above, revocation of the antidumping duty order would likely lead to a significant increase in the volume of subject imports into the Southern Tier region, and these shipments would likely undersell the domestic product and significantly depress or suppress the regional industry's prices. With demand in the Southern Tier region projected to increase at slower rates or remain flat in a price-sensitive market, the increase in subject imports is likely to cause decreases in both the prices and volume of regional producers' shipments. In addition, the volume and price effects of subject imports would likely cause the regional industry to lose further market share. This loss in market share and subsequent decrease in capacity utilization would be particularly harmful in this capital intensive

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[239] USITC Pub. 2305 at 46-51 and 65-67.

[240] USITC Pub. 2305 at 47-51 and 67.

[241] CR/PR at Table I-1A.

[242] CR/PR at Table I-1A.

[243] CR/PR at Table I-1A. Regional producers' shipments within the Southern Tier region and to the entire U.S. market increased by 2.8 percent and 4.2 percent, respectively, from 1997 to 1999. By comparison, apparent consumption in the Southern Tier region increased by 19.3 percent from 1997 to 1999. Id.

[244] CR/PR at Table I-1A.

[245] CR/PR at Table I-1A.

[246] CR/PR at Tables I-1A and III-6A, III-7A, and III-8A.

industry -- producers require high capacity utilization levels and operating margins to meet fixed costs and to justify capital expenditures.

The Southern Tier regional producers have undertaken, or have announced plans to begin, a number of production capacity expansion projects in order to meet increased demand.[247] As discussed above, the process of expanding production capacity takes three to five years for planning, permitting, and construction. Thus, these extremely capital intensive projects were begun as demand accelerated and have begun to be placed on line, or will be placed on line in the reasonably foreseeable future.[248] The evidence shows that capital expenditures by Southern Tier regional producers have increased substantially from 1997 to 1999.[249] Moreover, the demand cycle appears to have reached a peak with slower growth or constant demand expected in the Southern Tier region in the reasonably foreseeable future. Thus, the regional producers' investments in additional capacity will be particularly susceptible to the likely significant increases in subject imports if the order is revoked, and the result likely would be an adverse impact on the regional industry's capacity utilization levels and profitability due to high fixed costs.

We do not find that the regional industry's current level of operating income indicates that it likely would not be materially injured upon revocation of the order. Due to the cyclicality of the cement industry, high profits at the peak of a cycle are typical and do not indicate that the industry is immune from material injury. Moreover, due to the high fixed costs in this industry, relatively high levels of profitability are needed to justify investments and capital expenditures.[250]

While we analyzed the statutory factors regarding the aggregate data for the regional industry, we also examined the performance of individual regional producers to look for anomalies as a safeguard "to assure that the 'all or almost all' standard [was] met."[251] Mexican respondents have argued that the regional producers representing all or almost all of the production in the Southern Tier region would not experience continuation or recurrence of material injury if the order is revoked.[252] First, we are not convinced that the Mexican producers would refrain from using their excess capacity to ship cement to the Southern Tier region at volumes or price levels that would injure regional producers including their regional subsidiaries. As discussed above, the large capacity of the Mexican cement industry with its low capacity utilization levels and need to meet high fixed costs would provide necessary incentive for the Mexican producers to increase shipments to the Southern Tier region if the order is revoked. Without the discipline of the order, the interests of the Mexican operations likely would not be secondary to those of their smaller Southern Tier subsidiaries, which are running ***.

Second, we also are not convinced by respondents' arguments that, due to the regional nature of the cement industry, certain markets are insulated from competition with subject imports from Mexico and thus producers of all or almost all regional production would not be materially injured. While transportation costs tend to limit the distances that cement is shipped, we note that 20 percent of

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[247] CR/PR at Table I-7; Domestic Producers' Final Comments at 4-7; Domestic Producers' Prehearing Brief at 78-83.

[248] As noted earlier, we recognize that all announced expansion plans will not necessarily be completed and have considered that those in the construction phase, generally two years in duration, are more certain of completion than those in the planning or permitting phases. In the next two years alone, over 5 million short tons in production capacity is expected to come into service in the Southern Tier region. CR/PR at Table I-7.

[249] CR/PR at Table III-10A. Capital expenditures reported by Southern Tier regional producers were: $159.1 million in 1997, $277.9 million in 1998, $620.8 million in 1999, $93.5 million in interim period (Jan.-Mar.) 1999, and $145.6 million in interim period (Jan.-Mar.) 2000. Id.

[250] Tr. at 49

[251] Cemex, 790 F. Supp. at 296. CR/PR at Tables E-1 - E-8.

[252] Mexican Respondents' Posthearing Brief at 16-21.

We find that without the discipline of the antidumping duty order, there is a substantial likelihood that the Japanese cement would be priced aggressively in the California market in order to gain market share. The likelihood of price depression or suppression in this market is accentuated by the substantial excess capacity in Japan. The high fixed costs faced by cement producers provide significant incentive to the Japanese producers to sell their additional excess product even at low costs in order to meet their fixed costs. Conversely, the regional industry's capacity expansion projects and the resultant increase in supply is likely to increase price sensitivity in this market.

For the foregoing reasons, we find that revocation of the antidumping duty order on gray portland cement and cement clinker would be likely to lead to significant underselling by the subject imports of the domestic like product in the California region, as well as significant price depression and suppression, within a reasonably foreseeable time.

3. Likely Impact

We find that the likely significant volume of subject imports would adversely impact the regional industry if the antidumping duty order is revoked. The order appears to have had a beneficial effect on the regional industry's performance. The condition of the regional industry has improved since imposition of the order. While production capacity in the California region increased by less than two percent from 1990 to 1999, regional production increased by almost 16 percent for the same period.[275] Thus, the regional producers' capacity utilization has increased from 84.1 percent in 1990 to 95.5 percent in 1999.[276] However, while regional producers' shipments in absolute terms have increased since the original investigation, the increases for these shipments during the period of review have not been at the same rate as the substantial growth in apparent consumption in the California region.[277] Therefore, the regional industry's share of apparent consumption in the California region declined from 88.9 percent in 1997 to 73.9 percent in 1999.[278] The regional industry's market share in 1999 was the same as its market share of 73.9 percent in 1990.[279] The strong demand for gray portland cement during the period of review has contributed to the regional industry's positive financial performance. The regional industry's operating income margin was 18.6 percent in 1990 as compared to 23.1 percent in 1997, 26.9 percent in 1998, and 28.2 percent in 1999.[280] Based on the industry's recent overall performance, we do not find that the regional industry is currently in a vulnerable state.

As discussed above, revocation of the antidumping duty order would likely lead to a significant increase in the volume of subject imports into the California region, and these shipments would likely undersell the domestic product and significantly depress or suppress the regional industry's prices. With demand in the California region projected to increase at slower rates or remain flat in this price-sensitive market, the increase in subject imports is likely to cause decreases in both the prices and volume of regional producers' shipments. In addition, the volume and price effects of subject imports would likely cause the regional industry to lose further market share. This loss in market share and subsequent decrease in capacity utilization would be particularly harmful in this capital intensive industry --

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[275] CR/PR at Table C-6 and USITC Pub. 2376 at Table 7.

[276] CR/PR at Table C-6 and USITC Pub. 2376 at Table 7.

[277] CR/PR at Table C-6. Regional producers' shipments within the California region and to the entire U.S. market increased by 8.6 percent and 1.1 percent, respectively, from 1997 to 1999. By comparison, apparent consumption in the California region increased by 30.6 percent from 1997 to 1999. Id.

[278] CR/PR at Table C-6.

[279] CR/PR at Table C-6 and USITC Pub. 2376 at Table 6.

[280] CR/PR at Tables C-6 and USITC Pub. 2376 at Table 17.

producers require high capacity utilization levels and operating margins to meet fixed costs and to justify capital expenditures.

The California regional producers have undertaken, or have announced plans to begin, a number of production capacity expansion projects in order to meet increased demand.[281] As discussed above, the process of expanding production capacity takes three to five years for planning, permitting, and construction. Thus, these extremely capital intensive projects were begun as demand accelerated and have begun to be placed on line, or will be placed on line in the reasonably foreseeable future.[282] The evidence shows that capital expenditures by California regional producers have increased substantially from 1997 to 1999.[283] Moreover, the demand cycle appears to have reached a peak, with slower growth expected in the California region in the reasonably foreseeable future. Thus, the regional producers' investments in additional capacity will be particularly susceptible to the likely significant increases in subject imports if the order is revoked, and the result likely would be an adverse impact on the regional industry's capacity utilization levels and profitability due to high fixed costs.

We do not find that the regional industry's current level of operating income indicates that it likely would not be materially injured upon revocation of the order. Due to the cyclicality of the cement industry, high profits at the peak of a cycle are typical and do not indicate that the industry is immune from material injury. Moreover, due to the high fixed costs in this industry, relatively high levels of profitability are needed to justify investments and capital expenditures.[284]

While we analyzed the statutory factors regarding the aggregate data for the regional industry, we also examined the performance of individual regional producers to look for anomalies as a safeguard "to assure that the 'all or almost all' standard [was] met."[285] Japanese respondents have argued that the regional producers representing all or almost all of the production in the California region would not experience continuation or recurrence of material injury if the order is revoked.[286] First, we are not convinced that the Japanese producers would refrain from using their excess capacity to ship cement to the California region at volumes or price levels that would injure regional producers including their regional subsidiaries.[287] As discussed above, the extremely large capacity of the Japanese cement industry, with its low capacity utilization levels and need to meet high fixed costs, would provide necessary incentive for the Japanese producers to increase shipments to the California region if the order is revoked. Without the discipline of the order, the interests of the Japanese operations likely would not be secondary to those of their small California subsidiaries, which are running at ***. Ownership of California facilities did not prevent Japanese producers from shipping significant quantities of cement at

281 CR/PR at Table I-7; Domestic Producers' Final Comments at 4-7; Domestic Producers' Prehearing Brief at 78-83.

282 We recognize that all announced expansion plans will not be undertaken and have considered that those in the construction phase, generally two years in duration, are more certain of completion than those in the planning or permitting phases. In the next two years alone, over *** in production capacity is expected to come into service in the California region. CR/PR at Table I-7.

283 CR/PR at Table III-10B and Questionnaire responses. Capital expenditures reported by California regional producers were: $59.9 million in 1997, $51.8 million in 1998, $103.9 million in 1999, $21.4 million in interim period (Jan.-Mar.) 1999, and $37.0 million in interim period (Jan.-Mar.) 2000. Id.

284 Tr. at 49

285 Cemex, 790 F. Supp. at 296. CR/PR at Tables E-1 - E-9.

286 Japanese Respondents' Prehearing Briefs at 30-34; Japanese Respondents' Final Comments at 1-5 and 11-12. The Japanese respondents contended that Japanese producers would not ship excessive volumes of imports at price levels that would injure their regional investments and production, and that "the 'all or almost all' standard is not met here because ***." Id. at 2 and 11.

287 Japanese Respondents' Final Comments at 11-12.

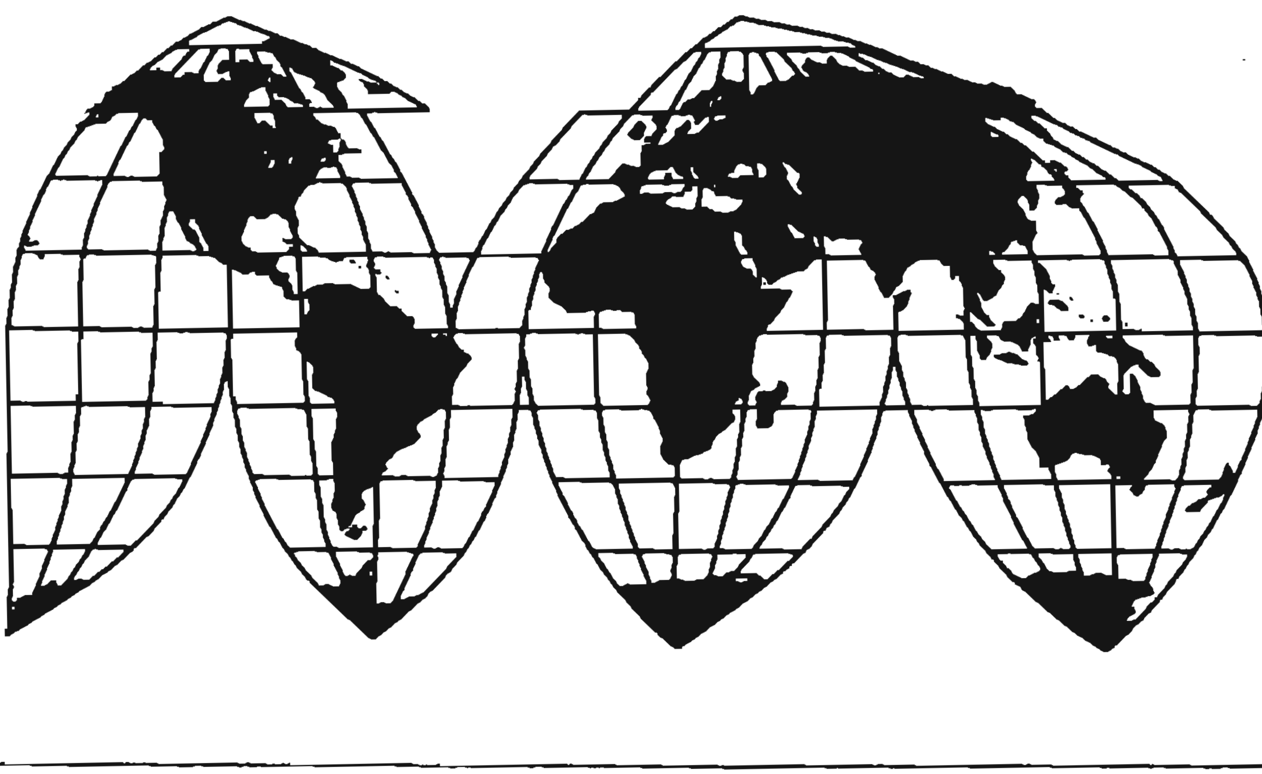
EXHIBIT 4

Gray Portland Cement and Cement Clinker From Japan

Investigation No. 731-TA-461 (Second Review)

Publication 3856 **May 2006**

U.S. International Trade Commission



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U.S. International Trade Commission

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Southern California.[27] In the first five-year review, the Commission revisited its regional industry definition, and found that there had been integration of the Northern and Southern regions of California. As such, having found that the market isolation criteria were satisfied, the Commission defined the region as the State of California.[28]

In this second review, the domestic interested parties advocate that the regional industry analysis continues to be appropriate and that the Commission again define the region as the State of California.[29]

C. Analysis

For the reasons discussed below, we determine that the record in this review supports a finding of a regional industry corresponding to the region of the State of California.

In five-year reviews involving regional industries, according to the SAA, the Commission should take into account any prior regional industry definition and whether the subject product has characteristics that naturally lead to the formation of regional markets (e.g., whether the product has a low value-to-weight ratio and is fungible).[30] According to the record in this review, cement is a low value-to-weight product and a fungible product, as the domestically produced product and subject imports are highly interchangeable.[31] The relatively low value-to-weight ratio of cement and relatively high transportation costs appear to limit the distances to which cement is shipped.[32] In this second period of review, as during the periods examined in the original investigation and first five-year review, the majority of producer shipments within the region were shipped to customers within 200 miles of the manufacturing plant and the majority of importer shipments within the region were shipped to customers within 200 miles from the port of entry.[33] Moreover, the practice of "freight equalization" or "freight absorption" is still performed in the industry, making transportation costs an important component of cement sales.[34]

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[27] Original Determination, at 13, 17-20, and 47-50.

[28] First Five-Year Determination, at 14, 17-18.

[29] Domestic Industry Comments on the Merits ("Domestic Industry Comments") at 6.

[30] SAA at 888. The Commission has found, in the past, that "appropriate circumstances" exist for the Commission to engage in a regional industry analysis for products with low value-to-weight ratios and where high transportation costs make the areas in which the product is produced necessarily isolated and insular. See, e.g., Gray Portland Cement and Cement Clinker From Japan, Mexico, and Venezuela, Invs. Nos. 303-TA-21 (Review) and 731-TA-451, 461, and 519 (Review) USITC Pub. 3361 (October 2000) at 12; See also Limestone, USITC Pub. 2533; Nepheline Syenite from Canada, Inv. No. 731-TA-525 (Final) USITC Pub. 2502 (April 1992)("Nepheline Syenite"); Gray Portland Cement and Cement Clinker from Venezuela , Inv. No. 731-TA-519 (Preliminary) USITC Pub. 2400 (July 1991)("Venezuela Cement"); Gray Portland Cement and Cement Clinker from Japan, Inv. No. 731-TA-461 USITC Pub. 2376 (April 1991)("Japan Cement,"); Gray Portland Cement and Cement Clinker from Mexico, Inv. No. 731-TA-451 (Final) USITC Pub. 2305 (August 1990)("Mexico Cement") .

[31] CR at V-1, I-11/ PR at V-1, I-9.

[32] CR/PR at V-1.

[33] CR/PR at V-1.

[34] CR/PR at V-3.

review, we consider the performance of individual regional producers as well as the performance of the regional industry in the aggregate, although we lack current data on individual producer performances in this expedited second review.

C. Conditions of Competition

In evaluating the likely impact of the subject imports on the domestic industry, the statute directs the Commission to consider all relevant economic factors "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[92] The following conditions of competition are relevant to our determination.

As at the time of the original investigation and first five-year review, cement continues to be a highly fungible, commodity product, and cement is readily interchangeable regardless of the country of origin.[93] Cement generally conforms to the standards established by the American Society for Testing and Materials ("ASTM"). In the first review, nearly all responding purchasers reported that U.S. produced cement and imported Japanese cement were used in the same applications.[94]

Price is an important factor in purchasing decisions.[95] Due to cement's low value-to-weight ratio, U.S. inland transportation costs account for a relatively large share of the delivered price of cement and are a limiting factor as to the distances to which cement is shipped.[96] As a result, the market for cement tends to be regional in nature.

Given that cement is used almost exclusively in concrete, the demand for cement is dependent on the demand for concrete.[97] Concrete, in turn, is essential to all types of construction, namely residential and commercial building as well as highways.[98] Because demand for cement is derived entirely from the demand for concrete and cement accounts for only a small measure of the cost of construction, demand for cement is relatively inelastic.[99] Moreover, because demand for cement is tied closely to construction activity, demand for cement tends to be cyclical in nature.[100] However, the overall demand for cement is somewhat less volatile than any particular construction market since cement is used in every type of construction. Demand for cement also tends to be seasonal, with peaks in consumption occurring in the summer months when the level of construction is highest.[101]

Apparent consumption in the State of California region declined from 12.2 million tons in 1990 to 10.0 million tons in 1997.[102] However, from 1997 to 1999, apparent consumption increased from 10.0 million tons to 13.0 million tons,[103] near the peak level of 13.2 million tons reached in 1989.[104] This increase in demand in the region was attributable to changes in the California construction market. Specifically, demand for cement increased as construction activity increased as a result of the growth in

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[91] (...continued)
918 F. Supp. at 427 (CIT 1996).

[92] 19 U.S.C. § 1675a(a)(4).

[93] CR at I-11/PR at I-10.

[94] First Review Report at I-26-I-27, I-33, and II-27-II-28.

[95] First Review Report at II-26.

[96] CR at I-24, II-1, V-1/PR at I-20, II-1, V-1.

[97] CR at II-7/PR at II-5.

[98] CR/PR at II-1.

[99] CR at II-8/PR at II-5.

[100] CR at II-8/PR at II-5.

[101] CR at II-8/PR at II-5.

[102] CR/PR at Table I-4B.

[103] CR/PR at Table I-4B.

[104] CR/PR at Table I-4B.

population and the state economy, low interest rates, and significantly improved government fiscal conditions that supported increased public works projects such as major highways.[105]

A number of industry forecasts at the time of the first review suggested that demand for cement in the California region would likely increase at relatively modest rates from 2001 to 2003.[106] According to the domestic interested parties in this second review, there has been increased demand in the region "in recent years that resulted principally from record levels of new residential construction."[107]

From the period examined in the original investigations to the period of the first review, approximately one-half of the regional cement operations underwent a change in ownership, with the share of foreign ownership increasing substantially.[108] In the original investigation, approximately 50 percent of domestic cement operations were owned by foreign corporations, while in the first review period approximately 65 percent were foreign-owned.[109] In addition to foreign ownership, there was a significant degree of vertical integration between regional cement producers and the downstream ready-mix concrete operations.[110]

As was true at the time of the original investigation and first period of review, the cement industry is highly capital intensive.[111] Because of the industry's high fixed costs, production facilities must operate at high capacity utilization levels in order to maximize the return on investment.[112] Cement facilities generally cannot be used to produce other products.[113]

Cement production capacity in the State of California region increased less than two percent from 1990 to 1997.[114] This increase in capacity was far less than the increase in apparent consumption in the region for the same period. At the time of the first period of review, regional cement producers indicated that they were in the process of increasing, or had plans to increase, production capacity by some 3.5 million tons by 2004.[115] Although regional production capacity increased slightly from 1990 to 1999, regional production increased by 16 percent.[116] In 1999, reported regional production was 8.2 million tons.[117] Domestic interested parties in this second review indicate that regional cement production rose to 12.8 million tons in 2003.[118]

During the first review period, the regional industry's share of the California market decreased from 88.9 percent in 1997 to 73.9 percent in 1999.[119] Domestic producers' loss in market share was the result of increasing volumes of nonsubject imports as well as marginal but increasing volumes of subject imports during the first period of review. The share of the California market held by Japanese imports was 0.0 percent in 1997, 0.1 percent in 1998, and 0.2 percent in 1999, while the share of nonsubject imports was 10.9 percent in 1997, 20.6 percent in 1998, and 25.5 percent in 1999.[120] In both the original investigation and first five-year review, U.S. producers and their foreign affiliates were responsible for

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[105] Original Staff Report at Table 7; CR at II-9/PR at II-6.
[106] First Review Determination at 31-32.
[107] Domestic Industry Response at 56-57.
[108] First Review Report at I-39.
[109] First Review Report at I-34, Table I-1A; Original Staff Report at Table 7.
[110] First Review Report at I-II-4.
[111] Domestic Industry Response at 8-9.
[112] Domestic Industry Response at 8-9.
[113] First Review Report at II-7.
[114] First Review Report at Table C-6; Original Staff Report at Table 7.
[115] CR at I-29/PR at I-23.
[116] First Review Report at Table C-6; Original Staff Report at Table 7.
[117] CR/PR at Table III-1B.
[118] CR at III-2/PR at III-1.
[119] CR/PR at Table I-4A.
[120] CR/PR at Table I-4A.

production capacity remained substantial. [129] In 1999, the most recent year for which we have data, Japanese subject producers' average production capacity for gray portland cement was 90.0 million tons.[130] Morever, in 1999, Japanese subject producers' reported capacity utilization rate for gray portland cement was 88.7 percent.[131] In 1999, Japanese subject producers' unused capacity was equivalent to 75 percent of California apparent consumption,[132] and 80 percent of regional production for the same year. Given that cement producers must maintain and maximize capacity utilization in order to be profitable, the existence of significant unused capacity gives Japanese subject producers the incentive to substantially increase their exports to the region if the order were lifted.

In addition to unused capacity, Japanese subject producers' ability to maintain fairly high capacity utilization rates is due in part to their reliance on its export markets. Although most cement shipments of Japanese producers were consumed by their home market during the first period of review, Japanese subject producers shipped between 9.2 million and 6.3 million tons of gray portland cement to third-country markets.[133] If the order were revoked, there is an incentive for Japanese producers to shift at least some of their exports to the U.S. regional market as the record indicates that Japanese producers are facing increasing competition from cement producers in both China and India in third-country markets.[134]

We note that during both the original investigation and first period of review, Japanese subject producers owned or controlled cement production facilities in the region.[135] While this ownership/control may impact somewhat the volume of subject imports from Japan if the order is revoked, the volume of the subject imports is nevertheless likely to increase significantly. Indeed, substantial ownership of California production facilities did not prevent Japanese subject producers from exporting significant volumes of subject merchandise to the region during the original investigation. Moreover, the Japanese subsidiaries' established customer base and distribution system would enable Japanese subject producers to quickly increase sales of subject merchandise in the region if the order was lifted. Finally, at the end of first review period, Taiheiyo, a Japanese subject producer, had invested in a new permanent import terminal in California.[136]

Given the subject producers' substantial production capacity and unused capacity, their continued reliance on export markets, increasing competition in third-country markets, the increase in subject exports to the United States in the original investigation, as well as such producers' need to maximize production capacity to be profitable, subject producers are likely to increase exports significantly to the region upon revocation of the antidumping duty order. Consequently, based on the record in this review, we conclude that the volume of subject imports likely would increase to a significant level and regain significant regional market share if the orders were revoked. Accordingly, we conclude that the likely volume of the subject merchandise, both in absolute terms and relative to consumption in the State of California region, would be significant, absent the restraining effect of the order.

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[129] CR at IV-12/PR at IV-9-IV-10.

[130] CR/PR at Table IV-3. We note that the domestic interested parties submitted figures pertaining to Japanese production capacity and Japanese apparent consumption in 2004. Domestic Industry Response at Attachment 36. However, since there is no indication in the record as to the source of these figures or how they were calculated, we rely instead on the data collected by the Commission in the first review.

[131] CR/PR at Table IV-3.

[132] Compare CR/PR at Tables I-4A and IV-3.

[133] CR/PR at Table IV-3.

[134] Domestic Industry Response at 46-47.

[135] First Review Report at I-51-I-52 and IV-38-IV-40.

[136] CR at IV-13, n.25/PR at IV-10, n.25.

is in a weakened state as contemplated by the statute. Therefore, given the limitations of the record, we are unable to reach a determination as to whether the regional industry is currently vulnerable.

As discussed above, revocation of the antidumping duty order would likely lead to a significant increase in the volume of subject imports into the State of California region, and these subject imports would likely undersell the domestic product and significantly depress or suppress the regional industry's prices. In addition, the volume and price effects would likely cause the regional industry to lose market share. This loss in market share and subsequent decrease in capacity utilization would be particularly harmful in this capital intensive industry, as cement producers must maintain high capacity utilization levels and operating margins to meet fixed costs and to justify capital expenditures. Morever, given the recent capacity expansions by the regional industry over the period of review, the decline in capacity utilization and revenue would likely be accelerated. In addition, the volume and price effects of the subject imports would likely have a significant adverse impact on the domestic industry's production, shipments, sales, and revenue levels.

Reductions in the regional industry's production, shipments, sales, and revenue levels would have a direct adverse impact on the industry's profitability as well as its ability to raise capital and make and maintain necessary capital investments. In addition, we find it likely that revocation of the order will result in employment declines for the regional firms commensurate with reduced production and profitability.

While we analyzed the statutory factors regarding the aggregate data for the regional industry, we also examined the performance of individual regional producers to look for anomalies as a safeguard "to assure that the 'all or almost all' standard [was] met."[145] As discussed above, a substantial percentage of California cement production is owned or controlled by Japanese subject producers. While the volume of likely imports may be limited somewhat as result of this ownership, if the order were revoked, subject imports would likely enter the California region at volumes or price levels that likely would injure regional producers including their regional subsidiaries. As discussed above, the substantial production capacity of the Japanese cement industry, with its low capacity utilization levels and need to meet high fixed costs, would provide necessary incentive for the Japanese producers to increase shipments to the California region if the order is revoked. Without the discipline of the order, the interests of the Japanese operations likely would not be secondary to those of their comparatively small California subsidiaries. Ownership of California facilities did not prevent Japanese producers from shipping significant quantities of cement at low prices to the California region in the original investigation. Moreover, even if an individual subject producer attempted to direct its imports to shield its regional affiliate's production, that regional affiliate likely would still be adversely affected by imports from other subject producers.

Accordingly, based on the limited record in this review, we conclude that, if the antidumping duty order is revoked, subject imports from Japan would be likely to have a significant adverse impact on the State of California industry within a reasonably foreseeable time.

CONCLUSION

For the foregoing reasons, we conclude that revocation of the antidumping duty order on gray portland cement and cement clinker from Japan would be likely to lead to continuation or recurrence of material injury to the California regional industry within a reasonably foreseeable time.

[145] Cemex, 790 F. Supp. at 296. CR/PR at Tables at D-1-D-9.

retard water absorption and allow for easier handling. This grinding step and the materials added are very important in determining the specifications and type of finished cement.

Portland cement is the most important of the four major categories of hydraulic cements,[35] accounting for just over 95 percent of domestic production in 2003.[36] All cement, including imports from Japan, generally conforms to the standards established by the American Society for Testing and Materials (ASTM).[37] General descriptions of the five standard types of portland cement are defined by ASTM as follows:[38]

Type I–For use when the special properties specified for any other type are not required;

Type II–For general use, especially when moderate sulfate resistance or moderate heat of hydration is required;

Type III–For use when high early strength is required;

Type IV–For use when a low heat of hydration is required; and

Type V–For use when high sulfate resistance is required.

In 1998 and 2003, types I and II portland cement together accounted for just over 90 and just under 83 percent, respectively, of the quantity of all shipments of portland cement from U.S. plants (table I-2).[39] Although specifications for type I and type II portland cement are very similar, they differ in that type I has no specifications for several items that are specified for type II. Thus, type II cement meets all the requirements of type I cement and may be used in lieu of type I. In addition to the standard portland cements, there are a number of special cement blends that contain portland cement.[40]

Cement is hygroscopic; that is, it has a tendency to absorb water. Because cement is hygroscopic, it must be handled and stored in a manner that minimizes the possibility of contamination by water. Thus, both domestic producers and importers must use some type of enclosed system or storage silo and relatively sophisticated equipment to handle finished cement.

Gray portland cement is used predominantly in the production of concrete, which in turn is consumed almost wholly by the construction industry. The chief end users are highway construction using ready-mix concrete and building construction using ready-mix concrete, concrete blocks, and precast concrete units. In many building applications, concrete is used with steel reinforcement to obtain greater strength and durability. One ton of portland cement is used to make about 4 cubic yards of concrete.

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[35] Portland, masonry, pozzolanic, and natural or Roman cement are the four major categories of hydraulic cements.

[36] USGS, *Annual Mineral Industry Survey, Cement, 2003*. In 1998, portland cement accounted for about 95 percent of domestic production. USGS, *Annual Mineral Industry Survey, Cement, 1998.*

[37] *First Review Report*, p. I-23 and Japanese Cement Committee response (Second Review), p. 7.

[38] Norman L Weiss, ed., *SME Mineral Processing Handbook* (Society of Mining Engineers, American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., New York, NY, 1985), volume II, p. 26-3.

[39] USGS, *Annual Mineral Industry Survey, Cement, 2003 and* USGS, *Annual Mineral Industry Survey, Cement, 1998.*

[40] Blended cements are not portland cements, but are inter-ground mixtures of finished portland cement (ground clinker plus gypsum) and cementitious additives, with the proportion of additives commonly ranging between 15 and 50 percent by weight. USGS, *Annual Mineral Industry Survey, Cement, 1998.*

Table I-3
Gray portland cement:[1] U.S. producers' estimated shipments[2] as a percentage of total shipments, by types of customers, 1998 and 2003

Type of customer	Percent of total	
	1998	2003
Ready-mixed concrete	74.2	74.2
Concrete product manufacturers	11.9	13.8
Road paving contractors	4.8	3.3
Building material dealers	3.8	3.8
Other contractors	3.1	3.0
Oil well drilling, mining, and waste stabilization	1.1	1.3
Federal, state, and other government agencies, and miscellaneous	1.1	0.9
Total	100.0	100.0

[1] Includes cement imported and distributed by domestic producers.
[2] Includes Puerto Rico.

Source: Compiled from data provided by the USGS, *Mineral Industry Survey, Cement 1998*.

Manufacturing Process[41]

For both the imported and domestic products, the production process for gray portland cement is standardized, with no significant technological advances since the original investigation in 1989-91. Gray portland cement is manufactured from a properly proportioned mixture of raw materials containing chemical components of calcium carbonate, silica, alumina, and iron oxide that react when combined with aggregate and water to form concrete. The raw material mixture usually consists of limestone (a source for calcium carbonate), clay (for silica and alumina), and iron ore (for iron oxide). In cases where the common materials are not available or contain an insufficient amount of the chemical components, other mined materials or industrial products may be substituted or used as additives to correct the deficiencies. The mixture is crushed, ground, and blended into a mill feed that is sintered at about 2,700 degrees Fahrenheit in refractory-lined, cylindrical, steel rotary kilns to make cement clinker.

There are basically two processes used to blend the raw materials to produce cement: a wet and a dry process, which are both depicted in figure I-1. The differences between wet and dry blending are procedural; there are no chemical or physical characteristic differences between the end products. In the wet process, the raw materials are ground, blended, and mixed with water to produce a slurry. This slurry is fed into rotary kilns in which it is heated to induce chemical reactions that convert the raw material into cement clinker. The wet process has typically been used where some of the raw materials are very moist; it is also the older process.

In the dry process, all grinding and blending are done with dry materials in a roller mill. The more technically advanced facilities in the United States and Japan improve the efficiency of the dry process by feeding the blended raw material through a preheater and precalciner in which it is partially heated using vented kiln gases and partially calcined by direct firing in a blast furnace before entering the rotary kiln. In those dry process facilities that do not include preheater/precalciner technology, the raw material is fed directly into a rotary kiln in which it is calcined into clinker.

The main advantage of the dry process is that it is more fuel efficient, depending on the moisture content of raw materials economically available; preheaters and precalciners further improve this

[41] *First Review Report*, p. I-25-I-27.

efficiency. In general, the dry process with preheaters consumes 19 percent less fuel than the national average of fuel consumed by all kilns per short ton of clinker production, whereas the wet process consumes 12 percent more than the national average. Kiln size is also a factor in fuel efficiency, with larger kilns being more efficient than the smaller ones. However, the dry process requires more electricity per unit of output than the wet process. Although electricity is used mostly for grinding clinker and pollution control, it is also used to operate the fuel conservation equipment (i.e., preheaters and precalciners). Some in the industry have expressed concern that increasing electrical costs (which vary nationwide), compared with fuel costs, could reduce the fuel cost advantage of the dry process.[42] In 2003, the USGS reported that the dry process production lines utilizing preheaters and/or precalciners consumed more electricity than equivalent capacity wet process lines.[43]

In 2003, approximately 78 percent of U.S. cement clinker production facilities used the dry process;[44] many domestic producers converted their facilities to the dry process to counter higher fuel costs as a result of the energy crisis in the mid-1970s. In Japan, the dry process reportedly is used for all of the cement clinker production.[45]

For both the wet and dry processes, the major sources of energy to operate the kiln include coal, fuel oil, and natural gas.[46] In the United States, the fuel predominantly used is coal; in the original investigations, the Japanese industry reported using mostly fuel oil. The choice of fuel is generally determined by the economics of fuel prices; transportation cost to the production site; efficiency cost in using one fuel over another; and, for already established facilities, the additional capital cost for handling equipment to convert from one fuel to another.[47]

Channels of Distribution

As noted in table I-3, nearly three-quarters of gray portland cement is distributed to readymix concrete operations. In many instances, the readymix operations are owned by or related to U.S. producers and importers.

Customer and Producer Perceptions

As noted earlier, gray portland cement is a fungible product, with domestically produced product and imported product being readily interchangeable.[48] During this review, the Japanese Cement Committee commented on this fact.

> "It {cement} is sold in the United States primarily in bulk form without distinctive packaging or labeling. Thus, domestic and imported cement are indistinguishable and are highly substitutable. There is little or no brand consciousness and little or no loyalty to any particular supplier. As a result, the prices offered by all suppliers in the competitive regional markets of the United States are dictated by competition based almost exclusively on price. Only a small price differential is usually sufficient to induce customers to shift suppliers, whether domestic or foreign. Consequently, domestic

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[42] U.S. Department of Commerce, *A Competitive Assessment of the U.S. Cement Industry.*

[43] USGS, *Annual Mineral Industry Survey, Cement, 2003* and USGS, *Annual Mineral Industry Survey, Cement, 1998.*

[44] USGS, *Annual Mineral Industry Survey, Cement, 2003.* In 1998, approximately 69 percent of U.S. cement clinker production facilities used the dry process. USGS, *Annual Mineral Industry Survey, Cement, 1998.* In 1988, approximately 59 percent of cement clinker was produced by the dry process. *Original Report*, p. A-9.

[45] *Cement in Japan 1999*, Japan Cement Association.

[46] In 2003, there was a "large, possibly cost-related decrease in the amount of natural gas consumed, particularly by dry process plants." USGS, *Annual Mineral Industry Survey, Cement, 2003.*

[47] U.S. Department of Commerce, *A Competitive Assessment of the U.S. Cement Industry*, p. 150.

[48] *First Review Report*, p. I-28 and Japanese Cement Committee response (Second Review), p. 7.

producers are required to match lower prices offered by importers or lose sales on a ton-by-ton basis. Matching the lower import price, however, inevitably causes domestic producer producers to suffer price depression and suppression."[49]

Additional information with respect to customer and producer perceptions is found in Part II of this report, *Conditions of Competition in the U.S. Market.*

Price

The only pricing data available for this report are from the original investigation owing to the fact that the Japanese essentially dropped out of the Southern California and California markets after the original investigation and, in the first review, no importers of Japanese product provided price data. During the original investigation, weighted-average delivered prices for U.S.-produced gray portland cement sold in California generally declined in all market areas from January 1986 to March 1990. Trends in weighted-average delivered prices for Japanese cement were mixed, but generally also declined.[50] Additional information with respect to pricing comparisons of products from the subject countries and the United States is found in Part V of this report, *Pricing and Related Data.*

SUMMARY DATA

Tables I-4A and I-4B present a summary of data from the original investigations and from the first review for Southern California and California, respectively.[51] In this report, all tables concerning "Southern California" end in the capital letter **A**, while all tables relating to "California" end in the capital letter **B**. As noted earlier, in all but one of the 15 investigations (including the *First Review*) concerning gray portland cement, the Commission has used a regional industry analysis. In the 1986 investigation concerning imports from eight countries, petitioner, while noting that cement was sold in regional markets, argued that producers in all regional markets were being injured, and the Commission could, therefore, view injury on a national basis. The Commission made a unanimous negative determination at the preliminary stage of the investigation.[52] In the first review, the Commission presented data on a national industry. Such data are found in table C-3 of this report.[53]

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[49] Japanese Cement Committee response (Second Review), p. 7.

[50] *Original Report*, p. A-65.

[51] In its response in this review, the Japanese Cement Committee provided 2004 production and shipment, but no financial data for the following firms: Southern California firms -- ***. California firms -- the aforementioned firms plus ***. Japanese Cement Committee response (Second Review), attachment 49 and Japanese Cement Committee supplemental response (Second Review), exhibits 2 and 3. .

[52] *Portland Hydraulic Cement and Cement Clinker from Colombia, France, Greece, Japan, Mexico, the Republic of Korea, Spain, and Venezuela*, Investigations Nos. 731-TA-356 through 363 (Preliminary), USITC Publication 1925, December 1986.

[53] See also, table C-4, *First Review Report*.

With respect to production levels of cement production, the Japanese Cement Committee noted that producers strive to maximize production, stating:

> "All firms in the cement industry are driven to maximize production. In competitive cement markets, producers have a strong incentive to sell as much cement as possible as long as the price of the last unit sold exceeds the marginal cost of producing that unit. As discussed below, given the fungible nature of cement and the market realities in Mexico and Japan, the drive to maximize production compels Mexican and Japanese producers to sell in the United States at whatever price covers their marginal cost plus transportation, while domestic producers are equally compelled to match these lower prices to try to maintain market share and capacity utilization."[15]

Japanese Imports

Based on available information during the first review, Japanese exporters were likely to respond with a significant increase in shipments of gray portland cement to the Southern California/California market if the antidumping order was removed. The main reasons for Japanese exporters' supply responsiveness was the existence of *** levels of excess capacity, and *** alternative markets, from which Japanese exporters could shift sales. However, the supply response was significantly constrained by high U.S. inland transportation costs from import terminals to Southern California/California customers and infrastructure constraints in both Japan and Southern California/California. *** levels of inventories, and the lack of significant production alternatives further constrained Japanese exporters' supply response. Additional information with respect to the Japanese industry is found in Part IV of this report, *U.S. Imports and the Foreign Industry.*

Japanese industry capacity

During the first review, Japanese producers' capacity to produce gray portland cement fell marginally from 1997 to 1999, while production declined at a greater rate. As a result, capacity utilization fell from 98.8 percent in 1997 to 88.7 percent in 1999. Although Japanese producers' capacity utilization rates were high, the absolute levels of excess capacity were substantial (1.0 million short tons in 1997, 9.6 million short tons in 1998, and 9.4 million short tons in 1999).[16]

Alternative markets

The vast majority of Japanese-produced gray portland cement was shipped to its home market during 1997-99. Home market shipments accounted for 89.4 percent of total Japanese shipments in 1997, 91.6 percent in 1998, and 91.7 percent in 1999. Nearly all of the remaining Japanese gray portland cement was shipped to export markets other than the United States, or was internally consumed. For further discussion of alternative markets, as it relates to this review, the Japan Cement Committee's remarks are found in Part IV of this report, *U.S. Imports and the Foreign Industry.*

Japanese producers' inventories

[15] Japanese Cement Committee response (Second Review), pp. 6-7.
[16] See, table IV-3 of this report.

During the first review, Japanese producers held small levels of inventories relative to their production. The ratio of Japanese producers' inventories to production remained under 5 percent during 1997-99.[17]

Production alternatives

In the first review, Japanese producers reported that ***.

Infrastructure constraints

***. In the first review, Japanese respondents argued that Japanese producers without affiliations with Southern California/California import terminals were unlikely to export to the United States. Japanese respondents reported that only two Japanese producers, Taiheiyo and Mitsubishi, are affiliated with import terminals in California, and those two companies supplied the bulk of the exports during the period covered by the original investigation. During the period of the first review, the other Japanese producers ***, and Japanese respondents maintained that there was no reason they would begin to do so if the order were revoked. ***, and their only access to the Southern California/California markets would have been through import terminals controlled by their competitors.[18]

During the first review, domestic interested parties stated that Japanese producers had substantial import infrastructure in California. They reported that major Japanese producers already owned (or had access to) import terminals situated on deep-water ports in California. Taiheiyo operated a terminal in Wilmington, CA (near Long Beach) which had a storage capacity of around *** and a throughput capacity of approximately *** tons per year. Taiheiyo also utilized a floating cement storage silo at the port of Stockton in northern California. This facility, which is known as the "Golden Arrow," had a storage capacity of approximately 45,000 tons and a throughput capacity of between 500,000 and 600,000 tons. In addition, Taiheiyo had announced plans to build a new import terminal at the port of Stockton that was to have a throughput capacity estimated at 650,000 tons per year.[19]

Finally, in the first review, domestic interested parties reported that Mitsubishi Materials, through its ownership of MCC, owned the MCC-Lucky import terminal at Long Beach, CA. The terminal had a storage capacity of around 60,000 tons and a throughput capacity of *** tons. Collectively, the three import terminals owned or operated by the Japanese producers, plus the new one that was to be built in Stockton by Taiheiyo, would have had a throughput capacity of approximately *** million tons.[20]

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[17] See, table IV-3 of this report.

[18] *First Review Report*, p. II-5, n. 13, citing to Japanese respondents' *First Review* prehearing brief, pp. 46-47.

[19] *First Review Report*, p. II-6, n.1 4, citing to domestic interested parties' *First Review* prehearing brief, pp. 155-156.

[20] Ibid.

SUBSTITUTABILITY ISSUES[26]

Purchase Factors

In the first review, nearly all gray portland cement purchasers reported making daily purchases. Most purchasers reported in the first review that their purchasing patterns had not changed significantly since 1990, and they did not expect them to change in the next two years. Most purchasers reported that gray portland cement purchases are seasonal, following construction activity. Purchasers tended to buy more gray portland cement during the spring, summer, and fall than they did in the winter. Before making a purchase, most purchasers contacted between one and four suppliers. Most purchasers reported that they changed suppliers only infrequently; those that changed cited factors such as price, quality, and geographic location as reasons for changing. Most purchasers reported that they did not vary their purchases from a given supplier (within a given quarter) based on the price offered for that quarter. Eight of the 48 responding purchasers reported buying gray portland cement subject to "Buy American" policies.

In the first review, when gray portland cement purchasers were asked to list the three most important factors considered when choosing a supplier, price was ranked first most often by a wide margin (table II-1). Quality and availability were ranked second most often, and price and availability were ranked third most frequently. Other factors listed include delivery, traditional supplier, and location.

Twenty-three of the 46 responding gray portland cement purchasers in the first review reported that they required their suppliers to become certified or prequalified. Twenty of these purchasers reported that 100 percent of their gray portland cement was bought subject to qualification. In general, gray portland cement must meet ASTM-C150 standards. Other factors considered by purchasers in their qualification process include state Department of Transportation approval, price, availability, delivery, consistency of product, and reliability. The qualification process can take anywhere from 1 day to 6 months. Forty-four of 48 responding purchasers reported that no domestic or foreign producers ever failed in their attempts to qualify their gray portland cement, or lost their approved status.

Comparisons of Domestic Products, and Subject and Nonsubject Imports

During the first review, nearly all responding Southern tier producers reported that U.S.-produced and imported Japanese, Mexican, Venezuelan, and nonsubject gray portland cement were always used interchangeably (table II-2). Importers were split between U.S.-produced and imported Japanese, Mexican, Venezuelan, and nonsubject gray portland cement always or frequently being used interchangeably (table II-3).

[26] Unless otherwise noted, discussion in this section is taken from the *First Review Report*, pp. II-13-II-19.

Table II-1
Gray portland cement: Most important factors considered when selecting a gray portland cement supplier

Factor	First	Second	Third
Price	26	4	12
Quality	8	17	4
Availability	3	11	10
Delivery	0	1	4
Traditional supplier	4	1	0
Location	1	1	1
Other	3	3	3
Total	45	38	34

Note: Figures indicate the number of purchaser responses in each category.

Source: Compiled from data submitted in response to Commission questionnaires in conjunction with the *First Review*. See also, *First Review Report*, table II-2.

Table II-2
Gray portland cement: Interchangeability between country pair products, as reported by Southern tier producers

Comparisons	Firms reporting always	Firms reporting frequently	Firms reporting sometimes	Firms reporting never
U.S. vs. Japan	17	-	-	-
U.S. vs. Mexico	19	-	-	-
U.S. vs. Venezuela	17	1	-	-
U.S. vs. nonsubject	16	1	-	-
Japan vs. Mexico	15	-	-	-
Japan vs. Venezuela	15	-	-	-
Japan vs. nonsubject	15	-	-	-
Mexico vs Venezuela	15	-	-	-
Mexico vs. nonsubject	15	-	-	-
Venezuela vs. nonsubject	15	-	-	-

Source: Compiled from data submitted in response to Commission questionnaires in conjunction with the *First Review*. See also, *First Review Report*, table II-3.

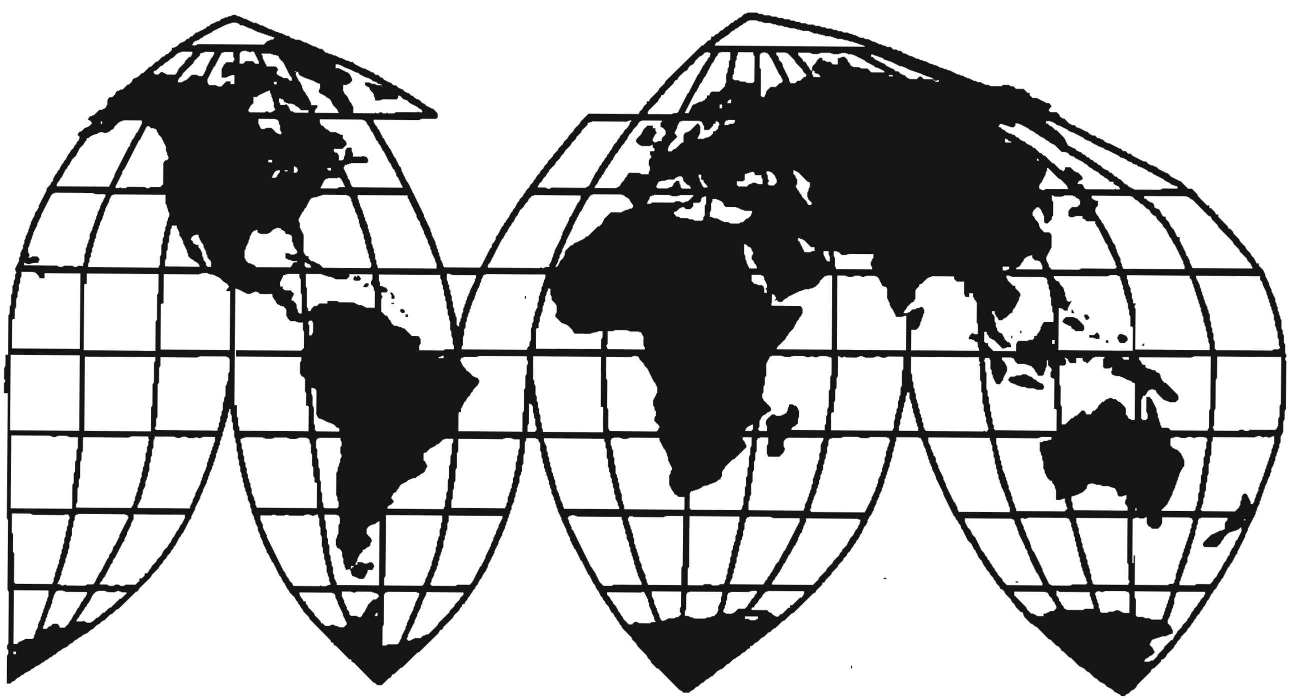
EXHIBIT 5

Gray Portland Cement and Cement Clinker From Japan

Views on Remand in
Investigation No. 731-TA-461 (Final)

Publication 2657 **June 1993**

U.S. International Trade Commission



Washington, DC 20436

domestic industry.[5] No party challenged these findings on review of the Commission's determination before the Court of International Trade. and the Court did not remand any of these findings to the Commission. We concur in those findings.

Regional Industry

In the final determination. the Commission also concluded that "appropriate circumstances" existed for a regional industry analysis of domestic cement production, and that the appropriate regional industry comprised producers in the Southern California region.[6] No party challenged these aspects of the Commission's determination on review. We concur in the conclusion that the statutory market isolation criteria[7] are satisfied in this case, and that regional analysis is appropriate. Based on the realities of the market for cement, and the relatively greater isolation of the Southern California region from outside supplies, we also concur in the conclusion that producers in the Southern California region constitute the appropriate regional industry for our consideration.

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[5] Gray Portland Cement and Cement Clinker from Japan, Inv. No. 731-TA-461 (Final) USITC Pub. 2376 (April 1991) (hereinafter 1991 Japan Final) at 13 (Views of Commissioner Seeley G. Lodwick and Commissioner Don E. Newquist); id. at 46-47, 50 (Views of Commissioner David B. Rohr); id. at 67-68 (Views of Acting Chairman Anne E. Brunsdale).

[6] 1991 Japan Final at 13-20 (Views of Commissioner Seeley G. Lodwick and Commissioner Don E. Newquist). Commissioner Rohr reached the same conclusions. Id. at 47-50.

[7] 19 U.S.C. § 1677(4)(C)(i) & (ii).

We also find that imports are sufficiently concentrated in the Southern California region.[8] As noted by the plurality in its determination,[9] and as held by the Court of International Trade,[10] there is no precise numerical t for determining when imports are sufficiently concentrated in the region. The percentage of total imports from Japan which entered Southern California was 67.9 percent in 1986, 70.8 percent in 1987, 73.0 percent in 1988, 73.7 percent in 1989, and 61.2 percent in 1990.[11] Determining whether the subject imports are concentrated in the region is an area in which the Commission exercises considerable discretion. Although these percentages are somewhat low in comparison to past Commission practice, we note that the Southern California region accounted for between 8 and 9.9 percent of total nsumption, yet a significant majority of U.S. imports from Japan were shipped to that region. In this case, therefore, we conclude that imports from Japan are sufficiently concentrated.

Conditions of Competition and Impact of Dumped Imports from Japan

Gray portland cement is a fungible commodity. All gray portland cement sold in the Southern California market, whether domestically produced or imported, meets the same standards, and the record indicates there are no

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[8] This was the conclusion reached by the Commission in its original final determination. 1991 Japan Final at 20-21 (Views of Commissioner Seeley G. Lodwick and Commissioner Don E. Newquist); 48-50 (Views of Commissioner David B. Rohr). The Court of International Trade affirmed this aspect of the Commission's determination on review. Mitsubishi Materials, Slip Op. 93-62 at 10-14.

[9] 1991 Japan Final at 20.

[10] Mitsubishi Materials, Slip Op. 93-62 at 11; Texas Crushed Stone Company v. United States, Slip Op. 93-81 (Ct. Int'l Trade, May 25, 1993) at 17-18.

[11] Report at A-13.

significant distinctions between cement from different sources in terms of quality, delivery, marketing, or terms of sale.[12] Cement is sold on a daily basis. Sales are sensitive to changes in price, and pricing information is spread rapidly throughout the market.[13] Thus, a change in one supplier's price is likely to be met rapidly by all other suppliers. Demand for cement is derived from demand for concrete, which in turn depends primarily on the level of construction activity. Cement represents a small portion of the cost of most construction projects, and there are no good substitutes for cement in the production of concrete.[14] Thus, the total amount of cement demanded in the regional market is unlikely to respond to a change in price.

Cement production is capital intensive, and hence subject to high fixed costs. Thus, as production increases and approaches the limits of capacity, unit costs would decline. In addition, as consumption increases, supplies in the market tighten (absent increased supplies from sources outside the region), prices increase, producers get increased revenues, and operating margins widen. Construction of new production facilities is both expensive and lengthy -- estimates of the time necessary to bring a new cement production facility on line range from three to five years, at a cost of approximately $175 million.[15] Under these conditions, there is little, if any, incentive for producers to cut prices during periods of increasing demand

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[12] Memorandum INV-O-064 at 15-16.

[13] See Petitioners' Pre-hearing Brief at Exhibits 12 and 22-26, discussing purchasers' use of low price quotes from one supplier to obtain a lowered price from another supplier.

[14] Memorandum INV-O-064 at 17; Report at A-63 & n.52.

[15] Petitioners' Pre-hearing Brief at Exhibit 36.

EXHIBIT 6

Conference Minutes of the Hearing in Final Investigation on Industry Injury for "the Application by Asia Cement Company, Taiwan Cement Company, Lucky Cement Company, Hsing Ta Cement Company, and China Rebar Company for Imposition of Antidumping Duty and Provisional Antidumping Duty on Imported Portland Cement and of Its Clinker from Philippines and South Korea"

I. Time: 8:40 AM, May 9, 2002

II. Location: Room 103, Taipei International Conference Center

(Portion is omitted here...)

Attorney Wang Zhong: On behalf of the five petitioner companies, *i.e.*, Taiwan Cement, Asia Cement, Lucky Cement, Hsing Ta Cement, and China Rebar, I am here, using some data and charts, to illustrate the fact that the domestic producers of the cement industry are materially injured by the dumping of large amount of cement and its clinker by South Korea and Philippines. (Portion is omitted here...) Cement is a highly price-sensitive product. This price sensitivity, first of all, is reflected on the consideration of consumers in purchasing the product. That is to say, actually, there is no difference between domestically-produced cement and imported cement, in terms of physical characteristics, usage of the product, sales channel, and etc. Imported cement can completely replace domestically-produced cement. Price is almost the only major factor for consumers to make the purchasing choice. More importantly, cement generally cannot be store for long periods. It will go bad when it is stored for long, under which situation, it cannot be sold or will be sold at discount. Moreover, it is a capital-intensive industry, and has to maintain production to allocate high investment on fixed assets.

(Portion is omitted here...)

「亞洲水泥、台灣水泥、幸福水泥、信大水泥及中國力霸等股份有限公司申請對自菲律賓及韓國進口卜特蘭水泥及熟料課徵反傾銷稅暨臨時課徵反傾銷稅案」產業損害最後調查聽證程序會議紀錄

一、時間：九十一年五月九日上午八時四十分

二、地點：台北國際會議中心一0三室

三、主席：阮組長全和　　四、紀錄：邱照仁

五、出席人員：

台灣區水泥工業同業公會	吳俊民、裴傳忠、王慶堂
台灣水泥股份有限公司	陳茂雄、黃健強、尤亞元、詹志鴻
亞洲水泥股份有限公司	楊桐欣、余佩萍
幸福水泥股份有限公司	陳坤源、劉彥麟
信大水泥股份有限公司	張清壽、洪瑞婉
中國力霸股份有限公司	張兆禎、杜聰明
台灣區預拌混擬土工業同業公會	陳麒麟
理律法律事務所	王仲、徐雪舫
駐台北韓國代表部	李丞宰
Ssangyong Corp.	Park Chung-suk、Hsing Dong-chun
馬尼拉經濟文化辦事處	Antonio L. Basilio

王律師仲：

我謹代表台泥、亞泥、幸福水泥、信大水泥、中國力霸等五家申請公司，利用一些數據、圖表來具體說明有關我國水泥產業因為韓國、菲律賓大量傾銷水泥熟料的行為，導致國內廠商招受重大損失的一個事實。我國水泥產業對我國整體產業經濟的貢獻絕對是不可磨滅的，是有目共睹的事實。從整個工業產值來看，水泥業每年大概是三佰伍拾到伍佰億元的貢獻，佔整體製造業的產值大概是百分之零點五到百分之一的幅度。但是最重要的是我國的水泥產業更是位居相關產業龍頭的地位及發動機的一個角色，不管是上游的土石採取業、金屬礦業、鋼鐵業、冶鍊業、或是陸上的鐵路或公路，還有海上的運輸業、下游的預拌混凝土或水泥製品等等產業，它都是居於樞紐及關鍵的地位。換言之，我國水泥產業體質的良窳與產業的榮枯，事實上不光是關切到有關水泥產業個別產業的生存或業者的利益，更關切到這廣大的關連產業業者的營運還有他們員工的生計。在今天景氣低迷的社會現象底下，我相信在員工生計及勞工權益的保障也是要加以謹慎考慮的。更重要的是我國水泥產業不只沒有像一般科技產業享有各式各樣優厚的稅賦優惠，而是一點一滴繳納各種所得稅捐，相較於其他產業，水泥產業更是繳納其他產業所不需要負擔的一種稅賦，也就是貨物稅，最近五年來貨物稅繳納的總額至少高達三佰三十億元。所以無論是從工業產值還是關聯產業的一個地位，或從財政稅收的角色來看，我們相信國內的水泥產業對整體產業的貢獻和關鍵地位是絕對不容忽視的。我們也感謝本案提起以後貿委會能夠對於水泥產業所遭受產業損害的事實作成肯定的初判的認定，我們也期待從這些相關數據裡面，主席及貿委會的長官也應該可以知道國內產業確實因為韓菲傾銷的關係而造成重大損失的事實。有關韓菲的傾銷行為，財政部在四月中旬作成傾銷部分的最後認定，我想已經有一個確定的判決，菲律賓廠商的傾銷稅率大概是百分之四十二到百分之一百零四等這樣的幅度。韓國廠商的傾銷稅率大約是一百一十到一百二十六的傾銷差率。我們可以看出這個傾銷差率相對於以往一些其他案件的傾銷差率，可能只是百分之二十或百分之三十的傾銷差率的幅度，可以想見，有關韓菲業者他們傾銷行為的嚴重和對於國產水泥業者價格打壓的嚴重幅度，所以在整個產業判斷損害的程度上，在關稅法及平衡稅及反傾銷稅課徵實施辦法第三十七條裡面，對於產業損害的判斷基本上是包括三個層面。第一個層面是進口貨物的數量的影響，第二個層面是有關進口貨物的價格對於國內同類貨物市價的影

響，還有國內產業有關因為進口貨物所產生各式各樣產業上的一些衝擊及影響。基本上從這三個層面來分析，我們依據貿委會以往的案例，我們可以得到以下的結論。有關這些產銷存或產能利用率或獲利率或資產報酬率等等這些經濟指標，這些產業衝擊指標，大概可以歸屬在有關產業損害到底有無的範疇之內。至於說進口數量到底是不是有增加，不管是相對或絕對的數字，或者是價格影響這些相關的數據，也就是進口貨物的傾銷行為、他們的低價行為導致國內產品、國內同類貨物價格受到抑制或是減價，這些效果是應該放在因果關係的判斷上面。在這邊必須要強調的是我們的關稅法、平衡稅及反傾銷稅課徵實施辦法等規定，都是源自WTO 的反傾銷協定規範，在這反傾銷協定裡對因果的判斷，它使用的文字是a causal relationship，換句話說只要是造成國內產業損害因素之一即可，不需是唯一的因果關係。換句話說，就是在因果關係的判斷上面，我相信傾銷案件相對於其他法律案件，在要求主要的因果關係或相當有關係是極為不同的，所以我想傾銷進口只要是原因之一就可以了！這也就是為甚麼反傾銷協定或者在以往的案件裡面，事實上並沒有要求對於各種因素必須要加以量化或比較各該因素原因大小緣故，懇請貿委會在作成最後認定的時候必須要考量法律的要件。其次就是說，每個案件都一樣，向時在我們的課徵實施辦法第三十七條裡面，其實從法規用語及字裡行間也可以得到立法的影子，也就是說這些產業衝擊還有進口數量或價格影響這些數字，它的判斷上必須要是對於一定期間的這些經濟指標等等的動態趨勢，作成一些分析和判斷，而不是任意擷取某一個時段，某一個時點中間的一些，特定的數字，作一些推測，更不是用一些原本調查期間之後新發生的事實，來推斷以往沒有發生產業損害，或者說未來不會發生產業損害等等。這樣的一個判斷，也就是說在本案，貿委會對於產業損害在調查期間的認定上，已經按照一九九七年WTO 反傾銷委員會所建議的原則，也就是說在本案開始調查之前的三到四年期間作為損害調查的調查期間。換句話說，貿委會各位委員在審核本案的時候，顯然必須要觀察這段期間，就整個有關經濟指標還有進口數量、進口價格等等，這些互動的一些關係，針對這一整段期間的前後真相變化來判斷，這是申請人在這裡懇請貿委會能夠衡量到這個法律上的要件。其次就是本案的水泥產品在特性上面，我們必須闡明就是說，水泥產品具有一個高度價格敏感性，這個價格敏感性不光是表現在顧客購買的選擇考量上，也就是說，其實國產水泥和進口的水泥，不管是物理特性也好，產品的用途也好，銷售的通路也好等等，幾乎是沒甚麼不同，而

進口的水泥是完全可以替代國產水泥的，而價格幾乎是顧客購買的選擇上唯一主要的因素。更重要是，水泥基本上絕對是不耐久存的產品，放久了一定會變質，變質當然就無法銷售出去，或價格會大打折扣，它又是一個高資本投入的產業，必須要維持生產來攤銷高額固定的投資。如果是價格持續下滑，甚至嚴重下滑的市場趨勢，那麼國產水泥就必須要面對一個選擇，到底是要賣，跟著市場的價格來賣，還是說不賣，任由這個水泥產品在倉庫裡面。事實上我們就發現一個重大事實，二○○一年第二季和第三季之交，事實上那時候也是正式提出申請本案的時候，當時國內的水泥產業事實上就面臨這樣的艱難抉擇，因為當時的庫存量已經高達一百六十萬到一百八十萬噸。這樣一個數字，同時正好又遭逢菲韓的進口產品，他們的價格從一千五百到一千六百的價格往下殺到一千二百到一千二百五十元的價格區間，顯見申請人就必須面臨一個價或量的取捨。我們再次懇請貿委會，能夠針對這個價格敏感性，在作出最後認定的時候，審慎的加以考慮。在接下來的部分，我們就來看有關國內一些產業所受到損害的一些具體數據。從申請人生產量而言，我們是用水泥公會統計全體有關業者的一個數字，可以觀察到雖然二○○○到二○○一年可能有一個微幅增長，大概是百分之二點五，但是相對整個調查時間來看，我們從一九九八年到二○○一年來看，事實上生產量是大幅下滑百分之八點二八。如果再從內銷產業的供需面來看，國產產業的內銷量，事實上更是一個嚴重下滑的幅度。那麼在二○○○至二○○一年下滑的幅度是負的百分之三點零八，那麼是以一九九八年來作比較，也就是以一九九八年的產業還是比較健康、體質比較良善，還沒有遭受傾銷損害的一個階段來看，一九九八年和二○○一年事實上內銷量下滑百分之十九點三五，光是從內銷量比較上面來看還無法窺得，就是有關進口業者價格破壞的力量。如果我們來對照，因為公會只有量的數字，沒有值得數字，那我們就來看看申請人五家業者，也就是說代表國內百分之八十三以上的業者他們相關數據來看，還可以得到這樣的對照，就是說在內銷量同樣的與公會整體的數字，向樣呈現一個巨幅下滑的現象，更重要是說，向期間內銷值的下滑幅度是更大的，我們用一個具體數字來看，內銷量下滑的幅度從九八年和二○○一年來比較，下滑幅度是負的十八點三四，但如果以內銷值，也就是說申請人合計的一個銷貨收入來看的話，在內銷部分，事實上下滑幅度是負的百分之三十八點九六。為甚麼量僅有下滑負的百分之十八，而相對於內銷值來講，卻下滑負的百分之三十八？顯現國產業者因為韓菲傾銷行為的結果，而導致價格侵蝕的幅度。我們

EXHIBIT 7

ANTI-DUMPING AND SUBSIDIES COMMISSION
JAMPRO Trade & Invest (JTI) Bldg. ~ 18 Trafalgar Road ~ Kingston 10 ~ JAMAICA
Telephone: 927-8665, 978-1800 ~ Fax: 978-1093
Email: antidump@jadsc.gov.jm Website: www.jadsc.gov.jm

STATEMENT OF REASONS
PRELIMINARY DETERMINATION

KINGSTON, JAMAICA **CASE. NO. AD-01-2010**
Issued: September 13, 2010

IN THE MATTER OF a Complaint, pursuant to sections 22 and 23 of the Customs Duties (Dumping and Subsidies) Act 1999, submitted by the Caribbean Cement Company Limited to the Anti-dumping and Subsidies Commission.

AND IN THE MATTER OF the Preliminary Determination by the Anti-dumping and Subsidies Commission, pursuant to section 27 of the Customs Duties (Dumping and Subsidies) Act 1999.

IN RESPECT OF the dumping in Jamaica of Ordinary Portland (Grey) Cement originating in or exported from the Dominican Republic.

I. SUMMARY

Initiation of Investigation. On February 15, 2010, Particulars of Complaint were submitted to the Anti-dumping and Subsidies Commission ("the Commission") on behalf of Caribbean Cement Company Limited ("CCCL") alleging that the dumped imports of Ordinary Portland (Grey) cement ("OPC") from the Dominican Republic ("D.R.") have materially injured and threatens to materially injure the domestic industry. The Commission is the body responsible for investigating and making determinations in relation to cases of dumping and subsidizing of goods under the *Customs Duties (Dumping and Subsidies) Act 1999*, ("the Act") and the *Customs Duties (Dumping and Subsidies)(Determination of Fair Market Price, Material Injury and Margin of Dumping) Regulations, 2000* ("the Regulations"). The Act and the Regulations implement the multilateral obligations under the World Trade Organisation Anti-dumping Agreement ("the ADA"), to which Jamaica is a signatory.

On April 30, 2010, the Commission in accordance with the requirements set out in Section 22 of the Act initiated an investigation. The Commission was satisfied to the standard of initiation that the Complaint filed is properly documented, that there is evidence of dumping and that the evidence discloses a reasonable indication that the dumping is likely to cause material injury to the domestic industry. Notice of Initiation of the investigation was given to the Minister of Industry, Investment and Commerce ("the Minister"), the Government of the Exporting country, the known parties to the investigation and other entities as provided under Section 25 of the Act and by publication in the Jamaica Gazette Volume CXXXIII No. 17E and a daily newspaper the Jamaica Gleaner dated April 30, 2010.

The Commission invited comments from interested parties on the Statement of Reasons ("SOR") for Initiation to be submitted within thirty (30) days from the date of receipt of the SOR. Questionnaires and Requests for Information (RFIs) were sent to the relevant parties. The Commission also sought and received information from Government of Jamaica ("GOJ") bodies including the Jamaica Customs Department, Fiscal Services Limited and the Bureau of Standards Jamaica.

Volume of Subject Goods. The Commission examined information from the Importer and Exporter[2] on the volume of subject goods imported from the Dominican Republic during the POI. It was found that the volume of goods under consideration imported from the Dominican Republic accounted for about sixty-five point five seven per cent (65.57%) of total imports for the POI, thereby exceeding the statutory minimum negligibility threshold of three per cent (3%).

The Commission also noted that the Importer was granted a waiver of the Common External Tariff ('CET") which expired in September 2009. The Importer has paid the CET of fifteen per cent (15%) on all shipments of the subject goods from October 2009 to April 2010.

VII. LIKE GOODS

Section 2 of the Act in accordance with Article 2.6 of the ADA, defines "like goods" in the following manner:

> Like goods, in relation to any other goods means –
> (a) goods which are identical in all respects with those other goods, or
>
> (b) in the absence of identical goods as aforesaid, goods of which the uses and other characteristics closely resemble those of the other goods.

The Commission examined the goods produced in Jamaica by the industry claiming injury in order to determine whether the goods are "like goods", that is, whether they are identical in all respects or have uses and characteristics closely resembling the goods under consideration (the imports). The locally produced goods are Ordinary Portland Grey Cement (OPC Type I) and a blended OPC containing Pozzolan (OPC Type IP), referred to as Carib Plus. The goods under consideration exported from the Dominican Republic are Ordinary Portland Grey Cement.

The Commission considered factors such as the physical and chemical characteristics, manufacturing and production processes, functions and end uses, channels of distribution and marketing, substitutability and competition and customer and producer perception to determine whether the goods produced locally and the goods under consideration are "like goods" as defined by the Act. The Commission found that the locally produced goods are like goods to the goods under consideration. This was not contested by the Importer who indicated in its Questionnaire response that they are like goods. The Exporter also submitted that there is no difference in quality between the cement produced for the local market in the Dominican Republic and those exported to the market in Jamaica[3]. These factors are addressed in more detail below.

Physical and Chemical Characteristics. An examination of the physical and chemical characteristics revealed that the domestically produced goods appear to be identical to or closely resembling the investigated products based on the technical industry standards, composition and physical characteristics. Portland cement is a fine powder substance which is the basic ingredient of concrete. OPC is a closely controlled chemical combination of calcium, silicon, aluminium, iron and small amounts of other ingredients to which gypsum is added in the final grinding process to regulate the setting time of the concrete. Lime and silica make up about eighty five per cent (85%) of the mass. Common among materials used in its manufacture are limestone, shells, and chalk or marl combined with shale, clay, slate or

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[2] Joint Rebuttal, Exhibit 17, Exporter Questionnaire, page 19

[3] Exporter Questionnaire, page 10, Section 2.2

EXHIBIT 8

Report of Final Investigation on Industry Injury for the Application by Asia Cement Company, Taiwan Cement Company, Lucky Cement Company, Hsing Ta Cement Company, and China Rebar Company for Imposition of Antidumping Duty and Provisional Antidumping Duty on Imported Portland Cement and of Its Clinker from Philippines and South Korea

Ministry of Finance Case Transfer Investigation Code
91·4·19 Tai Cai Guan Zi No.0910550172
Public Version
Passed at 36th Commissioners' Meeting of the International Trade Commission of the Ministry of Economic Affairs
June 13, 2002

(Portion is omitted here...)

I. Market Competition Situations

Portland cement is an important raw materials for general building and construction projects. Besides the situation of the real estate industry, the demand for Portland cement also depends on factors such as the number of public projects, progress of construction, and etc.

(Portion is omitted here...)

As explained above, Portland cement is a price sensitive product. Furthermore, the domestic product and imported product are highly fungible, in terms of product quality, packaging, sales target, and etc

(Portion is omitted here...)

調查編號：一九－九〇－〇一

財政部移案調查文號

九一．四．一九台財關字第〇九一〇五五〇一七二號函

亞洲水泥、台灣水泥、幸福水泥、信大水泥及中國力霸等股份有限公司申請對自菲律賓及韓國進口卜特蘭水泥及熟料課徵反傾銷稅暨臨時課徵反傾銷稅案產業損害最後調查報告

公開版

經濟部貿易調查委員會
第三十六次委員會議審議通過
九十一年六月十三日

一、市場競爭狀況

□市場需求相關影響因素：卜特蘭水泥為一般建築、土木工程之重要原料，其需求除受房地產景氣之影響外，亦取決於公共工程之多寡及施工進度等相關因素。依據調查國內十二家生產同類貨物廠商所得資料（其中七家廠商回覆，惟南華一家表示該公司於調查資料涵蓋期間並未生產同類貨物）及相關進口統計資料，卜特蘭水泥年需求量於調查資料涵蓋期間八十七年至九十年分別為一千七百九十六萬公噸、一千七百一十一萬公噸、一千六百八十萬公噸及一千五百五十七萬公噸，其中八十八年至九十年之成長率分別為負四．七％、負一．八％及負七．三％。另依台灣區水泥工業同業公會所出版之「台灣區水泥工業概況」資料，卜特蘭水泥年需求量於調查資料涵蓋期間八十七年至九十年分別為二千零五十七萬公噸、一千八百九十萬公噸、一千八百四十八萬公噸及一千六百六十七萬公噸，其中八十八年至九十年之成長率分別為負八．九％、負二．三％及負一○．八％。顯見近幾年因受經濟不景氣、部分公共工程陸續完工、台灣高鐵等工程延後及營建業陷入低迷等因素之影響，國內水泥年需求呈逐年下降趨勢。另水泥市場有淡、旺季之分，按發貨量之大小，依序為第四、二、一、三季；其中第四季因屆年關，需求較高，第二季次之；第一季因跨農曆年，自年前需求量大，年後則較晚開工，故需求較第二季低；第三季因農曆七月（俗稱鬼月）及颱風季節雨量較多，故發貨量減少。

□市場供應相關影響因素：卜特蘭水泥屬內需型產業，整個市場供應以國產品為主，不足部分來自國外進口，兩者市場占有率之比重約為八比二。目前國內有十二家生產廠商，其中以台泥、亞泥為主，約占七至八成；進口產品部分，八十九年前以日貨為大宗，九十年轉以菲、韓等涉案貨品為主軸。據調查國內同類貨物生產廠商所得資料顯示，國內卜特蘭水泥產能為二千六百萬至二千三百萬公噸之間；八十六年後雖受西部礦權到期之影響，產能無法滿載，惟部分廠商配合政府產業東移政策，於東部地區投資興建更具生產效能之廠房設備並開採新礦

源，以彌補西部地區產能之不足。調查資料涵蓋期間八十七年至九十年卜特蘭水泥供應量分別為一千六百五十一萬公噸、一千五百九十五萬公噸、一千五百五十七萬公噸及一千六百四十九萬公噸，顯示國內產業之有效產能足供國內八成以上之市場需求。

□市場競爭相關影響因素：卜特蘭水泥訂有國家標準（CNS）為確保市面流通之產品品質均能符合國家標準，國內廠商對所生產之卜特蘭水泥，於出貨時均規定須通過廠內實驗室之品質檢驗，並出具檢驗報告；至於進口產品，則規定於通關時，除須檢附國外生產廠商之檢驗報告外，尚須經標準檢驗局進行抽驗，因此國內外產品品質差異不大。惟考量卜特蘭水泥不耐儲存、不易運送等特性，自交易型態以散裝貨為主，因此行銷過程須具備特殊之儲存槽、運輸、卸載等機具設備；加之，近幾年市場低迷，預拌混凝土廠商、水泥製品廠商、營造商等基於管控施工進度及降低營造成本，一般以價格及交貨便利性作為進行採購之重要參考依據。

□市場行銷交易相關特性：卜特蘭水泥分散裝及袋裝兩種，並以散裝交易為主，此現象國產品與涉案進口產品皆然。至於銷售對象，國產品與涉案進口產品大致相同，其中包括預拌混凝土廠商、水泥製品廠商、經銷商、營造商、工程公司及軍公機關。銷售價格決定方式，除少數如軍公客戶之銷售價格係由雙方訂立長期合約決定外，其餘絕大部分則以現貨市場行情為主，並逐筆決定其交易價。另交易方式，約九成以上以現貨方式交易，即客戶先開支票訂購水泥提貨單，於提貨時如遇市價下跌，則請求發貨折讓優惠；用戶於水泥庫存提貨單數量只剩一至二個月使用量時，即洽談新訂單。

□綜上所述，卜特蘭水泥係價格敏感性產品，自從產品品質、包裝型態、銷售對象等觀之，國產品與進口產品彼此間具高度市場重疊性。

二、產業實質損害之評估

EXHIBIT 9

ANTIDUMPING & SUBSIDIES COMMISSION
24 Trafalgar Road ~ Kingston 10 ~ OR ~P.O. Box 494 ~ Kingston 5 ~Jamaica
Phone; 968-7970, 920-1493/7006, 929-7973 ~ Fax: 926-4622
Email: [illegible]

STATEMENT OF REASONS

KINGSTON, JAMAICA **REF. No. AD-01-2002**
July 2, 2002

IN THE MATTER OF a complaint, pursuant to sections 22 and 23 of the Customs Duties (Dumping and Subsidies) Act, 1999, submitted by Caribbean Cement Company Limited, to the Anti-Dumping and Subsidies Commission.

AND IN THE MATTER OF the **Final Determination** by the Anti-Dumping and Subsidies Commission, pursuant to section 30 of the Customs Duties (Dumping and Subsidies) Act, 1999.

IN RESPECT OF the dumping in Jamaica of Ordinary Portland Grey Cement, originating in or exported from Indonesia.

I. SUMMARY

On January 3, 2002, the Commission initiated an investigation pursuant to section 22 of the Customs Duties (Dumping and Subsidies) Act, 1999 (hereinafter known as "the Act") into the alleged injurious dumping into Jamaica of Ordinary Portland Grey Cement originating in or exported from Indonesia.

The investigation was initiated in response to a complaint filed by Caribbean Cement Company Limited of Kingston, Jamaica.

The Commission made an affirmative Preliminary Determination on April 3, 2002 that the goods under consideration had been dumped and were likely to cause material injury to the domestic industry. Further, the Commission indicated that the evidence on the record, at that time, did not support an affirmative Preliminary Determination concerning the imposition of retroactive duties at the Final Determination. The Commission also found that neither the estimated margin of dumping, nor the volumes of dumped goods imported was *de minimis*, and instructed that provisional duties in the amount of 56.21 per cent should be imposed.

At Initiation, CCCL estimated the margin of price undercutting at approximately 13.18 per cent[8]. However, the Commission noted in its Statement of Reasons at the Preliminary Determination that the evidence presented indicated that there was price undercutting of 0.78 per cent on average prices, which, at the time, was considered to be an insignificant price effect.

The Complainant as well as the Importer increased prices in February 2002, a comparison of the average prices of the Importer and the Complainant for the period February to May 2002 reflect price undercutting of 1.06 per cent. In absolute terms, a price differential of 1.06 per cent does not suggest significant price undercutting. However, information gleaned from the Importer and the Complainant during the verification visits indicates that, in relative terms, small variations in cement prices may be significant, as cement is typically purchased in large quantities and so even a small price differential may represent a significant saving to the consumer, so consumers would generally be more inclined to purchase the lower priced cement. The Commission observed a particular trend in the Importer's pricing strategy which is to maintain some amount of price undercutting relative to the domestic industry.

3) PRICE SUPPRESSION

Price suppression is experienced when the domestic industry's margin between unit cost and selling price cannot be maintained. Price suppression will not be evident during the review period unless there has been a significant increase in unit costs or reduction in selling price, since the dumped imports entered the market.

CCCL's monthly data on unit costs exhibited a high degree of variability due to CCCL's practice of valuing inventory at the end of each quarter and adjusting the variations against the cost of sales in that month. There is considerably less variation in CCCL's unit costs on a quarterly basis than the monthly data would reflect and this gives a better reflection of the company's true margins over the period. In particular CCCL's margins actually widened during the period following the introduction of the dumped cement. CCCL's attempts to increase its margin through the reduction in cost and an increase in unit price have overshadowed any suppressing effects the imports may have had on prices. CCCL has indicated that one factor that impacted on its decision to increase prices in June 2001 and February 2002 was the desire to preserve the margin between unit cost and selling price. Thus, the Commission satisfied that price suppression has not occurred as a result of the introduction of Indonesian cement on the market.

C. ECONOMIC IMPACT ON THE DOMESTIC INDUSTRY

1) SALES

CCCL's sales to the local market increased by 0.11 per cent for the period September 2001 to May 2002 relative to the period September 2000 to May 2001, while CCCL's total sales volume declined by 0.85 per cent, based on the decline in export sales. The sales value (revenue) for the period under investigation increased by 15.95 per cent over the prior year period, due mainly to the two price increases that had an impact during the period September 2001 to May 2002 relative to the similar prior year period.

[8] In September, CCCL's prices were 13.96 per cent higher than they were before June 2001.

EXHIBIT 10

ANTIDUMPING & SUBSIDIES COMMISSION
24 Trafalgar Road ~ Kingston 10 ~ Jamaica
Phone: 968-7970, 920-1493/7006, 929-7973 ~ Fax: 926-4622
Email: antidump@cwjamaica.com

STATEMENT OF REASONS

KINGSTON, JAMAICA **REF. No. AD-01-2003**
June 14, 2004

IN THE MATTER OF an investigation, pursuant to section 4 of the Customs Duties (Dumping and Subsidies) Act, 1999, on the initiative of the Anti-Dumping and Subsidies Commission on behalf of the Jamaican cement industry.

AND IN THE MATTER OF the **Final Determination** by the Anti-Dumping and Subsidies Commission, pursuant to section 30 of the Customs Duties (Dumping and Subsidies) Act,

IN RESPECT OF the dumping in Jamaica of Ordinary Portland Grey Cement, used for building or construction purposes, except in the case of white cement used for decorative purposes and oil well cement, originating in or exported from The People's Republic of China ("China"); and where the characteristics of the goods under consideration fall under separate sub-headings of the Harmonized Tariff Schedule (HS) Codes the characteristics and purpose of the goods shall be the controlling guide.

I. SUMMARY

On December 16, 2003, the Commission self-initiated an investigation pursuant to sections 4, 22(2), (3), (4) and 23 of the Customs Duties (Dumping and Subsidies) Act, 1999[1] hereinafter referred to as "the Act" and in keeping with Article 5 of the World Trade Organisation ("WTO") Agreement on Implementation of Article VI of the General

[1] The Commission is empowered under section 4-(1)(a) to carry out on its own initiative investigations in relation to the dumping of goods.

1) The material injury currently being exerted on the Domestic Industry, and
2) the ability of the dumped imports to exacerbate these circumstances in the future.[40]

Material Injury Currently Suffered By the Domestic Industry

Currently the Domestic Industry has suffered a decline in its sales from its own production, loss in market share, a build up in clinker inventories, declines in production and negative price effects (price undercutting and price depression) as a result of low priced imports, as noted in the section outlining injury.

The Ability of Dumped Imports to Exacerbate Circumstances - The continued importation and any increase in the volume of unfairly priced imported cement will exacerbate the injurious pressures currently being faced by the Domestic Industry. The demand for the Domestic Industry's cement has become more elastic with the introduction of substitutes. Because Chinese cement is a similar product to the Domestic Industry's product, any price differentials will cause the demand for the Domestic Industry's cement to decline, as consumers will switch to the lower priced alternative.

The extent of the dumping margin is an indication of the extent to which Chinese imports can undercut the Domestic Industry's prices. And, because cement is a product for which small differentials in price can have a significant impact on sales, price undercutting is likely to be more pronounced given the changing market.

The Commission is of the view that an increased availability of dumped imports priced to undercut the Domestic Industry's product can potentially worsen the situation of the Domestic Industry. The Commission observed that in the last quarter of 2002, when most of the total volume of dumped Chinese cement was on the market, Mainland expanded its imported volumes significantly by 49% over 2001. Also, in 2002, Mainland's imports, the majority of which was Chinese cement, accounted for 77% of total imports. This coincided with a decline in annual increase of CCCL's production from approximately 15% in 2001 to approximately 3% in 2002.

Therefore, the Commission considers that the likely price and volume effect of future dumped Chinese cement will be more pronounced given that the dumping margin is an

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[40] This practice is followed by Canada, in one case in particular; while the dumped imports were having an impact on the Domestic Industry this impact was deemed to be not yet material. In this case it was found that should imports of the dumped product continue then the Domestic Industry would not be able to maintain its viability, and the Canadian International Trade Tribunal concluded as follows:
"In light of all the foregoing, the Tribunal concludes that, in the absence of anti-dumping and countervailing duties, the threat of material injury to the Domestic Industry in the form of net margin reductions, reduced profitability, lost sales, reduced production and lost market share is clearly foreseen and imminent." It is important to note that the aforementioned effects highlighted by the CITT were not seen during the period of investigation. However the Tribunal determined that the domestic sugar industry could not maintain the strategy that it employed during the period of investigation and that eventually, in the foreseeable future, a change in strategy would have the aforementioned result. Thus, it is clear from the quotation that in any discussion on threat of injury one should make reference to the indicators that would likely be affected once the threat is manifested.

EXHIBIT 11

California Deepwater Terminals, Their Owners, And Their Respective Storage Capacities

Owner	Location	Storage Capacity
California Portland Cement	Stockton	66,000 metric tons
California Portland Cement/Lehigh	Wilmington	45,000 metric tons
CEMEX	Long Beach	57,000 short tons
CEMEX	Redwood City	63,500 short tons
CEMEX	Richmond	Unknown
CEMEX	Sacramento	> 75,000 metric tons
CEMEX	San Diego	40,000 short tons
Lehigh Cement (Lehigh Hanson)	Redwood City	Unknown
Lehigh Cement (Lehigh Hanson)	Stockton	100,000 metric tons
Mitsubishi	Long Beach	54,000 metric tons
Pan Pacific	Sacramento	75,000 metric tons
Sunshine Cement	Stockton	50,000 metric tons

EXHIBIT 12

California Cement Production, Consumption, And Imports

Metric Tons (1,000)

Year	Clinker Capacity[1]	Clinker Production[1]	Capacity Utilization	Grinding Capacity[2]	Cement Production[2]	Capacity Utilization	Consumption[3]	Imports[4]	Share Of Consumption: Domestic Producers' Domestic Shipments	Share Of Consumption: Imports
1990	10,391	8,874	85.4%	10,631	9,126	85.8%	10,580	2,525	76.1%	23.9%
1991	10,223	8,178	80.0%	10,223	8,262	80.8%	8,378	1,430	82.9%	17.1%
1992	9,706	8,619	88.8%	10,278	8,169	79.5%	7,976	508	93.6%	6.4%
1993	8,842	8,024	90.7%	10,601	8,511	80.3%	7,666	439	94.3%	5.7%
1994	9,803	9,123	93.1%	10,709	9,639	90.0%	8,200	404	95.1%	4.9%
1995	9,734	9,227	94.8%	10,766	9,362	87.0%	8,102	227	97.2%	2.8%
1996	9,066	9,543	105.3%	10,823	9,907	91.5%	8,381	383	95.4%	4.6%
1997	11,114	9,824	88.4%	10,754	10,261	95.4%	9,470	1,036	89.1%	10.9%
1998	10,991	9,964	90.7%	10,723	10,017	93.4%	10,245	2,223	78.3%	21.7%
1999	11,501	10,645	92.6%	11,177	10,289	92.1%	11,741	3,087	73.7%	26.3%
2000	11,851	10,618	89.6%	11,895	10,877	91.4%	12,665	3,139	75.2%	24.8%
2001	13,469	10,148	75.3%	11,782	10,069	85.5%	12,592	3,865	69.3%	30.7%
2002	12,630	11,187	88.6%	13,107	11,166	85.2%	12,633	3,188	74.8%	25.2%
2003	12,880	11,283	87.6%	13,180	11,592	88.0%	13,255	3,456	73.9%	26.1%
2004	13,260	11,593	87.4%	13,444	11,928	88.7%	14,221	4,889	65.6%	34.4%
2005	12,920	11,466	88.7%	13,144	11,564	88.0%	15,322	6,091	60.2%	39.8%
2006	12,924	11,170	86.4%	13,900	10,949	78.8%	14,310	6,865	52.0%	48.0%
2007	12,939	10,878	84.1%	13,900	10,833	77.9%	12,368	3,227	73.9%	26.1%
2008	14,956	9,573	64.0%	13,708	9,879	72.1%	9,368	878	90.6%	9.4%

[1] Source: U.S.G.S., Minerals Yearbook Table 3 1990-94, 1998-03; Table 4 1995-97, Tables 5 1998-2008.
[2] Source: U.S.G.S., Minerals Yearbook Table 3 1990-94, 1998-03; Table 4 1995-97, Tables 3 1998-2008.
[3] Source: U.S.G.S., Minerals Yearbook Table 9 1990-1992; Table 11 1993; Table 8 1994-97; Table 9 1998-2008.
[4] Source: ITC Dataweb, HTS Nos. 2523.10, 2523.29, and 2523.90. Imports for consumption entered into Port Districts of Los Angeles, San Diego, and San Francisco.

EXHIBIT 13

CEMENT IMPORTS INTO CALIFORNIA

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
						(1,000 Metric Tons)				
China	2,577	2,405	1,479	1,187	1,546	2,540	3,594	2,136	844	203
India	0	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0	0
Indonesia	0	0	0	0	630	865	111	0	0	0
Switzerland	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0	0	0
Netherlands	0	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0	0
New Zealand	0	0	0	0	0	0	0	0	0	0
All Others	562	1,460	1,709	2,269	2,713	2,686	3,160	1,091	33	0
World	3,139	3,865	3,188	3,456	4,889	6,091	6,865	3,227	878	203
						Share Of Imports				
China	82.1%	62.2%	46.4%	34.3%	31.6%	41.7%	52.3%	66.2%	96.2%	99.9%
India	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Lithuania	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Indonesia	0.0%	0.0%	0.0%	0.0%	12.9%	14.2%	1.6%	0.0%	0.0%	0.0%
Switzerland	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Venezuela	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
France	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Netherlands	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Germany	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
New Zealand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
All Others	17.9%	37.8%	53.6%	65.7%	55.5%	44.1%	46.0%	33.8%	3.8%	0.0%
World	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: ITC Dataweb, HTS Nos. 2523.10, 2523.29, and 2523.90; imports for consumption entered into the Port Districts of Los Angeles, San Diego, and San Francisco.

EXHIBIT 14

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China

After a period of explosive capacity growth, oversupply and unprofitability the Chinese cement industry is now entering a crucial phase of structural adjustment. The elimination of obsolete technology and accelerated consolidation are key priorities for the industry which produces over one billion tonnes of cement annually. With low domestic prices and a surplus of capacity, China has rapidly become the world's largest exporter, though future export trade will depend on the speed of restructuring efforts at home. Download full introduction

Cement Plants

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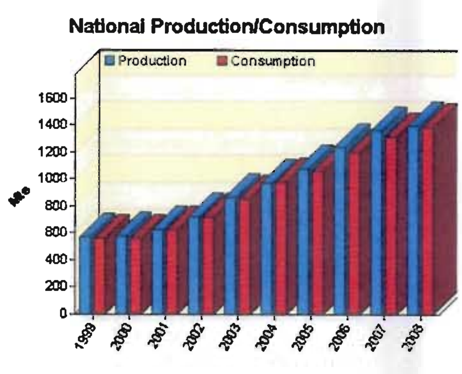
Anhui Hailuo Group - Anhui Congyang Hailuo Cement Ltd
Anhui Hailuo Group - Anhui Province Ningguo Cement Plant
Anhui Province Hailuo Group - Baimashan Cement Plant Filiale
Asia Cement - Jiangxi Yadong Cement Ltd
Baima Kouli Cement Co Ltd - Anhui Baimashan
Beijing City Pinggu Cement Second Plant - Beijing City Pinggu Cement Second Plant
Beijing Fangshan Qiangli Cement Plant - Beijing Fangshan Qiangli Cement Plant
Beijing Jingyu Group - Beijing Cement Plant Ltd
Beijing Jinyu Group - Beijing City Yanshan Cement Plant
Beijing Jinyu Group Ltd - Beijing City Liulihe Cement Plant
Changzhou Pangu Cement Ltd - Changzhou Pangu Cement Ltd

Map

Data



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Country Research

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26 November 2010

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The Baltic's main index has been erratic this year, as it was in 2009, because of swings in Chinese demand for iron ore, the primary ingredient of steel.
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China

After a period of explosive capacity growth, oversupply and unprofitability the Chinese cement industry is now entering a crucial phase of structural adjustment. The elimination of obsolete technology and accelerated consolidation are key priorities for the industry which produces over one billion tonnes of cement annually. With low domestic prices and a surplus of capacity, China has rapidly become the world's largest exporter, though future export trade will depend on the speed of restructuring efforts at home. Download full introduction

Map

Cement Plants

Aalborg White Anqing Co Ltd - Aalborg White Anqing Co Ltd
Anhui Conch Group - Anhui Province Ningguo Plant
Anhui Hailuo Group - Shanghai Hailuo Cement Ltd
Anhui Hailuo Group - Anhui Chizhou Cement Ltd
Anhui Hailuo Group - Anhui Congyang Hailuo Cement Ltd
Anhui Hailuo Group - Anhui Province Ningguo Cement Plant
Anhui Province Hailuo Group - Baimashan Cement Plant Filiale
Asia Cement - Jiangxi Yadong Cement Ltd
Baima Kouli Cement Co Ltd - Anhui Baimashan
Beijing City Pinggu Cement Second Plant - Beijing City Pinggu Cement Second Plant
Beijing Fangshan Qiangli Cement Plant - Beijing Fangshan Qiangli Cement Plant
Beijing Jingyu Group - Beijing Cement Plant Ltd
Beijing Jinyu Group - Beijing City Yanshan Cement Plant
Beijing Jinyu Group Ltd - Beijing City Liulihe Cement Plant
Changzhou Pangu Cement Ltd - Changzhou Pangu Cement Ltd

Data

Year	Capacity	Production	Consumption	Exports	Imports
2008	2000.0	1400.00	1390.00	26.03	0.00
2007	2000.0	1360.00	1320.00	30.97	0.00
2006	2000.0	1240.00	1200.00	35.00	0.00
2005	1115.0	1074.00	1059.00	22.15	0.00
2004	980.0	970.00	976.00	6.00	0.00
2003	882.0	863.00	857.00	4.90	0.62
2002	736.0	720.00	719.00	4.97	0.61
2001	633.0	620.00	620.00	5.91	0.00
2000	588.0	576.00	560.00	5.70	0.00
1999	600.0	573.00	557.00	7.80	0.00

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Controlling shareholder raises stake in Anhui Conch, China
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04 November 2010

EXHIBIT 15

China's Cement Production, Capacity, Domestic Sales, Imports and Exports, and Consumption

Year	2006	2007	2008	2009	2010 (Estimated)
			Metric Tons		
Production[1]					
– Cement Clinker	873,000,000 [2]	890,525,000	898,125,000	1,032,821,000	1,150,000,000
– Cement	1,235,000,000 [2]	1,360,000,000	1,400,000,000	1,650,000,000	1,850,000,000
Capacity					
– Cement Clinker					1,530,000,000 [5]
– Cement			1,870,000,000 [3]	1,620,000,000 [4]	2,370,000,000 [5]
Domestic Sales[1]		1,326,993,000	1,373,962,000	1,634,389,000	1,832,700,000
Export[1]					
– Cement Clinker		17,814,000	12,806,000	7,125,000	7,600,000
– Cement		15,913,000	13,232,000	8,487,000	9,700,000
Export to the U.S.[1]					
– Cement Clinker		N/A	N/A	N/A	N/A
– Cement		5,142,000	2,177,000	694,000	545,000
Import[1]					
– Cement Clinker		113,000	51,000	117,000	140,000
– Cement		539,000	566,000	703,000	760,000
Domestic Consumption[1]		1,326,993,000	1,373,962,000	1,634,389,000	1,832,900,000

[1] Published Data from the Chinese Cement Association (see attachments).

[2] Published Data from China Market Research Net (see attachments)

[3] Published Data from the Chinese Government Website (see attachments)

[4] Published Data from CementRen.com (see attachments)

[5] Published Data from CCement.com (see attachments).

China Cement Industry Report

Author: Kong Xiangzhong, China Cement Association   Source: Digital Cement Net   Date: October 18, 2010

. . . (portions omitted)

1. General Review of China Cement Industry in 2009

. . . (portions omitted)

5. Exports amounted to 15.6 million M/T

In 2009 China's cement exports amounted to 8.49 million M/T, decreasing by 35.85 percent over the last year. . . .

In 2009 China's cement clinker exports amounted to 7.13 million M/T, decreasing by 44.36 percent over the last year. . . .

6. Phased out backward capacity totaling 74.2 million M/T

In 2009 China phased out backward cement capacity totaling 74.2 million M/T. Pursuant to State Council's No. 38 Circular, China need to eliminate all the backward cement capacity by the end of 2012. . . .

. . . (portions omitted)

Table B. The production, sales and consumption of cement

				Unit: '000 M/T
Item	2007	2008	2009	2010 (estimated)
1. Operation				
- Nos. of companies	5,028	5,119	5,103	5,018
. . .				
2. Production				
- Cement clinker	890,525	898,125	1,032,821	1,150,000
- Cement	1,360,000	1,400,000	1,650,000	1,850,000
3. Sales				
- Domestic	1,326,993	1,373,962	1,634,389	1,832,700
- Exports: cement clinker	17,814	12,806	7,125	7,600
cement	15,193	13,232	8,487	9,700

- Total sales volume	1,360,000	1,400,000	1,650,000	1,850,000
4. Imports - Cement clinker - Cement - Total imports . . .	 113 539 651	 51 566 617	 117 703 820	 140 760 900
5. Domestic consumption - Total consumption - Increase (%) . . .	 1,326,993 	 1,373,962 3.5	 1,634,389 19.0	 1,832,900 12.1

Table C. The exports of cement and cement clinker (2007-2010)

						Unit: '000 M/T
Cement Clinker	Region	Major Countries	2007	2008	2009	2010 (estimated)
	. . .	. . .	. . .	. . .	. . .	. . .
Total cement clinker:			16,656	12,155	7,112	7,164
Cement	. . .	. . .	. . .	. . .	. . .	. . .
	Other	the U.S.	5,142	2,177	694	545
Total cement:			13,562		7,935	8,961
Total cement and cement clinker:			30,219	12,155	15,047	16,125

Table D. The imports of cement and cement clinker (2007-2010)

					Unit: '000 M/T
Cement Clinker	Major Countries	2007	2008	2009	2010 (estimated)
. . .	. . .	. . .	. . .	. . .	. . .
Total cement clinker:				117.004	

Cement				
Total cement:	521	554	690	720
Total cement and cement clinker:	521	554	807	720

中国水泥工业报告

作者: 中国水泥协会 孔祥忠 来源: 数字水泥网 更新日期: 2010-10-18 【字体: 小 大】

2009年在全球金融危机的大环境下，中国政府“保增长、扩内需、调结构”的一系列政策和固定资产的增长为我国水泥工业的发展带来难得的契机；政府投资稳定经济发展的政策对水泥需求市场的拉动十分明显。

一、2009年中国水泥工业基本情况

（一）水泥投资1700亿元

2009年，全国水泥累计投资额为17,00亿元，同比增长61.75%，创历史新高。

从2009年新增近2亿吨水泥熟料产能分析，直接用于水泥生产线的投资应在1100亿元左右，其余600亿元主要投资在环保、余热发电、大型水泥粉磨站建设和技术改造方面。

2006年以来，水泥投资出现了由东部向西部延递的趋势，西部地区的投资总量和增速在持续上升。反映出西部经济发展速度在提升，未来水泥产品新增需求的市场在西部地区。

2009年1～12月水泥投资 单位：亿元

地区	水泥投资	去年同期	增速（%）	比重（%）
全国	1,700.72	1,051.46	61.75	100.00
东部	415.25	269.00	54.37	24.42
中部	558.89	395.27	41.39	32.86
西部	726.59	387.19	87.66	42.72
华北	224.01	131.77	70.01	13.17
东北	116.89	88.25	32.46	6.87
华东	336.31	215.08	56.37	19.77
中南	439.81	340.54	29.15	25.86
西南	431.25	203.08	112.35	25.36
西北	152.46	72.75	109.57	8.96

来源：中国水泥协会 • 数字水泥

（二）水泥产量16.3亿吨

2009年全国水泥产量16.3亿吨，同比增长17%。

2009年1～12月度水泥产量 单位：万吨

地区	产量	增速（%）	比重（%）
全国	162,897.83	17.91	100.00
华北	19,137.06	23.99	11.75
东北	11,280.88	22.89	6.93
华东	58,677.28	10.38	36.02
中南	43,599.23	17.97	26.76
西南	20,218.78	32.04	12.41
西北	9,984.59	23.14	6.13

来源：中国水泥协会 • 数字水泥

全年水泥产量超亿吨的省份有六个，分别是江苏（1.44亿吨），山东（1.40亿吨），河南（1.17亿吨），浙江（1.07亿吨），河北（1.06亿吨），广东（1.00亿吨）。

（三）水泥利润400亿元

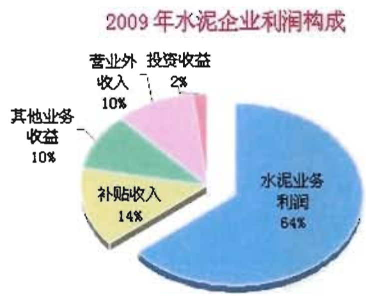
2009年水泥制造业利润总额预计400亿元，比上年增长12.3%，实现连续四年的利润攀升。2009年水泥市

东、中、西部地区水泥利润占全国比重趋势

场盈利区域分化明显，东西部反差较大。从东部、中
部、西部历年水泥利润占全国比重趋势分析，西部地区2008年超越中部地区，2009年超越东部地区。西部地区水泥利润的贡献率占全国比重45.04%。

2009年水泥企业从水泥销售中获取的收益约200多亿元，利用固体废物收入、出售纯低温余热发电技术收入等越来越成为水泥企业收益的重要来源。

来源：中国建材数量经济监理学会



来源：中国建材数量经济监理学会

（四）新线投产176条

2009年初步统计投产新型干法水泥生产线176条。随着2009年国务院办公厅38号文件的发布，水泥被列入抑制产能过剩的行业，2009年投产新线的数量可能是水泥工业发展史上最高的年份。

2009 年全国已投产新型干法生产线统计汇总

规 模（t/d）	1200～1600	2000～2500	3000～3200	4000	5000 以上	合计
生产线数（条）	6	81	8	12	69	176
熟料能力（万 t/a）	244.9	5983.0	768.8	1488.0	11005.0	19489.7
占熟料总产能比（%）	1.26	30.70	3.94	7.63	56.47	100.00

来源：中国水泥协会秘书处

2009年投产新线中日产4000吨以上规模的生产线占到了46%，其水泥熟料产能占到新增总能力的63%以上。新建水泥生产线的大型化已是未来发展趋势。

2009年新型干法水泥产量比重达到了76.88%，提前完成的水泥工业“十一五”规划要求。水泥工业在技术结构调整上已经取得重大突破。

（五）产品出口1560万吨

2009年我国水泥出口848.65万吨，同比下降35.85%。水泥出口价格继续下滑至50.15美元/吨。

2009年我国水泥熟料出口712.48万吨，同比下降44.36%。熟料出口价格持续下降至36.72美元/吨。

（六）淘汰落后7420万吨

2009年全国淘汰落后水泥产能7420万吨。按照2009年国务院办公厅38号文件要求，到2012年末要全部淘汰落后水泥产能，任务十分艰巨。

根据2009年具有合法生产许可证企业统计，今后需淘汰落后水泥产能约3.89亿吨。需淘汰小型水泥粉磨站的落后水泥

粉磨能力2.37亿吨。

（七）企业并购整合8000万吨

2009年中国中材集团、中国建材集团、华新水泥、冀东水泥、金隅集团、亚泰水泥、山东山水、华润水泥、台湾水泥、红狮水泥等大型水泥集团在并购重组方面有了重大进展。

初步统计，2009年水泥行业兼并重组涉及整合水泥产能近8000万吨。水泥行业重组整合分为企业收购、内部整合、外资参股三种形式。企业收购主要涉及10家大型水泥集团，内部整合主要涉及5家水泥集团，外资参股涉及2家外国公司。通过竞争与联合重组，国内水泥区域市场格局越来越明朗化。

根据中国建材数量经济监理学会统计，2009年，年生产能力在500万吨以上的水泥企业（集团）65家，水泥熟料生产能力6.73亿吨，占水泥熟料总生产能力48.53%，水泥熟料产量5.6亿吨，占水泥熟料总产量51.91%；其中千万吨以上的水泥企业（集团）20家，水泥熟料生产能力4.82亿吨，占水泥熟料总生产能力的34.76%，水泥熟料产量4.19亿吨，占水泥熟料总产量38.82%。

值得关注的新亮点是：水泥产业链的延伸进入大企业的发展战略。投资和收购水泥混凝土搅拌站、水泥机械、城市垃圾处理等新产业已迈出步伐。

（八）技术创新项目200多项

水泥行业是我国在推进节能减排方面做的较好的行业。2009年整个行业重大节能减排项目有200多项，项目的实施为企业在减少环境污染、提高资源利用率、降低能源消耗、增加市场竞争能力方面提供了有力保障。

广州越堡水泥和北京金隅集团新北水利用水泥窑大规模协同处置城市污泥生产线先后投入运行。

由天瑞集团投资兴建日产12000吨水泥熟料生产线在河南荥阳投产。这是世界单线生产能力最大水泥熟料生产线，配套有18兆瓦余热发电机组，年水泥生产能力达450万吨，装备全部国产化。

亚洲单线规模最大的新型干法白水泥生产线项目——阿尔博波特兰(安庆)有限公司年产40万吨白水泥熟料生产线于安徽省安庆投产。这是目前亚洲装备最好、技术最新、工艺最优、能耗最低、产能最大的白水泥生产基地。

由合肥水泥研究设计院和天津水泥工业设计研究院自主研发和制造的、配套日产5000吨新型干法水泥生产线的原料立式磨，已在新建生产线上大量使用。

2009年水泥余热发电项目初步统计，投运生产线245条，机组204台，总装机1705MW。

已累计完成联合国EB组织水泥注册项目31个，涉及每年减排量273万吨。

世界水泥行业CDM项目统计(截至2010年3月1日)

名称		单位	低碳燃料	原料替代	增加混合材	余热发电	能效提高
发改委批准的中国项目	项目数	个	1	12	5	174	0
	每年减排量	万吨	14	278	33	1,190	0
EB注册的中国项目	项目数	个	0	5	0	31	0
	每年减排量	万吨	0	120	0	273	0
	已签发减排量	万吨	0	0	0	38	0
EB注册的外国项目	项目数	个	2	10	13	3	5
	每年减排量	万吨	7	165	199	13	7
	已签发减排量	万吨	3	58	113	8	1

来源：上海川吉投资管理有限公司

（九）政策法规10件——健康发展

2009年是水泥产业政策出台的密集年份，全年政府出台和起草了涉及水泥工业发展的主要政策、法规文件有10件。从国家政策面上，保障了水泥行业的健康发展。

2009年11月10日《关于抑制部分行业产能过剩和重复建设引导产业健康发展的若干意见的通知》（国发[2009]38号）出台，为抑制水泥产能过剩、重复建设问题，为推进水泥行业结构调整进行了宏观调控。2009年11月21日工业和信息化部印发《关于抑制产能过剩和重复建设引导水泥产业健康发展的意见》的通知（工信部原[2009]575号），提出了具体贯彻落实国发[2009]38号文件精神的指导意见。

11月10日国家发改委办公厅下发《关于水泥、平板玻璃建设项目清理工作有关问题的通知》（发改办产业[2009]2351号），要求对2009年9月30日前尚未投产的在建项目、已核准未开工项目（含水泥熟料线和粉磨站）进行清理。10月26日

工业和信息化部印发《关于报送水泥和平板玻璃淘汰落后产能2009年计划及三年计划的通知》（工信厅原[2009]222号），计划涉及2009年淘汰落后水泥产能7420万吨。12月18日商务部和科技部联合发布《关于鼓励技术出口的若干意见》。12月31日财政部、国家税务总局、国家发展改革委公布《环境保护节能节水项目企业所得税优惠目录（试行）的通知》（财税[2009]166号），水泥余热发电、水泥窑协同处置项目有望得到国家税收优惠政策。《水泥工业产业发展政策》进行修订；《水泥行业准入条件》（征求意见稿）出台。12月29日财政部、国家税务总局《关于资源综合利用及其他产品增值税政策的补充的通知》（财税[2009]163号），修正了原156号文的掺兑废渣比例计算公式，保护了水泥企业利用废渣的积极性。5月国家环境保护部公告《清洁生产标准·水泥工业标准》，标准自2009年7月实施。标准规定了企业在达到国家和地方污染物排放标准的基础上，根据当前的行业技术、装备水平和管理水平，对水泥工业企业清洁生产又提出了新的要求。《水泥矿山工程设计规范》（报批稿）完成，该规范将于2011年年初实施，是今后指导水泥矿山可持续发展的规范性纲领。

二、2010年水泥工业展望

2010年中国水泥工业将面临新的挑战。

一、大企业还需要继续加强兼并重组，做大做强，提高产业集中度和资源配置效率。

二、必须加快淘汰落后水泥产能。涉及被淘汰企业涉及到约50万人的再就业，中国政府正在建立合理的落后产能退出机制，妥善安置被淘汰企业人员的再就业，并加大对被淘汰企业的经济补偿。

三、围绕低碳经济的发展要求继续做好水泥工业的节能减排工作。低碳经济时期水泥行业节能减排的重点更多的将转向可替代原料、燃料的利用，合理增加废渣利用率，利用水泥窑协同处理城市垃圾、污泥。发展低碳经济，水泥工业必将孕育和产生许多新的技术、装备和产业。

四、在国家积极的财政政策和货币政策影响下，投资拉动下水泥需求有所保障，水泥市场需求继续保持高位，但总量增速会有所回落。

五、中国的水泥产量占世界的50%，因水泥生产而产生的CO2排放也就占世界水泥排放量的50%。中国政府已郑重承诺：到2020年单位国内生产总值二氧化碳排放比2005年下降40％～45％。在完成政府向国际社会做出的减排承诺指标的落实中，水泥工业将面临新的挑战。

参阅资料：

1、中国水泥协会市场信息部《2009年水泥工业经济运行报告》2010/02
2、刘作毅《中国水泥区域市场分析》2010/01
3、张建新《金融危机下水泥工业的“冬日暖阳”》
4、周滔浩、孔祥忠《2009年水泥工业发展与技术进步》2010/03
5、周鸿锦《结构调整是水泥工业发展的主流》

中国

技术经济指标

时期：2007 - 2009（实际）& 2010（预期）

A. 主要经济指标

项目	2009 （实际）	2010 （预期）
1. 人口数量（百万）	1,334.7	1,340.0
2. 地理面积（平方公里）	960 万	
3. 人均国民生产总值（美元）	3,380	
4. 国民生产总值年增长率（%）	9.1	8.0
5. 城市建筑的增长率（%）		
6. 通货膨胀率（%）	-0.7	
7. 货币		
8. 与美元的汇率 （平均）	6.8	6.7
9. 贷款利率（%）	5.4	5.4
10. 国内水泥消费量（'000 t）	1,634,389	1,832,900
11. 人均水泥消费量（千克）	1,224	1,366

B. 水泥的生产、销售及消费量

(单位：'000 吨)

项目	2007（实际）	2008（实际）	2009（实际）	2010（预计）
1. 产量				
- 企业数量	5,028	5,119	5,103	5,018
- 工厂数量	5,028	5,119	5,103	5,018
- 窑的数量	810	950	1,128	1,280
- 窑的产量				
- 窑的投产比率（%）				
- 水泥磨的产量	1,360,000	1,400,000	1,650,000	1,850,000
- 水泥磨的投产比率（%）				
2. 生产				
- 熟料	890,525	898,125	1,032,821	1,150,000
- 水泥	1,360,000	1,400,000	1,650,000	1,850,000
3. 销售				
- 国内	1,326,993	1,373,962	1,634,389	1,832,700
- 出口：熟料	17,814	12,806	7,125	7,600
水泥	15,193	13,232	8,487	9,700
- 总销售量	1,360,000	1,400,000	1,650,000	1,850,000
4. 进口				
- 熟料	113	51	117	140
- 水泥	539	566	703	760
- 总进口	651	617	820	900
- 进口税（%）：熟料				
水泥				
5. 国内消费				
- 总消费量	1,326,993	1,373,962	1,634,389	1,832,900
- 增长（%）		3.5	19.0	12.1
- 人均消费（千克）	1,004.3	1,034.6	1,224.5	1,366.3
6. 国内供货价格（P 042.5）				
- 散装水泥，含运费（美元/吨）	45.29	53.22	53.98	54.56
- 袋装水泥，含运费（美元/40kg）				

C. 水泥和熟料的出口（2007 - 2010）

(单位：'000 t)

	区域	主要目的地国家	2007（实际）	2008（实际）	2009（实际）	2010（预计）
熟料	亚洲	孟加拉国	1,107	1,042	1,568	2,404
		阿联酋	3,078	3,266	1,462	1
		台湾	855	1,268	1,167	1,184
		印度	5	10	586	312
		越南	41	21	313	227
		新加坡			200	
		科威特	1,094	1,134	102	
		香港	119	136	88	68
		菲律宾			36	125
		澳门	358	277	28	
		马来西亚	60	243	15	53
		印度尼西亚				412
		韩国	3	1	9	3
		朝鲜	6	5	6	10
		蒙古	23	18	5	
		伊朗	124	11	4	1
		卡塔尔	31	502		
	非洲	肯尼亚	73		160	212
		吉布提		6	77	
		埃及		3	65	281
		埃塞俄比亚		25	53	
		加纳				369
		莫桑比克				179
		尼日利亚	35		15	
		马达加斯加		30	10	
	其他	西班牙	8,064	3,054	746	476
		比利时	226	242	148	282
		澳大利亚	54	27	108	312
		巴西	83	151	98	250
		意大利	1,065	540	31	
		墨西哥	7	2	4	6
		法国	132	8	4	
		荷兰	11	9	3	
		俄罗斯联邦	4	125		
	熟料总量		16,656	12,155	7,112	7,164

	区域	主要目的地国家	2007（实际）	2008（实际）	2009（实际）	2010（预计）
水泥	亚洲	台湾	693	723	798	1,118
		香港	512	478	525	535
		蒙古	391	599	310	467
		缅甸	161	174	212	277
		日本	148	140	146	117
		韩国	1,420	681	129	120
		新加坡	49	173	79	193
		澳门	345	148	78	41
		哈萨克斯坦	784	315		23
		澳大利亚	96	166		126
	非洲	安哥拉	1,044	2,053	2,532	2,961
		尼日利亚	1,217	1,212	826	475
		刚果(布)		595	559	653
		喀麦隆		176	180	333
		加蓬	116	194	169	229
		莫桑比克	110		124	45
		刚果(金)		34	100	48
		马达加斯加	109	147	87	34
		几内亚	99		76	171
		纳米比亚	125		56	98
		朝鲜	74	64	52	81
		南非	479	279		
	其他	美国	5,142	2,177	694	545
		俄罗斯联邦	352	1,020	140	146
		澳大利亚	96	166	66	126
	水泥总量		13,562		7,935	8,961
水泥、熟料总量			30,219	12,155	15,047	16,125

D. 水泥和熟料的进口（2007 - 2010）

（单位：'000 t）

	主要国家	2007（实际）	2008（实际）	2009（实际）	2010（预计）
熟料	台湾		51.000	74.059	50
	日本			42.689	58
	英国		0.046	0.216	
	澳门			0.022	
	韩国		0.001	0.009	0.1
	法国			0.009	
	越南				8
	台湾				50
	熟料总量			117.004	
水泥	日本	519.260	550.315	686.391	720
	澳门			1.368	
	越南			0.900	
	爱沙尼亚			0.200	
	马来西亚	0.159	0.671	0.190	
	美国	0.100	1.795	0.167	
	新加坡	1.573	0.510	0.149	
	韩国	0.036	0.657	0.120	
	德国		0.142	0.062	
	台湾		0.176	0.031	
	法国		0.029	0.025	
	意大利		0.022	0.008	
	澳大利亚		0.010	0.006	
	水泥总量	**521**	**554**	**690**	**720**
水泥和熟料进口合计		**521**	**554**	**807**	**720**

编辑：顾坡

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China Market Research Net

China Cement Production in 2006

Date: June 14, 2007

According to preliminary statistics, China's cement clinker total production reached 873 million M/T in 2006, representing a 14.87 percent increase over 2005; . . . China's cement total production reached 1.235 billion M/T in 2006, representing a 15.53 percent increase over 2005. . . .

2006年全国水泥产量

完成日期：2007-6-14 16:13:29

水泥产量12.35亿吨据初步统计，2006年全国生产水泥熟料8.73亿吨，比2005年增长14.87%，其中预分解窑熟料3.98亿吨，比2005年增长31.64%.水泥产量12.35亿吨，比2005年增长15.53%.新型干法比例46%，比2005年上升6个百分点。

上一篇报告： 2006年05月塑料包装箱及容器产量
下一篇报告： 2007年4月份广东省钟表产品产量

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中国水泥协会：预计今年水…

www.gov.cn

Nov. 26, 2010 Source: The website of the Ministry of Industry and Information Technology

Opinions Relating to Curbing Overcapacity and repeated Construction in Cement Industry and Guiding the Healthy Development of Industries

. . . (portions omitted)

In 2008, China's cement capacity reached 1.87 billion M/T, and cement production reached 1.4 billion M/T. . . .

中央政府门户网站 www.gov.cn 2009年11月26日 来源：工业和信息化部网站

关于抑制产能过剩和重复建设
引导水泥产业健康发展的意见

为贯彻落实国务院《关于抑制部分行业产能过剩和重复建设引导产业健康发展的若干意见》（国发〔2009〕38号），进一步加强和改善水泥行业管理工作，现提出如下意见：

一、提高认识，统一思想

水泥是重要的建筑基础材料，我国水泥产量居世界第一，为经济社会发展做了巨大贡献。今年以来，面对国际金融危机的不利影响，在中央实施“保增长、扩内需、调结构、惠民生”一揽子计划的推动下，水泥工业形势继续向好，产量稳步增长，效益明显回升，结构调整取得新的成效。

但是，在看到保增长成绩的同时，必须清醒认识到水泥工业存在的深层次矛盾。一是重复建设出现加剧趋势。2008年全国水泥产能18.7亿吨，产量14亿吨。截止2009年9月底，全国新建成投产和在建生产线400余条，总产能约6亿吨，水泥产能严重过剩。二是落后产能数量较大。目前全国仍有5亿吨落后产能，约占现有总产能的27%。三是产业集中度低。前10位企业水泥企业产量仅占全国比重20%左右。四是资源浪费、环境污染、生产无序等状况依然比较严重。一些地方能耗和环保超限企业没有得到及时整治，部分地区仍然存在无证企业的非法生产。

当前我国水泥工业正处在发展的关键时期，必须进一步统一思想，在保增长的同时更加注重结构调整和转变发展方式，将抑制水泥产能过剩和重复建设作为结构调整的重点工作抓紧、抓实，抓出成效。

二、坚决抑制产能过剩和重复建设

一是严格市场准入，提高准入门槛。工业和信息化部将会同有关部门抓紧制定和发布《水泥行业准入条件》，进一步提高能源消耗、环境保护、资源综合利用等方面的准入门槛。二是配合有关部门做好对2009年9月30日前尚未开工的水泥项目的清理（具体要求见附件），并将清理结果和意见报送工业和信息化部。坚决停止违法违规项目建设，

清理期间一律不得核准新的扩能建设项目。

三、继续加大淘汰落后工作力度

一是继续认真贯彻执行《关于印发节能减排综合性工作方案的通知》（国发〔2007〕15号）规定，确保完成“十一五”期间淘汰落后水泥产能2.5亿吨的工作目标。要求各地在媒体上公告应予淘汰的落后企业（生产线）名单，接受社会监督。二是按照国发〔2009〕38号文规定进一步加快淘汰落后产能。各地要按照《关于报送水泥和平板玻璃淘汰落后产能2009年计划及三年计划的通知》（工信厅原〔2009〕222号）要求抓紧制定2010-2012三年内彻底淘汰不符合产业政策和环保、能耗、质量、安全要求的落后水泥产能时间表。要将淘汰落后产能指标分解落实到各地区和具体企业，积极争取各级财政资金，加大对淘汰落后的支持力度，逐步建立落后产能退出机制。

四、以省为单位做好地区水泥产需总量平衡

鉴于水泥生产和销售区域性较强，在总量上应以省区平衡为主。各地要加强本地区水泥工业发展规划编制工作，对已经制定发布的水泥规划要认真执行，强化规划的约束性。还没有制定水泥规划的省区要抓紧制定。在此基础上，通过全国和省级水泥工业规划结合，制定若干重点经济区域水泥工业发展规划，切实搞好水泥产需总量平衡和结构调整。

五、支持企业开展技术改造

重点支持企业通过上大压小、等量或减量置换落后产能、开展综合利用、推进节约生产、清洁生产等有利于节能降耗、减排治污、提高质量为主要内容的技术改造，推动淘汰落后。主要包括水泥余热发电、粉磨系统节能改造、粉尘治理和利用工业废弃物、垃圾、城市污泥生产水泥等一批具有示范和带动作用的技术改造项目，推进水泥行业结构调整和产业升级。国家将在技术改造专项中适当安排部分资金，重点支持符合上述领域的技术改造项目。

六、推动优势企业兼并重组

按照国家发展改革委等八部门《关于水泥工业结构调整的指导意见》（发改运行〔2006〕609号）要求，水泥企业前10户集中度“十一五”末要达到30%，前50户集中度要超过50%。按照国家发展改革委、国土资源部、中国人民银行《关于公布国家重点支持水泥工业结构调整大型企业（集团）名单的通知》（发改运行〔2006〕3001号）要求，鼓励大企业并购重组落后企业，推动结构调整，提高产业集中度。积极开展调查研究，提出支持水泥兼并重组的新的优惠措施建议，完善国家对重点支持水泥企业的各项政策。

七、建立信息发布制度

各地工业主管部门要会同同级相关职能部门和行业协会建立信息发布制度，及时公布水泥产销和投资的最新情况，客观分析市场容量和产能利用率，评估已核准水泥项目产能规模与分布，引导企业冷静思考，谨慎决策，适时规避投资风险。

八、加强组织领导，切实落实问责制

各地工业主管部门要认真履行职责，切实加强组织领导，进一步改进和强化水泥行业管理。对违反国家土地、环保、生产许可等法律法规和信贷政策、产业政策规定，工作严重失误或失职造成水泥违规建设项目的，要及时向相关部门通报，切实落实问责制。要充分发挥好行业协会的参谋助手作用，通过实施有效的行业管理，引导水泥产业健康可持续发展。

附件：清理水泥建设项目表

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Cementren.com

China Cement Industry: How to Avoid Overcapacity Dilemma

Date: July 12, 2010 Source: Cementrent.com

. . . (portions omitted)

In 1998, China's cement capacity was 79.86 million M/T, however, China's cement capacity reached 1.62 billion M/T in 2009. . . .

中国水泥行业如何走出产能过剩的困局

发布：2010-7-12 09:55 | 编辑：阿辉 | 来源：水泥人网

水泥人网讯： 2009年，我国**水泥产能**总产量是16.2亿吨，稳坐了世界水泥产能排名的头把交椅，但是，我们不得不承认，我国虽然是水泥产能大国，但不是水泥强国，主要原因是什么呢？我国**水泥企业**龙头又都在干什么呢？

水泥企业多而不强 产能严重过剩

从**水泥行业**的发展来看，中国从1978年改革开放以来的32年中，水泥行业一直处于高速发展的状态。1980年，我国水泥总产能为7986万吨，到2009年我国水泥总产能居然达到了16.2亿吨；从85年开始，我国水泥总产能持续居世界首位；到1999年，我国大小水泥企业达8000多家；国家在强制实施一些**淘汰落后产能**，关闭小水泥企业的政策后，到2009年底，我国光**新型干法水泥**生产线还有1113条。

2010年，我国水泥产能严重过剩是一个不争得事实。2009年，我国水泥行业总投资额高达1700亿元，同比增幅达到了61.75%。截至到今年4月，我国水泥行业的投资额为428亿元，同比增幅是17%。据水泥人网了解，目前除了京津沪没有在建拟建项目外，其它地区在建水泥生产线248条，预计新增产能3.5亿吨。由此推算，我国今年在建**项目投资**规模将达1200亿元以上。即便减去今年水泥落后产能淘汰掉的9155万吨，今年预计水泥总产能将逾18亿吨，整个行业产能严重过剩，毋庸置疑。

国家促进企业兼并重组 企业积极响应

我国水泥企业众多，各行其是，由此导致了我国水泥产能多而不强的尴尬局面。**冀东水泥**稳坐华北、东北地区龙头老大，近期，又收购秦岭，拟重组金顶，虽然，北京金隅的崛起会给其在华北地区（主要是河北）的销售带来一定压力，但是并不会影响到冀东水泥"三北"战略的实施；**中材国际**主要注重西北地区，毕竟是央企，响应国家的号召，是他们的职责，西部大开发第二个十年规划后，中材将会受益匪浅，其旗下的**赛马实业**、**祁连山**、**天山股份**等将会受益，因为西部地区海拔较高，建线的的难度非常大，很多水泥龙头企业是心有余而力不足；**海螺水泥**稳坐华南及华中地区，但是由于**中国建材**旗下的**南方水泥**迅速崛起，众多水泥企业共同组成南方水泥，将会给海螺水泥带来巨大的压力，最后谁会是华中及华南地区的龙头还待等待。

我国不断出台政策，大力度的淘汰落后水泥产能，并且积极的促进水泥企业间的兼并重组，使之尽快的走出产能过剩的困局。并且，在国家相关政策的积极促进下，水泥企业正在以迅雷不及掩耳之势进行兼并重组，相信我国水泥行业在不久的将来，不但会成为产能世界第一，单个企业市场竞争力也将会是世界第一。

TAG：水泥产能 水泥行业

Ccement.com

Gao Changming: The Outlook on Regulating and Controlling of China's Cement Capacity

Ccement.com September 30, 2010

. . . (portions omitted)

It is estimated that by the end of 2010, China's cement clinker capacity would reach 1.53 billion M/T, . . .; China's cement capacity would reach 2.37 billion M/T. . . .

高长明：我国水泥产能调控前瞻

【中国水泥网】【2010-9-30】【收藏本页】【打印本页】【大 中 小】【关闭窗口】

2008年世界性经济危机重创了各国的经济，然而在我国政府果断的经济刺激措施的推动下，我国经济发展仍然保持强劲的势头。2000~2009年我国GDP年增长率大多在两位数的水平。得益于政府大量基建投资拉动经济发展的政策，水泥需求与产能扩张之势则更为迅猛。水泥年产量由2000年的5.93亿吨，增长为2009年的16.48亿吨；新型干法水泥生产线相应地由135条增长至1113条，新型干法水泥占总产量的比重由16%上升为72.8%。在建并将于2010~2012年投产的新型干法线还有约250条。据预测，2010年水泥产量约18亿吨，其中新型干法水泥可能接近80%；立窑水泥将削减到17%，同时要完成工信部要求今年淘汰1.07亿吨落后水泥产能的任务；特种水泥约3%。另外，2010年我国GDP增长可能达9.8%，城市化率可能达46.2%。

笔者估算，2010年年底我国水泥已有产能的基本情况是：熟料产能15.3亿吨，其中新型干法窑熟料12.6亿吨，立窑熟料2.7亿吨；水泥产能23.7亿吨，其中新型干法水泥19.4亿吨，立窑水泥4.3亿吨；水泥产量18亿吨，其中新型干法水泥14.4亿吨，立窑水泥3亿吨；以上数值均未计入特种水泥约5000万吨的产量。此外还有2个事实必须考虑到，其一，2012年年底前还有约250条新型干法线将投产，这是已成既定的新增产能；其二，在已有的新型干法线中，熟料日产1500吨以下、生产技术指标低下、环保不佳的约有300条，熟料产能约1亿吨，今后3年其中大部分也将被列入淘汰队伍。因此水泥工业淘汰落后产能的任务仍很艰巨，绝不能松懈。

落后产能的彻底淘汰，为我国水泥工业从量变到质变实现质的飞跃提供了机遇，同时也为现代化新型干法水泥产能的新建腾出了一定的发展空间。显然，上述4亿多吨的落后产能在2014年以前是可以而且应予逐步淘汰的。

近来，有些经济学家和从事宏观经济研究的学者认为，过度依赖基建投资拉动GDP的高增长率是难以持续的，同时还有可能对资源能源配置、节能减排、生态环境、安全生产、净增财富、民生福祉等方面诱发某些延滞性的负面影响。他们主张选择稍低的"绿色"GDP，而不要虚高的"黑色"GDP，建议"十二五"的GDP年增长率宜控制为8%~9%，切实贯彻科学发展观，多增加科技创新、拉动内需、改善民生等领域的投入，转变发展方式，注重全面均衡发展。笔者十分赞同这个观点。

如果"十二五"期间，我国GDP平均年增长率能控制在8%~9%，城市化率为53%，那么在现有的具体条件下水泥工业应作何响应和规划？这里最重要的就是必须寻求行业共识。笔者的观点是，在保证国家经济建设需求的前提下，我国相应的水泥产量平均年增长率控制为4%足矣。这样，到2015年水泥产量将为21.5亿吨，其中95%以上为新型干法水泥，落后水泥已经匿迹。之后我国水泥年产量将维持在22亿吨左右并一直延续到2018年，人均累计水泥消费达26吨，2019年水泥产量（需求量）将开始逐步下降。

因为我国的基数很大，往往还习惯于"猛进"，所以更要强调平稳地发展，而不宜像一些发达国家那样水泥产量连续多年冲高到顶峰之后又迅速回落，形成所谓的"拐点"，应力求形成一个高位平台，这才是符合我国国情的。这是笔者所预期的我国水泥界吸取了国际的经验教训，根据我国的具体情况并达成行业共识后，在中国水泥协会的引导和全行业的努力，特别是许多大中型水泥企业集团公司以行业利益为首位的协力调控下的一大目标。因为笔者的发展预测模型计算结果表明，这是我国水泥工业大幅提升整体品质，实现低碳，兼并重组，强强联合，优化产业结构，促进规模化、集约化、

国际化经营，提高集中度和市场话语权，增强盈利与抗风险能力的最优化发展路线图，而且具有较强的可操作性和达标实现性。虽然这样的调控是有难度的，但是笔者有信心，只要行业达成共识，目标是可以实现的。实际上，最令人担心的是缺乏大局为重的共识，各自忙于扩张，无序竞争，其结果必将是整个水泥行业利益受损，大多数企业仍然难以摆脱微利的束缚。所谓“共识”，首先就要共同努力扭转水泥行业太过微利甚至但求保本的陋习，消除“内斗”，一致对“外”，开拓盈利空间。这在立窑水泥日趋彻底淘汰的今天，其现实的可能性也在与日俱增，前景值得期待。

由于各种原因，如果今后若干年内国内大规模的基建投资仍然居高不下，水泥需求依旧旺盛，水泥产能的增长也绝不能像过去那样几乎失控地任其发展。投资人千万不要贪图短期的“繁荣”，哄投滥建水泥生产线。否则几年以后，一旦水泥年消费量越过拐点，届时水泥产能就会严重过剩，远比现在的所谓“产能过剩”更具杀伤力。因为到那时落后产能已经淘汰到了所剩无几，应对过剩已经不具有任何缓冲作用，必然导致大量水泥企业相互间为生存而“血拼”的残酷局面，整个水泥行业将受到重创。笔者的研究表明，2015~2018年，水泥产量调控到22亿吨左右，熟料产能年利用率70%~90%，水泥粉磨产能年利用率65%~85%，利用率有±10%的波动，意在用于调控产量，应对供求变化。这是当水泥需求开始下降以后，实现水泥工业“软着陆”的临界边际条件。我们必须充分重视，从现在开始就要努力朝着这个目标积极调控。

8年以后，即2018年前后，回顾我国水泥产能、产量、消费量变化的轨迹，届时如果基本符合上述预期的话，就说明我国水泥行业的确足够理性、成熟和强大起来了，具有相当的调控与适应能力，技术含量和对环保的贡献不断提高，盈利也趋于合理水平。到那时，我国就将跻身世界水泥强国之列。这绝不是奢望，而是经过全行业的共同努力完全可以实现的。

（中国水泥网 转载请注明出处）

来源：中国建材报

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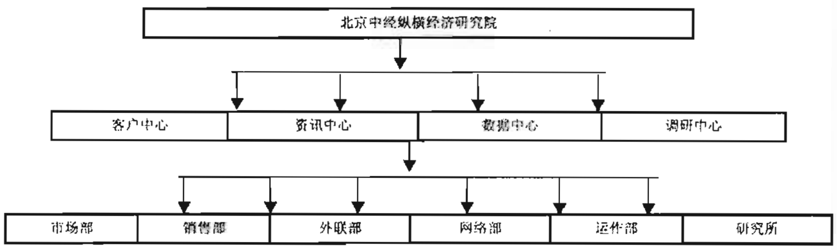
机构简介：

北京中经纵横经济研究院是专业从事于市场调查与产业经济研究的服务机构。我院侧重于行业现状、竞争状况及发展趋势研究、帮助客户了解行业进入机会，制定正确的投资策略，协助客户准确分析市场机会和行业风险。我院自成立以来，开展了大量经济预测、经济分析和经济数据库的建设工作，并与国家统计局、教育部联合开展了调查分析师认证培训和考试工作，为发掘更好的市场调查人才做出了应有的贡献。

我院的研究采用新闻、数据、图表、专家分析、政策、文献等形式，通过在线浏览、编写报告等途径向客户提供高质量的专业信息数据，其中固定报告15000余份，每年新增各行业信息报告数量超过5000份。根据报告涉及的产业项目，分成18个产业大类，96个子类，在大量经济预测成果、经济数据库和全国性网络信息的基础上，为企业市场研究、营销策划、管理咨询、消费洞察提供强有力的决策支持。



作为专业研究咨询服务机构，我院的专家库拥有上千来自于政府、国际组织、高等院校、科研院所和大中型企业的各类精英人才。我们还聘请了数名在行业有着较高的社会声望、独道见解分析和长远战略眼光的资深专家顾问。

我院自成立以来，不但在产业研究方面开展了大量经济预测、经济分析和经济数据库的建设工作，并积极参与市场调研、信息建设等方面的推广工作，为发掘更好的市场调查人才做出了应有的贡献。其中主要有：

主办单位	项目名称	参阅网址
国家统计局 教育部	调查分析师培训与认证	http://www.dcfx.com.cn
国家人事部经济人才专业委员会	市场调查员、市场调查师培训与认证	http://www.cmrqc.org
中国人民大学信息管理学院	中国人民大学情报学在职研究生	http://www.irm.cn

我院本着"客户的发展就是我们的进步"的理念，在向国内客户提供各类咨询服务的同时，还向数十家国外企业提供了来华投资机会、市场调查、可行性研究分析等服务，目前我院的国际业务量正在迅速增长，已逐步确立了同行业中的领军地位。随着我国经济形势的迅猛发展，通过不断更新和丰富所拥有的经济信息数据，未来北京中经纵横经济研究院将继续开拓更加广阔的市场领域，逐步发展成为中国本土具备一体化咨询服务能力的、最具影响力的咨询服务机构之一。

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设备维修工程师	4人
运行部副经理	1人
设备润滑工	4人
水泥和硅酸盐专业员	3人
高级秘书	1人
安全管理员	2人
制造部助理工程师	1人
工艺技术员	1人
公司设备副总	10人
机修、电修、巡检	20人
机械工程师	3人
窑煅烧工程师	1人
机械、设备工程师	2人
生产部工艺员	1人
运行部调度员	1人
窑操作员	1人

企业名称:水泥人网

所属行业：咨询信息
所在地区：北京北京市石景山区
公司性质：股份制企业
成立日期：
注册资金：300万元人民币
公司规模：50-200人

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公司概况

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2002年 网络电子刊物管理系统获计算机软件著作权登记证书
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Appendix C

KEYBRIDGE
RESEARCH

December 14, 2010

Memorandum for the Coalition for Sustainable Cement Manufacturing & Environment

From: Keybridge Research, Dr. Robert F. Wescott & Mark W. McNulty

Subject: Distributing Output-Based Allowance According to a "True-Up" Method

I. Introduction

In its attempt to minimize leakage, CARB proposes to allocate allowances to leakage-exposed industries according to the formula:

$$A = O \times B \times a \times C$$

Where:

A = the quantity of allowances received by an entity

O = an entity's output

B = the benchmark, as defined by the average industry emissions intensity

a = the assistance factor, based on CARB's assessment of an industry's leakage exposure

C = the cap adjustment factor, which generally declines in concert with the overall cap

A critical component of CARB's proposed framework is a dynamically updating "output factor". Ideally, the level of output used to determine a facility's allowance allocations in a given year would correspond precisely to the level of output that generated its emissions obligations in that year. Under CARB's proposed approach, however, a facility's allowance allocations are based on the average level of output from previous years (e.g., 2008-2010), while its emissions obligations are based on its actual level of output during the compliance year (e.g., 2012). Given the economic realities of the recent recession and reasonable expectations regarding future industry growth, this approach virtually guarantees that output-based allowances to the California cement industry will be persistently and severely under allocated. The purpose of this note is to discuss a "true-up" method for bringing allowance allocations and emissions obligations in any given compliance year into alignment.

II. Conceptual Overview

As a point-of-departure, consider an approach in which CARB does not distribute output-based allowances at the beginning of a compliance period but, rather, distributes allowances once emissions and output are known (i.e., after mandatory reporting data is submitted). In concept, CARB could distribute all allowances prior to the surrender deadline or, alternatively, simultaneously credit an entity's allowances against its compliance obligations and distribute the residual, if any. Although such an approach would ensure perfect alignment between allowance and obligations, it presents two distinct challenges:

(1) Market Liquidity: A significant portion of allowances associated with a particular compliance year will not be in active circulation during that year – effectively restricting the supply of allowances available for trading and reducing market liquidity.

(2) Auction Uncertainty: Given that the ultimate amount of allocations to the industrial sector would be unknown during the compliance year, CARB would need to have some basis for determining the appropriate amount of allowances to auction. This creates the risk that CARB could auction more allowances than appropriate during the compliance year, resulting in a deficit of budget year allowances when eventually distributing output-based allowances to industry.

2.1 Addressing the Market Liquidity Problem: The True-Up Method

One approach to resolving the market liquidity issue is to adopt a "true-up" method. In its pure form, a true-up method would consist of distributing allowances at the beginning of the compliance period based on a projection (the initial distribution) and requiring regulated entities to reconcile those balances once actual output and emissions are known (the final distribution). For example,

- Consider a scenario in which a facility's actual output was greater than its projected output – resulting in an under allocation of allowances in the initial distribution. In such an instance, CARB would make a final distribution of allowances equal to the difference between the facility's "accrued allowances" and its "initial distribution".

- Alternatively, consider a scenario in which a facility's actual output was less than its projected output – resulting in an over allocation of allowances in the initial distribution. In such an instance, CARB would require the facility to surrender allowances equal to (1) its base compliance obligation (i.e., its actual emissions) plus (2) the difference between the facilities "accrued allowances" and its "initial distribution".

Ultimately, by distributing allowances based on projections and reconciling balances once actual levels of output are known, the full true-up method has the potential to bring final allowance allocations and obligations into alignment while also minimizing the potential impact on market liquidity. A critical question, however, is CARB's ability to "claw back" any excess allowances provided in the initial distribution (i.e., instances in which actual output is less than projected output) – an issue that may merit careful consideration from both a technical and legal perspective. In the event that this is surmountable, the full true-up approach seems preferable.

In the event that CARB's ability to "claw back" allowances proves to be insurmountable from a technical or legal perspective, however, CARB could consider a more incremental approach. Specifically, CARB could make initial distributions that correspond to some percentage of projected emissions. In effect, CARB would be purposefully under allocating in the initial distribution with the expectation that it would only make upward adjustments in the final distribution – thereby avoiding any challenges associated with reclaiming excess allocations. In implementing this approach, CARB could transfer the proportion of allowances withheld from the initial distribution to a special CARB account until actual output levels are verified and final distributions are executed.

Such an approach introduces a critical policy decision into the equation: What percentage of projected emissions should be distributed at the beginning of each compliance period? To some extent, the "right" percentage is an empirical matter. For example, CARB might use the decline in California's industrial output during the "Great Recession" as a benchmark — reasoning that a more severe economic downturn during the policy timeframe is unlikely. Ultimately, such a decision is a risk management exercise that requires CARB to balance its concerns about market liquidity with its concerns about over allocating in the initial distribution.

III. Addressing the Auction Uncertainty Problem: The Leakage Prevention Reserve

Regardless of the true-up method employed, CARB will still face uncertainty with respect to determining the quantity of allowances available for auction during the compliance year. In short, CARB cannot know precisely how many allowances to auction in a given year until it knows how many allowances must be dedicated to leakage prevention. CARB can, however, manage this uncertainty.

One approach to managing this uncertainty is to create an allowance reserve that would supplement the pool of allowances available for output-based allowances in the event that CARB underestimates industrial output in a given compliance year (i.e., overestimates the amount of allowances available for auction). This reserve could be capitalized with a small fraction of allowances from the 2015-2020 timeframe. Furthermore, the reserve could be incrementally unwound beginning in 2015, when the "margin of error" in determining the amount of allowances available for auction decreases substantially.

IV. Conclusion

The practice of allocating allowances based on a lagging measure of output virtually guarantees that output-based allowances to the California cement industry will be persistently and severely under allocated, especially in the early years of the program as the economy recovers. CARB should consider several feasible policy measures to avoid such an outcome. In particular, a true-up method coupled with a reserve mechanism will enable CARB to better manage the risk and consequences associated with inaccurately projecting the amount of allowances available for auction.

Appendix D

KEYBRIDGE
RESEARCH

December 14, 2010

Memorandum for the Coalition for Sustainable Cement Manufacturing & Environment

From: Keybridge Research, Dr. Robert F. Wescott & Mark W. McNulty

Subject: The Output Effect - Estimating Industry Output & Its Impact on Allowance Allocation

I. Introduction

In its attempt to minimize leakage, as mandated by AB 32, CARB proposes to allocate allowances to leakage-exposed industries according to the formula:

$$A = O \times B \times a \times C$$

Where:

A = the quantity of allowances received by an entity

O = an entity's output

B = the benchmark, as defined by the average industry emissions intensity

a = the assistance factor, based on CARB's assessment of an industry's leakage exposure

C = the cap adjustment factor, which generally declines in concert with the overall cap

A critical component of CARB's proposed framework is the dynamically updating "output factor". Ideally, the level of output used to determine a facility's allowance allocations in a given year would correspond precisely to the level of output that generated emissions obligations in that year. Under CARB's proposed approach, however, a facility's allowance allocations are based on the average level of output from previous years (e.g., 2008-2010), while its emissions obligations are based on its actual level of output during the compliance year (e.g., 2012). At best, CARB's proposed approach is likely to result in a significant mismatch in timing between the generation of compliance obligations and the receipt of allowances. At worst, it is likely to result in a persistent and severe under allocation of allowances, especially within those industries that experience consistent output growth throughout the 2012-2020 timeframe.

The purpose of this analysis is to estimate the extent to which CARB's proposed approach is likely to result in the under allocation of allowances to the California cement industry. Specifically, it estimates allowance allocations to the industry under two approaches for determining output: (1) CARB's proposed method and (2) a "true-up" method in which both obligations and allowances are assessed on the same level of output.

Using the Portland Cement Association's ("PCA") most recent forecasts for California cement consumption and reasonable assumptions about other policy parameters, the analysis finds that CARB's proposed approach is likely to result in $669 million in compliance costs to the California cement industry between 2012-2020, as compared to $358 million under a true-up method. Put differently, it is estimated that CARB's definition of output is likely to almost double the cement industry's compliance costs under AB 32 – thereby exacerbating the cost disadvantage experienced by California producers and enhancing the risk of emissions leakage.

II. The CARB Method vs. The "True-Up" Method

According to CARB's proposed allocation framework, allowances are distributed based on a lagged output metric, while an entity's emissions obligations are determined by its output in the current compliance year. Specifically, CARB's proposed output measure for the purpose of allowance allocation is a three-year moving average, with a one-year gap between the averaged three years and the compliance year. For example, in compliance year 2012, emissions obligations will be associated with 2012 output, while allowances will be distributed to entities based on average output during 2008-2010.

CARB's lagged output metric is problematic for several reasons:

- A lagged output metric will almost certainly result in under-allocation to regulated entities. Due to the economic impact of the severe 2008-2009 recession, output for virtually every industry during 2011-2018 will be higher than 2008-2010 levels.[1]
- Using lagged output as a basis for allowance distribution arbitrarily penalizes those entities that experienced greater increases in output between 2010 and 2012.
- Under-allocation will exacerbate the cost disadvantage to California producers and, therefore, undermine CARB's efforts to stem leakage through the provision of allowances.

Under the alternative method, CARB would allocate emissions allowances based on an industry's actual output in the compliance year, as confirmed by verified mandatory reporting data. Conceptually, this can be achieved through an ex-post "true-up" of allocations once more accurate output data becomes available[2] – effectively allocating additional permits or taking back superfluous ones based on an entity's verified output levels.[3]

III. Methodology for Estimating Cost Impacts

To demonstrate the cost disadvantage to California industries associated with CARB's lagged output metric, this analysis uses the cement industry as an example, calculating its total direct compliance cost over the policy period based on: (1) CARB's lagged output methodology and (2) the alternative "true-up" method.

Specifically, the true-up method inserts an alternative output metric into CARB's original allocation formula, such that the benchmark, assistance factor, and cap adjustment factor remain unchanged from CARB's own analysis and assumptions. Standardized assumptions across both approaches include:

- **Benchmark**: 90% of the cement industry's average GHG intensity in 2009, which is assumed to be 0.871.[4]

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[1] For example, current California demand for cement is over 60% lower than 2006 demand, and capacity utilization rates at California cement plants is averaging just 50%.

[2] It is important to note that data constraints are not a barrier in CARB implementing the "true-up" method. Given that it is able to calculate emissions obligations for each year using annual Mandatory Reporting Data, CARB should also be able to obtain current output data to "true-up" allowance allocations prior to the surrender of allowances.

[3] CSCME is preparing a separate document that outlines how a true-up method might be implemented, including a more detailed discussion regarding the advantages and disadvantages of such an approach.

[4] This average GHG intensity in 2009 is based on unverified and incomplete data. However, future revisions and additions to the data are not expected to significantly change this value or materially impact the conclusions of this analysis.

- **Cap Adjustment**: Declines from 1.0 in 2012 to 0.925 in 2020
- **Assistance Factor**: 100% throughout the policy period, based on the cement industry's high leakage exposure.

This analysis makes four key assumptions regarding California cement industry and policy characteristics throughout the period:

- There are no major capacity expansions or additions in the California cement industry during 2012-2020.
- The California cement industry captures the vast majority of the state's cement consumption growth, though its share decreases rapidly as consumption approaches capacity.
- The allowance price starts at $25 in 2012, and increases at a real annual rate of 5%.[5]
- The California cement industry's emissions intensity of 0.871 in 2009 remains constant throughout the forecast period.

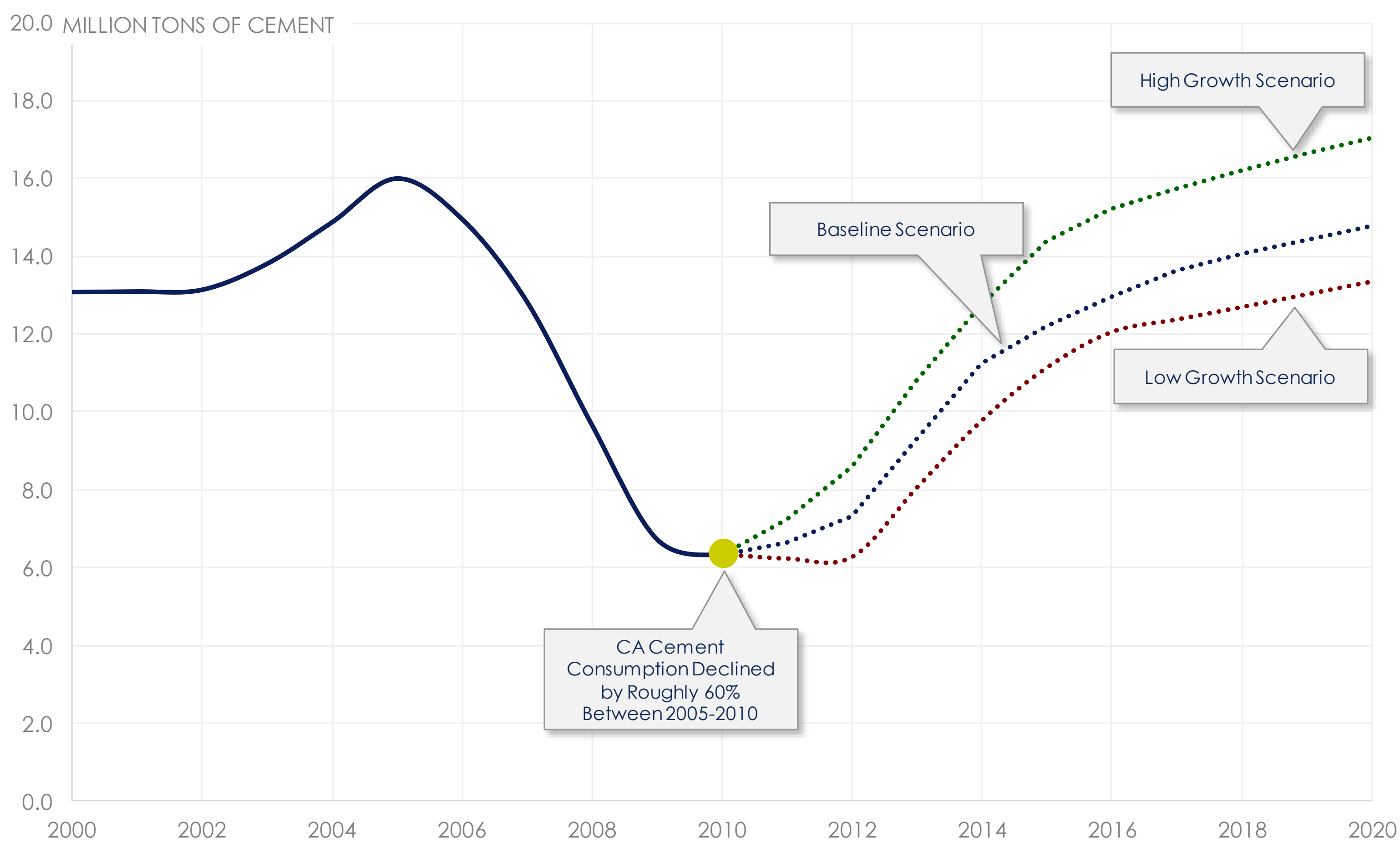
IV. Results

In each of the three scenarios, it is estimated that cement companies would, on average, only receive allowances for 60-80% of their emissions under the CARB's lagged output methodology (Figure 2). The industry would therefore have to pay for 20-40% of its emissions allowances, potentially exposing it to a greater risk of leakage. However, according to the true-up method, California cement producers would receive allowances equal to 90% of their direct emissions in 2012, declining to 82.5% in 2020.

Assuming a carbon price of $25 in the baseline scenario, California cement producers would pay an additional $311 million during 2012-2020 under CARB's lagged output calculation than they would under the true-up method (Figures 3 & 4). In all three scenarios, CARB's current approach to determining allowance allocation resulted in a far more significant under-allocation of allowances than the true-up method. Ultimately, the additional cost imposed by using a lagged output metric effectively doubles the compliance cost cement producers face over the forecast period and significantly reduces California producers' competitiveness versus imported cement.

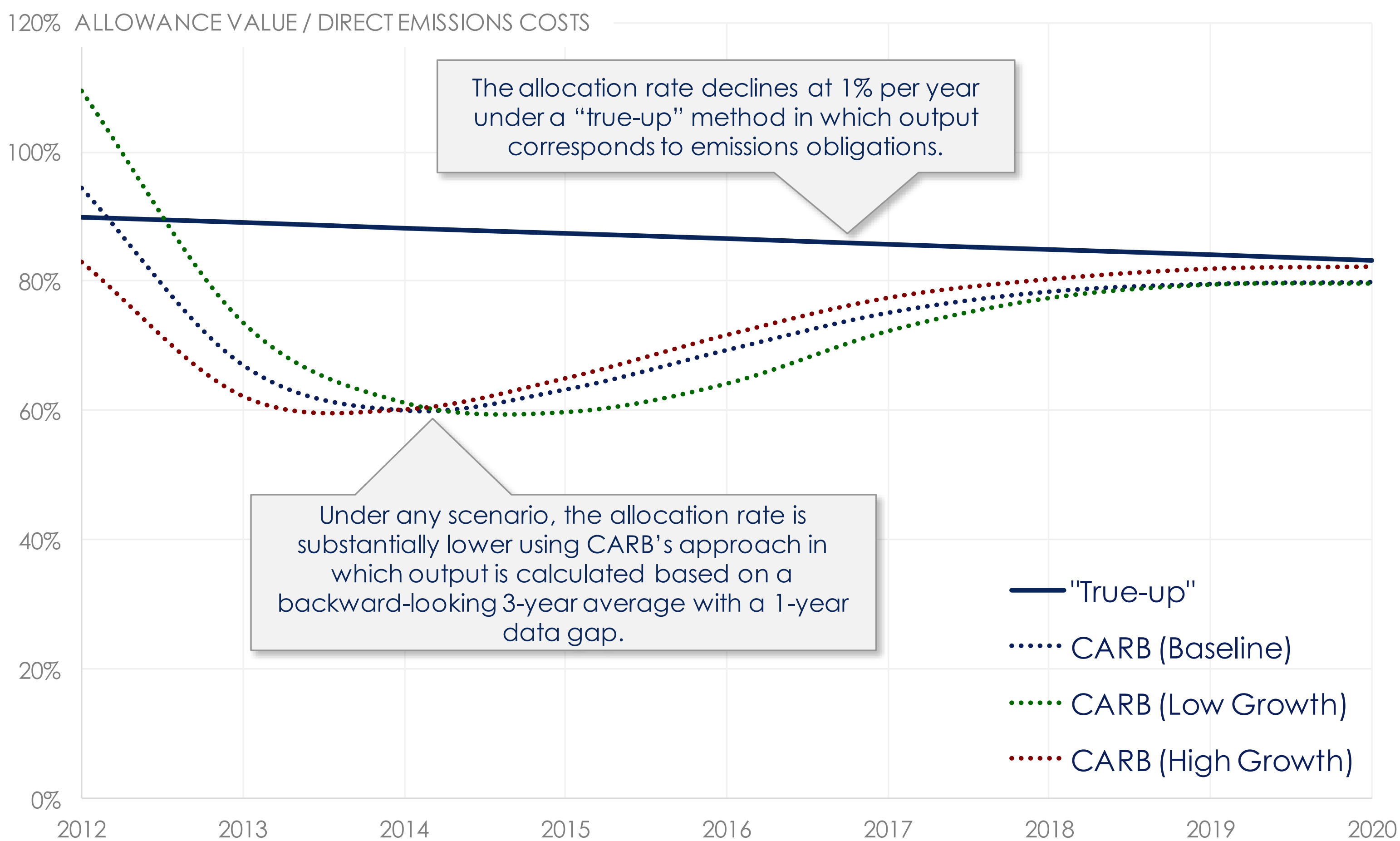
[5] Sensitivity analysis indicates that alternative assumptions about allowance prices do not materially alter the primary conclusions of this analysis.

Figure 1. California Cement Consumption



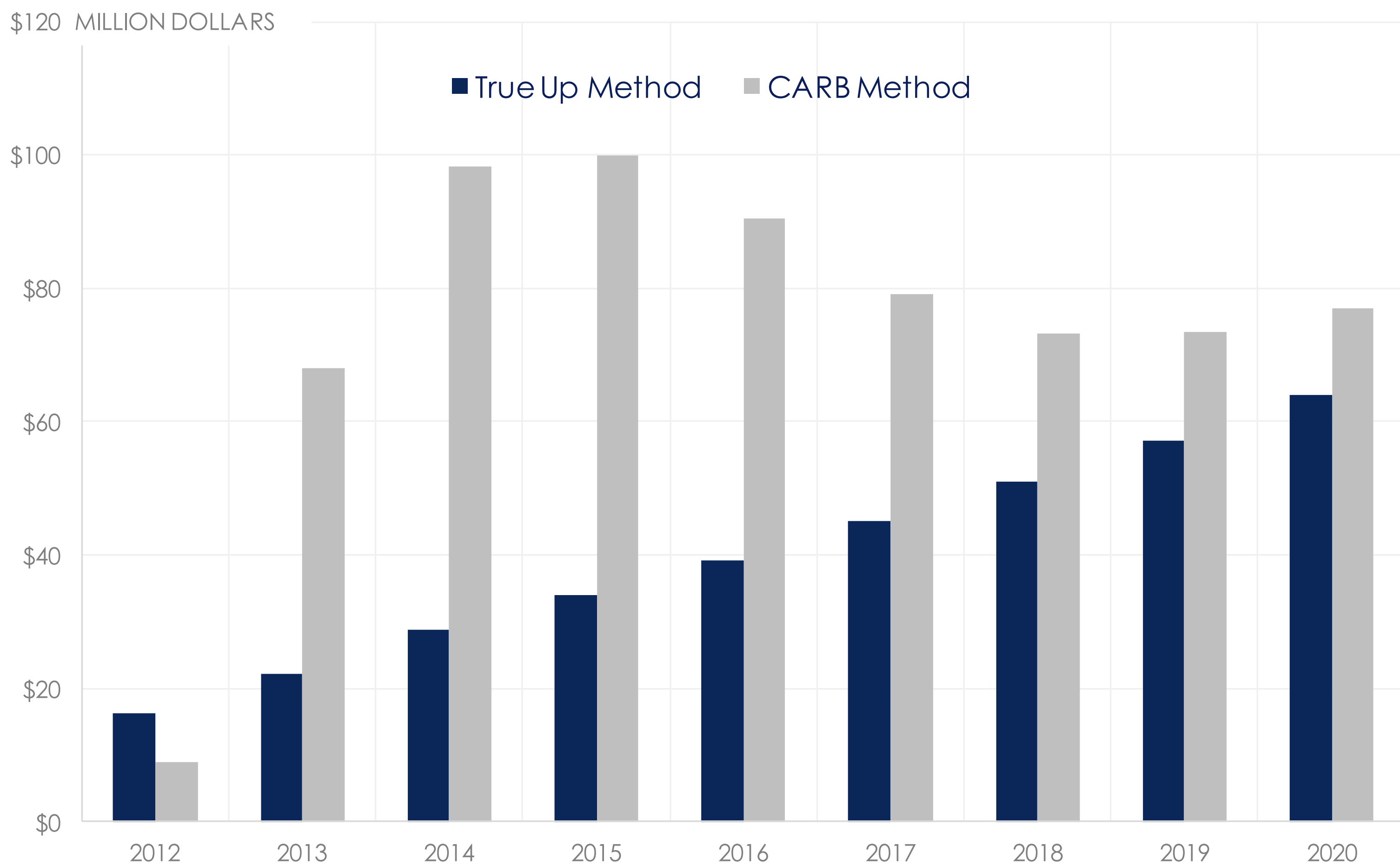
Source: PCA Updated California Forecast (November 2010)

Figure 2. Allocation Rates



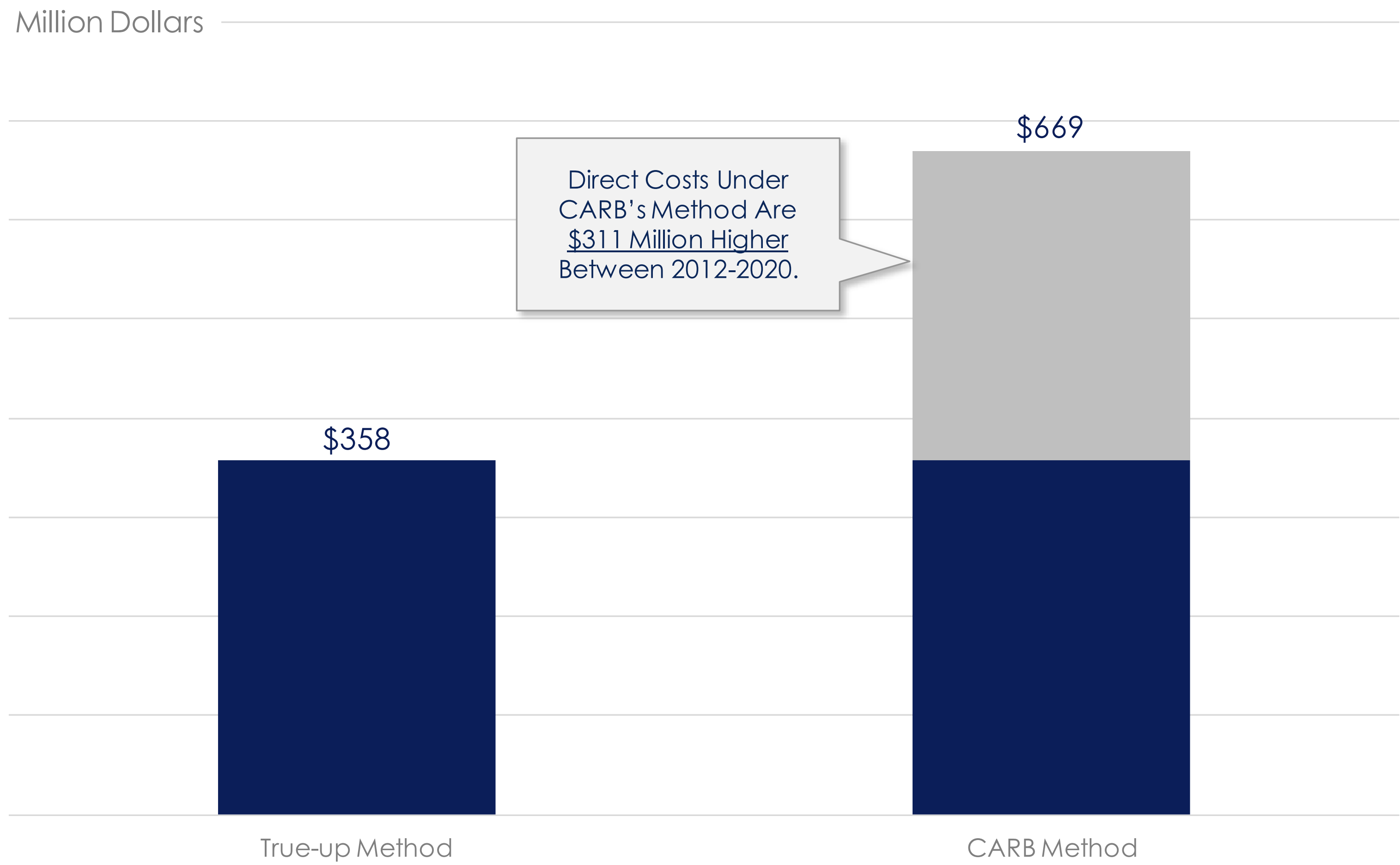
Source: Keybridge Research.

Figure 3. Annual Net Direct Costs, 2012–2020 (Baseline Scenario)



Source: Keybridge Research.

Figure 4. Cumulative Net Direct Costs to the Cement Industry, 2012–2020 (Baseline Scenario)



Source: Keybridge Research.

Appendix E

KEYBRIDGE
RESEARCH

December 14, 2010

Memorandum for the Coalition for Sustainable Cement Manufacturing & Environment

From: Keybridge Research, Dr. Robert F. Wescott & Mark W. McNulty

Subject: The California Cement Industry's Trade Intensity

I. Introduction

In its efforts to comply with AB 32's mandate to minimize leakage, CARB has developed a methodology to assess the risk of leakage in California's manufacturing sector. A key element of CARB's assessment is the calculation of each industry's trade intensity, which is combined with estimated GHG intensities to classify industries according to their relative leakage exposure (i.e., high, medium, low). This classification then serves as the basis for assigning each industry an "assistance factor", which partially determines the level of leakage protection it will receive. Consequently, the accurate estimation of an industry's trade intensity is fundamental to the success or failure of CARB's overarching efforts to minimize leakage.

Employing CARB's basic methodological framework, this analysis uses data from the U.S. Geological Survey to calculate trade intensities for both the U.S. and California cement industries. The analysis finds that the California cement industry's average trade intensity is almost twice as high as the U.S. cement industry's trade intensity, using comparable data, and more than 2.5 times higher than the estimate that CARB uses in its leakage exposure assessment. Based on these results, the analysis concludes that:

(1) The California cement industry is substantially more trade exposed than the U.S. industry, and

(2) The California cement industry should be reclassified as "highly trade intensive", as opposed to the "moderately trade intensive" designation derived from CARB's existing methodology.

When considered in conjunction with the industry's extraordinarily high emissions intensity, such a designation suggests that the California cement industry is extremely vulnerable to the impacts of a state cap-and-trade program and, consequently, may merit a more customized approach to leakage minimization.

II. CARB's Trade Intensity Methodology

CARB's current methodology for calculating the trade intensity of California industries relies on national industry data to populate the formula:

Trade Intensity = Trade Volume / Gross Shipments

Where:

Trade Volume = Imports + Exports

Gross Shipments = Imports + Total Shipments[1]

[1] Total Shipments is defined as goods shipped by domestic producers to both domestic consumers and foreign consumers (i.e., exports).

National trade and shipments data, reported in monetary values, is publicly available for all regulated California industries, which facilitates a standardized assessment of trade intensity and leakage exposure. According to this methodology, CARB has assessed the California cement industry's trade intensity as 16% — resulting in a "medium" classification on its scale of relative trade exposure.

However, in its own leakage analysis (Appendix K), CARB notes two important limitations to its methodology:

- The use of national data assumes that trade volume and shipments for California industries mirror trade volume and shipments for national industries, which is not necessarily an appropriate assumption for all industries. [2] According to CARB:

  "*…the regional trade calculation represents a better approximation of the California market than do national data.*" (K-21)

- CARB's use of monetary values is a less transparent and precise measure of trade volume and shipments than physical quantities. Specifically, unknown price differences between imports, exports, and domestic shipments may artificially distort relative market shares — resulting in a fundamentally less "pure" measure of trade intensity than one based on physical quantities (e.g., tons of cement). According to CARB:

  "*Instead of reporting imports and domestic production in terms of per unit price and quantity, federal agencies report them in terms of total value…Since per unit prices of domestic and foreign goods is [sic] not known, it is impossible to evaluate price differences between foreign and domestic firms or trade share as a ratio of quantities.*" (K-18)

III. Enhanced Methodology

To address these limitations, this analysis calculates trade intensities for both the U.S. and California cement industries using data from the U.S. Geological Survey ("USGS") in order to utilize the most appropriate and accurate data available.

The USGS provides state-level import and shipments data for the cement industry in its Annual Cement Yearbook, and state-level export data in its monthly California Letter Data report. These California-specific and industry-specific data are used to populate CARB's trade intensity formula and calculate the cement industry's average trade intensity during the years 2003-2008, consistent with CARB's original methodology. Specifically,

- Imports = Imports into California's three customs districts
- Exports = Shipments by California producers to adjoining states or other jurisdictions

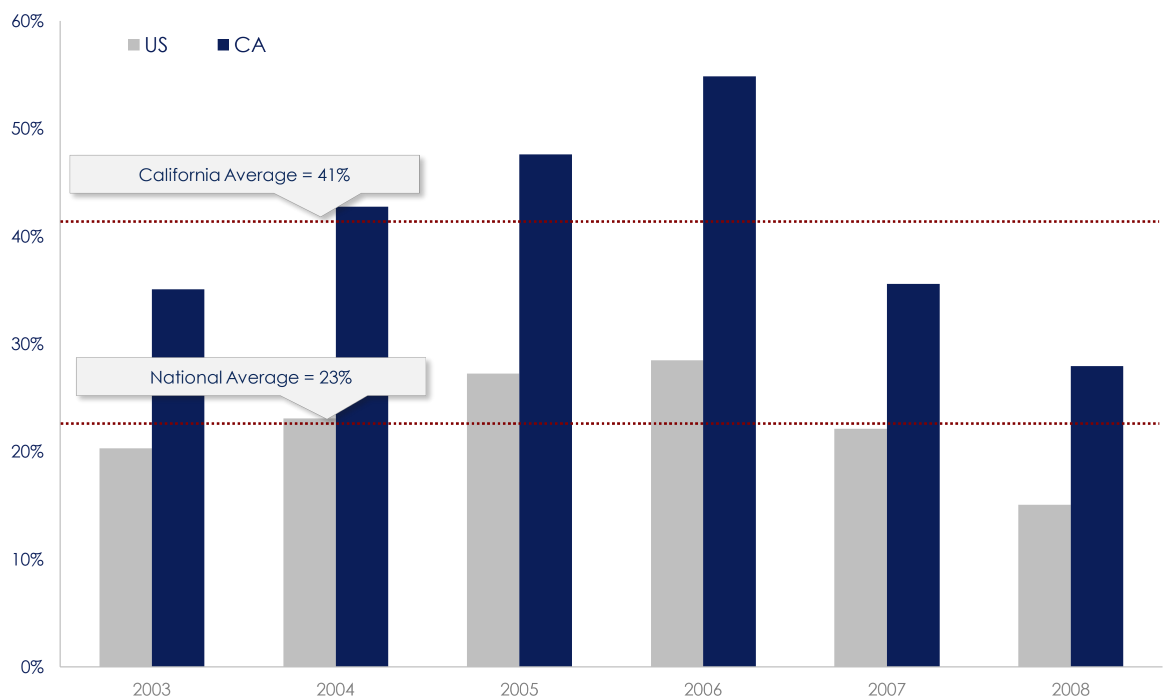
[2] CARB attempts to address the limitations of using national industry data by conducting a supplemental trade intensity analysis using regional trade and shipments data. However, given that state-level shipments data for years 2003–2008 are only available at an overly aggregated industry level, this analysis likely significantly misrepresents the trade intensity of several industries. For example, CARB's regional analysis uses the aggregate cement and concrete industry as a proxy for the cement industry, calculating its regional trade intensity at just 6%. As a point of comparison, the trade intensity of the national cement and concrete industry is 5%, compared to CARB's assessed national cement industry trade intensity of 16%.

- Total Shipments = Shipments by California producers into Northern and Southern California, as well as consumers in other jurisdictions

IV. Results

According to this analysis, the California cement industry's trade intensity is 41% — almost twice as high as the U.S. cement industry's trade intensity (23%) using comparable data. Furthermore, the California industry's estimated trade intensity is more than 2.5 times higher than the measure used by CARB in its leakage exposure assessment, and well beyond the threshold of 19% that CARB has established to identify industries with a "high" trade exposure.

Figure 1. Trade Intensity of U.S. & California Cement Industries
Share of Total Shipments



Source: U.S. Geological Survey.

V. Conclusion

CARB's use of national industry data in monetary values significantly misrepresents the California cement industry's trade intensity, and potentially those of other industries within the state. The use of state-level and industry-specific data, when available, is likely to enhance the accuracy of CARB's trade intensity assessment and, therefore, ensure that California industries receive adequate leakage protection.

In the case of the California cement industry, USGS shipment data confirms that the California cement industry's historic trade intensity is substantially higher than that of the U.S. industry. This result is consistent with the fact that the low value-to-weight ratio of cement makes it expensive to ship by truck or rail but relatively affordable by water — suggesting that trade intensities in coastal markets, such as California, should be substantially higher than the U.S. industry average. This effect is only amplified by California's location on the Pacific coast, as it makes the state physically and economically accessible to imports from Asian nations, such as China, which is responsible for more than half of global cement production.

Furthermore, the results indicate that the California cement industry's trade intensity is well beyond CARB's upper threshold, suggesting that the industry should be reclassified as "highly trade intensive", as opposed to the "moderately trade intensive" designation derived from CARB's existing methodology. When considered in conjunction with the industry's extraordinarily high emissions intensity, such a designation indicates that the California cement industry is extremely vulnerable to the impacts of a state cap-and-trade program and may merit a more customized approach to leakage minimization.

Table 1. USGS California Cement Industry Trade & Shipments Data

Shipments by CA Producers & Importers in California & Adjoining States *(1,000 Metric Tons Cement)*						
Destination	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Northern California	4,792	5,169	5,525	4,891	4,199	3,252
Southern California	8,997	9,714	10,485	10,079	8,646	6,427
Nevada	1,212	1,467	1,652	1,697	1,315	1,102
Arizona	778	942	1,051	928	619	527
Other	106	112	129	189	122	843
Total	**15,886**	**17,405**	**18,842**	**17,783**	**14,900**	**12,151**

Source: United States Geological Survey, Annual Cement Yearbook & California Letter Data.

Imports into California Customs Districts *(1,000 Metric Tons Cement & Clinker)*						
Destination	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Los Angeles	1,976	2,513	3,053	3,422	1,848	538
San Diego	466	678	717	720	407	13
San Francisco	1,033	1,728	2,363	2,800	988	371
Total	**3,475**	**4,919**	**6,133**	**6,942**	**3,243**	**922**

Source: United States Geological Survey, Annual Cement Yearbook

Table 2. California Cement Industry Trade Intensity Calculations

California Cement Industry Trade Intensity *(1,000 Metric Tons Cement)*						
	2003	**2004**	**2005**	**2006**	**2007**	**2008**
Total Shipments	12,411	12,486	12,709	10,841	11,657	11,229
Imports into CA	3,475	4,919	6,133	6,942	3,243	922
Exports from CA	2,097	2,522	2,832	2,813	2,055	2,472
Trade Volume (Imports + Exports)	5,572	7,441	8,965	9,755	5,298	3,394
Gross Shipments (Imports + Total Shipments)	15,886	17,405	18,842	17,783	14,900	12,151
CA Trade Intensity	**35.1%**	**42.8%**	**47.6%**	**54.9%**	**35.6%**	**27.9%**

Sources: United States Geological Survey, Annual Cement Yearbook & California Letter Data

Trade Exposure Metric	Value
Average CA Cement Industry Trade Intensity (2003-2008)	**41%**

Appendix F

KEYBRIDGE
RESEARCH

December 14, 2010

Memorandum for Coalition for Sustainable Cement Manufacturing & Environment

From: Keybridge Research, Dr. Robert F. Wescott & Mark W. McNulty

Subject: Evaluation of the AB 32 Cap-and-Trade Economic Analysis

I. Introduction

To assess the range of effects on California's industries, consumers, and macro economy of implementing AB 32, CARB has conducted an economic impact analysis of the proposed cap-and-trade program, as outlined in Appendix N. This critique highlights several major deficiencies in CARB's assumptions and analytical approach, which call into question the accuracy of the study's results and conclusions. Three issues are particularly problematic to the study's accuracy and credibility: (1) the study's general lack of transparency, (2) CARB's decision to use a static, as opposed to dynamic model, and (3) CARB's failure to account for leakage in regulated entities.

II. CARB's analysis is based on non-transparent, internally inconsistent, and overly optimistic assumptions.

Given that assumptions drive model outcomes, it is imperative that useful, robust modeling studies develop detailed, systematic, and verifiable inputs, providing clear documentation and underlying data for all assumptions. While CARB's high-level assumptions regarding total costs, investments, and avoided fuel costs are listed in the report, it does not provide nearly enough information to fully vet its input assumptions, or assess the accuracy of its results. As noted by the Economic and Allocation Advisory Committee ("EAAC") in its March 2010 memo, for example, behavioral responses to energy prices – central to the entire study – lack sufficient explanation or verification.

> "This aspect of the modeling might be a particularly strong element. Unfortunately, however, the nature of this specification is left obscure. Future work should expose the empirical basis of this specification and the relevant formulas."[1]

Due to CARB's overarching lack of transparency, justification for the following assumptions also remains unclear:

- CARB's micro-analysis assumes that California's economic growth rate will be 2.4% in 2020 (Table N-7). It also assumes that California's gross state product will grow by 35% during 2007-2020. Although the analysis is not explicit about what would be required to achieve this cumulative growth, California's economy would need to average 2.95% growth during 2010-2020, given that actual growth in 2008 was just 0.4%, and 2009 growth was approximately -2.5%. However, if the state returns to its historical average annual growth rate of 3.7% (1998-

[1] Economic and Allocation Advisory Committee (2010). "Comments on the ARB's Updated Economic Impact Analysis."

2008), the baseline level of emissions would be substantially higher — resulting in significantly higher allowances prices than projected. Accordingly, the thinking behind CARB's current growth assumptions should be more clearly articulated, and its analysis "stress tested" against alternative economic growth scenarios.

- Given the available data, CARB's assumptions of transportation efficiency gains do not appear to be internally consistent. In order for gasoline emissions to meet CARB's expectations, the entire California vehicle fleet would need to improve its efficiency by 22% during 2012-2020. In the absence of any supporting data or justification for these assumptions, it is unclear how such efficiency gains would be achieved. In fact, CARB's assumptions appear overly optimistic:
  - To achieve CARB's assumed efficiency gains, roughly 36% of vehicles in California would need to be replaced during 2012-2020, and the average new vehicle would need to be about 61% more efficient than today. In contrast, only 4.5% of vehicles are currently scrapped each year[2] and the Energy Information Agency's ("EIA") 2010 Annual Energy Outlook ("AEO") projects that gasoline powered vehicles will achieve, on average, approximately 15% efficiency gains between 2012 and 2020.
  - Therefore, CARB's implied transportation efficiency gains would need to be largely realized through a combination of (1) fewer miles driven for every dollar of GDP, and (2) replacement of existing vehicles with more fuel efficient vehicles, including hybrids and electric vehicles.
  - However, as EAAC points out, it may be unrealistic to assume that vehicle miles traveled decline to such an extent, particularly without associated costs. Furthermore, a 2008 Congressional Budget Office ("CBO") study, using data from California highways from 2003-2006, found that drivers are relatively insensitive to changes in gasoline prices, in terms of miles driven and vehicle choice.[3] Therefore, CARB's estimated increase in gasoline prices of 4% - 8% may not have a significant impact on efficiency improvements via driver behavior.
  - Also, to the extent that conventional gasoline vehicles are replaced with alternative fuel vehicles, upfront cost to consumers would increase significantly, and it would be important for the ENERGY 2020 model to examine consumer decision parameters.
- CARB's analysis also implicitly assumes a 16% efficiency improvement for California petroleum refineries during 2012-2020, although no supporting data or justification is given for this projection.

[2] http://climatenavigator.org/wiki/US_Motor_Vehicle_Technology

[3] U.S. Congressional Budget Office (2008). "Effects of Gasoline Prices on Driving Behavior and Vehicle Markets." http://www.cbo.gov/ftpdocs/88xx/doc8893/01-14-GasolinePrices.pdf

III. CARB's analysis does not adequately capture the dynamic impacts associated with a cap-and-trade system.[4]

There are two general types of economic models:

(1) Static models, which analyze only a snapshot in time, and

(2) Dynamic models, which are able to show economic effects over time (usually annually)

While static models can be instructive in particular applications, dynamic models tend to be better suited for analyzing scenarios in which multiple policy and economic factors evolve over time – such as a cap-and-trade system over a given policy period.

CARB's economic analysis was conducted using two economic models – ENERGY 2020, a microeconomic model for simulating the supply and demand of fuels, and E-DRAM, a static macroeconomic model that provides a snapshot of the California economy in 2020.

Given the size and scope of the California economy and the dynamic nature of a cap-and-trade program, the use of a static macroeconomic model results in a disconcerting lack of inter-temporal analysis. Specifically,

- Because AB 32's cap-and-trade program will be phased in over several stages, the impacts of the program will not be consistent through time. Therefore, an analytical "snapshot" of 2020 is not necessarily indicative of the true economic impact of cap-and-trade on the California economy. Conceivably, CARB's analysis is merely showing a single point in time when the costs and benefits of cap-and-trade are relatively equal, but is not reflective of cumulative costs and benefits.
- When analyzing long-term policies, the typical analytical approach is to calculate the cumulative impact over time, and discount future costs and benefits to present value. This is the required analytical approach detailed by the U.S. Office of Management and Budget.[5] However, CARB's use of a static model precludes this type of approach.
- Policy evaluations typically present a cost-benefit ratio or cost-effectiveness measure. For example, AB 32's cap-and-trade program could be compared to a revised policy that incorporates a border adjustment in order to reduce leakage. However, the lack of inter-temporal detail in CARB's study does not allow for such an assessment.

IV. CARB's analysis fails to assess or otherwise account for the negative impacts associated with leakage.[6]

It is generally accepted in the economic and environmental policy communities that unilateral cap-and-trade programs create the potential for economic and emissions leakage (*i.e.*, a shift

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[4] Similar points were raised in a CSCME memo to CARB on October 14, 2008.

[5] U.S. Office of Management and Budget, Circular A-94.

[6] Similar points were raised in a CSCME memo to CARB on October 14, 2008.

in economic activity and its associated emissions to less regulated jurisdictions in response to GHG-reducing policies). By raising the cost of production in California relative to other regions, AB 32's cap-and-trade program may cause some industries, particularly those that are emissions intensive and trade exposed ("EITE"), to experience a loss of market share and investment. To the extent that leakage occurs, California could suffer significant negative economic impacts, including job loss and a diminished tax base. For these reasons, any instructive and thorough economic analysis of a cap-and-trade program should include an in-depth discussion of leakage risk and its ramifications. According to the Economic Policy Institute,

> "In an increasingly competitive global economy, it is necessary to account for the trade implications of any policy that could impose significant costs on firms producing traded goods… This trade impact occurs in large part because … carbon taxes assessed on domestically produced energy-intensive products are not assessed on competing goods produced elsewhere … As a result, … U.S. producers are burdened by a significant additional cost that foreign producers are not, resulting in lost market share … This problem is less pronounced in the results discussed here because … this policy package, unlike most previously modeled, includes a border adjustment of the carbon tax for fossil-fuel-producing and energy-intensive industries … This policy would help to keep the playing field level … so that U.S. producers are not subjected to undue erosion of market share by firms located in countries that do not employ a carbon charge."[7]

However, despite the clear risk of leakage associated with AB 32's cap-and-trade program and the significant impact that leakage would have on California's economy, CARB's economic impact study completely fails to incorporate leakage in its economic analysis. In fact, the term "leakage" is only mentioned twice in Appendix N, and not in the context of quantitative analysis. Not only does CARB's study lack rigorous quantitative analysis on the issue of leakage risk, it also fails to offer a qualitative discussion of leakage, which could, at the very least, indicate the potential magnitude of the associated economic and environmental losses.

EAAC takes a similar view of CARB's analysis in regards to its treatment of leakage. In a March 2010 memo titled, "Comments on the CARB's Updated Economic Impact Analysis," it clearly articulates CARB's failure to address the potentially significant problems of leakage:

> *"The ARB study did not attempt to measure leakage. The models utilized are not equipped to capture how California policies might cause firms to alter behavior in ways that lead to leakage or reshuffling … Because it is not a focus of the present analysis, it is difficult to estimate exactly how significant these impacts might be. However there is reason to believe they might be quite substantial."*[8]

[7] Barrett, James P. and Hoerner, Andrew J. (2002) "Clean Energy and Jobs: A comprehensive approach to climate change and energy policy." Economic Policy Institute.

[8] Economic and Allocation Advisory Committee (2010). "Comments on the ARB's Updated Economic Impact Analysis."

CARB's failure to model, discuss, or even acknowledge the issue of leakage risk in its impact study of AB 32's cap-and-trade program is troubling. Not only does this produce incomplete and potentially inaccurate results regarding the economic impact to the California economy and specific industries, but it suggests that CARB may not fully understand or appreciate the impacts that its proposed regulations will have on leakage-exposed industries.

V. Implementing four key recommendations could improve CARB's economic analysis and facilitate a fuller understanding of the trade-offs associated with alternative policy choices.

This critique has outlined several key weaknesses of CARB's economic impact study that make it an insufficient and potentially inaccurate analysis of the effects of cap-and-trade on California's economy. Based on this and other reviews, the following critical steps are recommended to facilitate a more comprehensive study:

(1) Utilize a dynamic model of California's economy that includes a detailed domestic and international trade module. Use of such a model would provide a platform for fully analyzing leakage and inter-temporal effects of AB 32's cap-and-trade program.

(2) Incorporate feedback from California's private sector on the potential risk of leakage. While economic models provide a framework for economic analysis, they are only as good as their inputs, and cannot replace specific-industry expertise. Of course, input from the private sector should be verifiable and substantiated by empirical data.

(3) Model policy alternatives to identify the tradeoffs between achieving stated policy objectives and minimizing economic loss. For example, the analysis should provide a basis for considering the appropriateness and ideal size of complementary policies, such as alternative allowance allocation frameworks and border adjustments.

(4) Provide a full account of the modeling assumptions. Policy impact studies ideally should present data appendices and tables that clearly show the model's inputs and justification for key assumptions.

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LIST OF EXHIBITS

1.	October 23, 2007	Minimizing "Leakage" Under Climate Change Proposals Affecting the California Cement Industry
2.	May 14, 2008	Comments on the Economic Modeling of AB 32
3.	June 18, 2008	Building a Sustainable Future: Economic Growth, Climate Change, & the California Cement Industry
4.	August 22, 2008	Technical Support Document: Fuel Switching from Coal to Natural Gas California Portland Cement Association
5.	September 8, 2008	Tradable Performance Standards: A Policy Framework for Effectively, Efficiently, & Equitably Regulating GHG Emissions in the California Cement Industry
6.	September 8, 2008	The Application of Anti-Leakage Measures in the California Cement Sector to Achieve AB 32's Climate Change Objectives
7.	September 8, 2008	The Role of Offsets in AB 32: The Cement Industry's Perspective
8.	December 10, 2008	California Cement Industry's Comments on the Proposed Scoping Plan
9.	February 6, 2009	Comments on the ARB Mandatory Reporting Regulations for Identifying Emissions as Biomass Emissions in Reports
10.	February 13, 2009	California Cement Industry's Comments on the AB 32 Administrative Fee Regulation
11.	August 10, 2009	Draft Language for California Cement Industry Tradable Performance Standard
12.	May 11, 2009	CSCME letter to Chairman Mary Nichols
13.	November 23, 2009	Reconciling TPS With Cap-and-Trade: An Inside-The-Cap Approach
14.	December 14, 2009	CSCME letter to Professor Larry Goulder and Members of the Economic Allocation Advisory Committee ("EAAC")
15.	December 15, 2009	CSCME follow-up comments via email on EAAC report
16.	January 9, 2010	California Cement Industry's Comments on the Economic and Allocation Advisory Committee's ("EAAC") January 2 and 7, 2010 Draft Reports
17.	January 11, 2010	CSCME letter to Chairman Mary Nichols
18.	February 16, 2010	Prospects for Expanding the Use of Supplementary Cementitious Materials in California
19.	May 25, 2010	Measures Under AB 32 To Prevent Leakage Are Consistent With The U.S. Constitution And WTO Obligations
20.	June 7, 2010	CSCME letter to Chairman Mary Nichols

21.	July 9, 2010	CSCME letter to Chairman Mary Nichols
22.	September 2, 2010	CSCME letter to Secretary Linda Adams and Chairman Mary Nichols
23.	October 20, 2010	CSCME letter to Susan Kennedy
24.	October 20, 2010	CSCME letter to Chairman Mary Nichols
25.	December 9, 2010	Application Of AB 32 To Imported Cement: Preventing Leakage And Facilitating Sectoral Cooperation

EXHIBIT 1

MINIMIZING "LEAKAGE" UNDER CLIMATE CHANGE PROPOSALS AFFECTING THE CALIFORNIA CEMENT INDUSTRY

On Behalf Of

Certain California Cement Manufacturers

October 23, 2007

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EXECUTIVE SUMMARY

Both the California legislature and the California Air Resources Board ("ARB") recognized that adoption of measures for greenhouse gas ("GHG") emission reductions from carbon-intensive industries would be futile if measures resulted in a shift in consumption to unregulated imports. As ARB has recognized, the electricity generation sector is prone to the danger of this "leakage" to imported power. The California cement industry is also a carbon-intensive industry with a significant potential for "leakage," but the current regulatory structures proposed have not yet addressed this urgent problem in the cement industry.

In order to uphold ARB's statutory responsibility to minimize leakage and its environmental responsibility not to "export" California's GHG emissions to other countries, ARB must fully consider the issue of leakage during the entire regulatory development process. The purpose of this paper is to provide additional information in support of the dialogue that must occur on this critical issue for the California cement industry.

We believe that leakage is a critical issue in evaluating proposed measures under the "early action" items and scoping plan processes for the following reasons:

- The production of cement and the California cement industry are unique. Taking into account the nature of the product and its producers is critical for ARB to meet its statutory responsibilities in implementing AB32. (Section I)

- AB32 requires ARB to adopt rules that minimize "leakage," which refers to the shifting of emissions to jurisdictions outside California as a result of ARB's implementation of GHG reduction measures. "Leakage" reduces or eliminates the benefit of such measures by sending both the GHG emissions and the regulatory authority over such emissions to other countries and surrounding states. Thus, the enactment of measures that knowingly result in leakage would undermine both ARB's responsibilities under AB32 and California's climate change objectives. (Section II)

- The conditions of competition in the California cement industry make it highly vulnerable to additional compliance costs, and such increased costs will necessarily lead to increased imports. (Section III)

    - Cement is a homogeneous, bulk commodity that is highly substitutable and sold almost exclusively on the basis of price. Thus, customers are generally indifferent to purchasing California-produced versus imported cement.

    - The California cement market is an isolated regional market that competes almost exclusively with imports, and cement imports are readily available in California and already widely used.

    - The cement industry is highly capital intensive, and in order to sustain profitability and limit unit costs, both California and foreign producers must keep sales and capacity utilization at high levels. Thus, producers have an enormous incentive to sell excess capacity at low prices, and other producers are forced to match such prices, even in the face of increasing compliance costs.

    - New investment in the California cement industry is already subject to high barriers, as evidenced by the absence of any capacity expansion from 2002 to 2006 and by the fact that only one expansion project is expected prior to 2012. Additional compliance costs that are not shared by imports will result in even greater barriers to investment.

- Although it is common for industries to complain about increases in compliance costs and for ARB to ignore these complaints, this paper will demonstrate that if AB32 imposes higher compliance costs on the California domestic cement industry, these manufacturers will be unable to pass through the costs and will likely not survive without measures imposing a similar cost burden on imports. Moreover, unless they are addressed effectively, imports will increasingly satisfy California consumption, and such increased imports will lead to significant leakage. (Section IV)

- Preserving California cement manufacturing capacity is critical to meet the demands of the expanding California economy and to achieve climate change objectives. Any approach that increases reliance on imports to meet California's significant infrastructure requirements will have adverse climate change consequences in the form of significant leakage and will otherwise threaten the security and reliability of local cement supplies. (Section V)

Based on the concerns about leakage that are elaborated in this paper, we have the following recommendations about the AB32 regulatory approach:

1) Expand the GHG inventory and mandatory reporting regulations for the cement industry to include all cement sold in California rather than just the cement manufactured in California;

2) Include historical data on cement imports in assessing future growth projections for the cement industry and also consider ongoing infrastructure needs for replacement of existing structures or for GHG-related upgrades;

3) Impose a border adjustment measure, a requirement that imports hold appropriate allowances, or other suitable alternative to ensure that the same burden is placed on imports as is placed on domestic cement production; and

4) Provide for the free allocation of allowances to the cement industry under any cap-and-trade approach to account for the unique characteristics of the industry, including high import competition and the inability to pass-through costs to customers.

I. BACKGROUND ON THE CEMENT INDUSTRY

A. What Is Cement And How Is It Made?

Cement is the fine mineral powder used as the glue that, when added to water and aggregates (*e.g.*, sand, gravel, and/or other materials), forms concrete. "Concrete is second only to water as the most consumed substance on Earth, with almost one ton of it being used for each human every year."[1] Cement is indispensable for making the concrete required for critical California infrastructure (buildings, roads, bridges, and other structures) and for other residential and non-residential private and public construction of significant importance to the California economy.

Cement is produced by first extracting thousands of tons of material from shale and limestone quarries. The extracted materials are then transported to the cement plant and are crushed in one or more stages. The crushed raw materials are fed by conveyor belt into facilities for grinding and blending the raw materials to achieve the necessary chemical composition for the raw material feedstock. The raw materials are then fed into a kiln, where they are heated to 1,450° C. The product of the burning process is called "clinker." The clinker is then cooled and moved to a storage hall. Finally, the clinker is blended with a small percentage of gypsum or other materials and is fed into a grinding mill. The fine powder resulting from the grinding process is cement.

B. Cement Production Is Unique Because CO_2 Emissions Are An Unavoidable Result Of The Production Process

Clinker is essentially a combination of lime, silica, alumina, and iron oxide. The burning of the raw materials in the kiln to make clinker results in a chemical process that converts the limestone (calcium carbonate, $CaCO_3$) to calcium oxide (CaO), releasing CO_2. Thus, unlike

[1] www.wbcsdcement.org/concrete_misc.asp.

other manufacturing industries, CO_2 is an unavoidable result of the cement production process. Additional CO_2 is emitted directly through the burning of fossil fuels to heat the cement kiln and indirectly through the use of electricity in various stages of the production process.

Notably, the steel industry, for example, emits greater amounts of CO_2 per ton of product. Because the price per ton of cement is far lower than the price per ton of steel, however, the control of CO_2 emissions based on an equivalent cost of carbon per ton has a far greater cost impact on the cement industry.

II. MINIMIZING "LEAKAGE" IS REQUIRED UNDER AB32 AND IS NECESSARY TO PRESERVE THE CALIFORNIA CEMENT INDUSTRY

A. AB32 Requires ARB To Adopt Rules That Minimize Leakage

Under section 38562(b)(8) of AB32, ARB is required to "minimize leakage" when adopting GHG emission limits and emission reduction measures. "Leakage" is defined in section 38505(f) as "a reduction in emissions of greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state." Thus, ARB cannot adopt alternatives for reducing GHG emissions in California that would result in equivalent or greater GHG emissions in other states or foreign countries. In short, AB32 prohibits ARB from "exporting" California's GHG emissions to other states or foreign countries.

B. Leakage To Imported Cement Is Not A Viable Solution

If restrictions are placed on the California cement industry without placing corresponding burdens on cement imports, there will be a shifting of cement production to unregulated jurisdictions, which will imply higher, not lower, GHG emissions in the long run. The shifting of production overseas results in the "export" of GHG emissions to other countries, including developing countries. Moreover, such a shift also removes the relevant GHG emissions from the control of California regulators. Thus, any approach that results in a shift to imports would amount to ARB passing its regulatory responsibility, as well as the associated GHG emissions, to other countries. It would also be fundamentally inconsistent with California's climate change objectives and with the express requirement in AB32 to limit leakage.

A shift to imports and the resulting leakage would also jeopardize jobs of cement manufacturing workers, as well as workers in the industries that support cement manufacturing. It would also mean that California infrastructure projects would increasingly rely solely on foreign sources of cement, which would likely result in shortages. In addition to the environmental consequences, these economic and supply effects of leakage must also be considered in developing an alternative under AB32.

III. THE ECONOMICS AND CONDITIONS OF COMPETITION IN THE CEMENT INDUSTRY MAKE IT HIGHLY VULNERABLE TO ADDITIONAL COSTS

A. Cement Is A Homogeneous, Bulk Commodity That Is Highly Substitutable And Sold On The Basis Of Price

Imported cement is manufactured to meet the same physical and chemical specifications prescribed by the American Society of Testing Materials (ASTM) International. In California, as in the rest of the United States, cement is generally sold in bulk and in large quantities, with no distinctive packaging or labeling and with little or no brand consciousness or loyalty. The purchasers, predominantly ready-mixed concrete suppliers, are not able to identify the source of cement, and the product of one producer cannot be materially differentiated from that of other producers. Thus, because all producers sell essentially the same homogeneous commodity and the source of the cement makes little, if any, difference to the purchaser, cement produced in California is highly substitutable with cement imported from foreign sources.[2]

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[2] *See, e.g., Gray Portland Cement And Cement Clinker From Japan*, Inv. No. 731-TA-461 (Second Review), USITC Pub. 3856 (May 2006) ("*Japan Second Sunset Review*"), at 19 ("cement continues to be a highly fungible, commodity product, and cement is readily

Moreover, consistent quality, efficient and prompt delivery, and assurance of supply are marketing prerequisites that are generally met by all suppliers of California-produced and imported cement.[3] These non-price considerations neither advantage nor disadvantage suppliers of imported cement relative to Californian producers. Suppliers of imported cement have distribution terminals in California that hold substantial cement inventories currently enabling them to reliably supply cement. The relative equality of these additional considerations means that California-produced cement and imported cement are almost perfect substitutes.

As a consequence of the near perfect substitutability between California-produced cement and imported cement, cement is sold in the California market almost exclusively based on price. Given that imports are readily available, the California market is highly competitive, and sales typically go to the lowest-priced supplier. Because a small price change for a homogeneous commodity would induce large shifts in market shares, California producers must match the lowest price offered by imports. Consequently, unlike electric utilities and other industries, cement producers cannot pass along increased costs to their customers.

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interchangeable regardless of the country of origin."); *Gray Portland Cement And Cement Clinker From Japan*, Inv. No. 731-TA-461 (Preliminary), USITC Pub. 2297 (July 1990) ("*Japan Preliminary Determination*"), at 18 ("portland cement from any source -- either domestic or foreign -- is highly substitutable for Portland cement from any other source").

[3] *See, e.g., Gray Portland Cement And Cement Clinker From Japan*, Inv. No. 731-TA-461 (Rmand), USITC Pub. 2657 (June 1993) ("*Japan Remand*"), at 3-4 ("Gray portland cement is a fungible commodity. All gray Portland cement sold in the Southern California market, whether domestically produced or imported, meets the same standards, and the record indicates there are no significant distinctions between cement from different sources in terms of quality, delivery, marketing, or terms of sale.").

B. The California Market Is An Isolated Regional Market That Competes Almost Exclusively With Imports From Overseas

As discussed, cement is a homogeneous, bulk commodity. It also has an extremely low value-to-weight ratio, which means the costs of land transportation per ton of cement are high.[4] Given these product characteristics, cement markets are necessarily regional in nature.[5] The majority of California cement production is shipped to customers within 200 miles of the manufacturing plant, and the majority of California imports of cement are shipped to customers within 200 miles of the port of entry.[6] California producers sell the vast majority of their cement production within California,[7] and producers in other States sell virtually none of their production in California.[8] As a result, the California cement market is isolated from the rest of the U.S. market, and California cement producers compete almost exclusively with imports.

C. The Cement Industry Is Highly Capital Intensive

Cement production is highly capital intensive. By some measures, it is second only to "petroleum and coal products" in terms of relative capital intensity.[9] As a result, the cement industry is subject to high fixed costs, which creates a high break-even point. Even a small

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[4] *See Japan Second Sunset Review*, at 9. By contrast, ocean transportation costs per unit of cement are much lower, and it is often more cost effective to source from import terminals rather than from in-land cement plant locations.

[5] *Id.*

[6] *Id.*

[7] California producers have virtually no exports from the United States, and only a small amount of cement is exported to other states, normally to major cities nearby, such as Las Vegas.

[8] *Id.* at 10.

[9] *See* **Exhibit 1**. In 1996, the last year for which such data was reported, the Annual Survey of Manufacturers by the U.S. Census Bureau reported that the per employee capital expenditures of the "cement, hydraulic" industry was second only to the "petroleum and coal products" industry.

decline in sales tonnage will have an extremely adverse impact on profits. The loss of sales volume not only reduces revenues, but increases the fixed cost of production per ton, further negatively affecting profitability.[10]

In order to sustain profitability and limit unit costs, a producer must keep sales and capacity utilization at high levels. Foreign producers share the same economic incentives and, thus, have an incentive to export excess cement capacity to the U.S. market, even at prices that barely exceed variable costs of production plus freight. Moreover, because California producers have the same incentives, they are forced to match import prices to maintain market share. Thus, compared to other, less capital intensive industries, the economic need to operate at high capacity utilization rates and maximize sales volumes makes California producers significantly more vulnerable to any measures that add to costs and weaken their competitive position relative to imports. To the extent that the position of the domestic cement industry is weakened, the consequence will be disinvestment and/or a decline in California production capacity. If this occurs, imports will fill the gap, resulting in substantial leakage and an increase in global GHG emissions.

D. New Investment In The California Cement Industry Faces High Barriers

The California cement market is also highly cyclical, rising and falling in tandem with regional construction activity. In a cyclical market, investment decisions are necessarily "lumpy," with major investments not initiated during the downturn in the cycle. A new cement plant will not be built for capacity of less than 1 million tons, at a cost exceeding $350 million. The lead time for a new plant is five years, which is necessary for acquiring regulatory

[10] *See, e.g., Japan Remand*, at 4-5 ("Cement production is capital intensive, and hence subject to high fixed costs. Thus, as production increases and approaches the limits of capacity, unit costs would decline.").

approvals, making financing arrangements, actual construction (normally 24 months), and debugging the production process. The lag of several years between the time a producer decides to make an investment and the time the plant actually begins production means that producers cannot react quickly to changes in prices, costs, or cyclical movements in demand when making decisions about expanding capacity. Therefore, in addition to barriers in relation to the high cost of new investment, producers face enormous risks in relation to market fluctuations.

Moreover, many foreign countries target the California market to dump their excess cement during periods of slow demand in their home markets. The U.S. market is the favorite dumping ground for foreign produced cement because of its open markets and fair and transparent trade practices. The U.S. Department of Commerce has repeatedly found over the past 15 years that foreign cement is being dumped in the United States at prices adjudicated to be less than fair value. By contrast, most foreign countries that produce large quantities of cement foster structural barriers to the importation of cement and therefore have few imports. There has never been nor will there ever be any significant market for exports of U.S. produced cement. Because of this dynamic, U.S. cement production capacity has declined to far less than U.S. cement demand, while countries with structural barriers to imports often have more production capacity than demand. Such conditions continue to affect new investment, particularly in areas that are particularly vulnerable to cement imports, such as California.

As a consequence of the barriers and risks associated with new investment, the California cement industry has not expanded clinker capacity in the past five years. As demonstrated in **Exhibit 2**, clinker capacity in the California cement industry actually declined by 2.7 percent from 2002 to 2006, despite consumption increasing over 20 percent during the same period. The only expected future increase in California cement capacity is at Texas Industries Inc.'s

("TXI's") Oro Grande Plant, where the out-dated and cost prohibitive kilns are being replaced and are set to begin operation in early 2008. According to PCA's most recent Capacity Expansion Update, no further capacity expansion is expected in California through 2012, and the clinker capacity increase in California from the TXI expansion is less than 4 percent of the total increase expected in the United States between 2007 and 2012.[11] Given that California consumed almost 13 percent of all cement in the United States in 2006, this lack of investment demonstrates that barriers to new investment in California are already significant. Any approach by ARB that imposes even higher barriers or creates any uncertainty are likely to mean that all future growth in consumption of cement will be met by imports and that associated GHG emissions from California's growth will be "exported" to other countries.

IV. INCREASED COMPLIANCE COSTS CANNOT BE PASSED THROUGH TO CONSUMERS AND WILL RESULT IN INCREASED IMPORTS AND SUBSTANTIAL LEAKAGE

A. The California Cement Industry Cannot Pass Through Costs

As demonstrated above, the economics and conditions of competition in the California cement industry make it highly vulnerable to any increased costs, including those associated with the implementation of AB32. The California cement industry is already subject to significant import competition, with imports meeting almost half of California consumption. This consumption will continue to grow, as discussed in further detail in the next section.

As evidenced by extensive import competition, the California cement market is highly competitive. Due to the capital intensive nature of the industry, foreign producers have enormous economic incentives to maintain high capacity utilization rates and to sell any excess

[11] *See* Portland Cement Association, *Flash Report: Capacity Expansion Update*, Sept. 28, 2007 (attached as **Exhibit 3**).

capacity to the California market, even at prices that barely cover variable costs plus transportation. California producers must similarly maintain high levels of capacity utilization and sales volumes. Because of the homogeneous nature of cement and its high substitutability, however, purchases of cement are based almost exclusively on price, and therefore, California producers are forced to meet import prices.

Under these conditions, the increased costs associated with compliance with AB32 cannot be passed on to customers. This inability to pass through costs distinguishes the cement industry from other industries. In the absence of corresponding cost adjustments for imports, California producers will be forced either to absorb the increased costs in their entirety or concede market share to imports, resulting in unsustainable declines in volumes and capacity utilization. Either alternative will lead to substantial economic harm to the California cement industry and consequent disinvestment in California cement capacity. Given the barriers and risks already associated with new investment in the cement industry, even incremental cost increases will make it impossible for the California industry to invest in new capacity or in modernizing existing capacity.

Accordingly, ARB must account for the unique situation faced by the California cement industry in implementing AB32. Any approach resulting in a significant shift in consumption from California-produced cement to imports will not only cause irreparable harm to the California cement industry but will also result in substantial leakage of GHG emissions. These adverse environmental and economic effects would undermine the balance of objectives spelled out in AB32.

B. The Imposition Of Increased Costs On The California Cement Industry Will Lead To Substantially Increased Imports To Meet Growing Consumption

If ARB implements AB32 by imposing GHG reduction measures on California-produced cement without also addressing imports, increased imports of cement will inevitably result. As already demonstrated, enormous compliance costs, market and regulatory risks, and uncertainty regarding the implementation of AB32 have limited new investments in the California cement industry. Capacity levels have stagnated for the past five years. Over the same period, California consumption has grown, with the difference being met by increasing imports.

California consumption of cement will continue to grow and may accelerate to meet the objectives of California's Strategic Growth Plan, described below. If the ARB adopts measures that increase the California cement industry's costs compared to imports, it will be the death knell for the industry. In the absence of measures to address imports, any limitations on domestic production will directly result in the replacement of domestic production with imports. If the domestic industry attempts to pass along increased costs to its customers, these customers will, as already demonstrated, simply shift purchases to imports. If the industry absorbs the increased costs, it will suffer irreparable financial damage that will lead to disinvestment in the California industry and, ultimately, a consequent shift to imports. Under any scenario, an approach that fails to maintain relative competitiveness between domestic production and imports will result in significant increases in imports of cement.

C. Increased Imports Of Cement Will Cause Significant Leakage

Any AB32 implementation approach for the California cement industry that increases imports at the expense of domestic cement production will necessarily result in leakage. Moreover, unless the climate change impact of cement imports is addressed, the California cement industry will be stifled and will be unable to satisfy any increased demand from

California's substantial future infrastructure development projects. Without California capacity to meet this growing demand and without measures to regulate the GHG impact of imported cement, the consequence would be that GHG emissions that would otherwise be controlled in California would be "exported" or "leaked" to other states or foreign countries.

Cement production outside the United States is in many cases less regulated, is on average less efficient, and results in higher CO_2 emissions, particularly when emissions from inefficient energy inputs (*e.g.*, unregulated coal-fired electricity plants) are considered. Even disregarding any potential differences in direct CO_2 emissions from California cement production versus foreign cement production, however, cement importation itself creates additional GHG emissions attributable to cement handling and land and maritime transport. In its report, attached as **Exhibit 4**, ENVIRON estimates that importation of cement from China, which is the source of over half of California imports of cement, creates 221 kilograms per metric ton (441 pounds per short ton) in additional CO_2 emissions from purchased electricity, ground transport (in China), cement handling, and maritime transport relative to domestic cement. Consequently, the importation of cement creates 25 percent more CO_2 emissions than domestic production. (Notably, the impact is actually higher for almost one-third of California cement imports that originate from Thailand, because such imports require longer maritime transportation and thus involve higher transport CO_2 emissions.)

The magnitude of transport CO_2 emissions for cement imports is substantial. In 2006, cement imports of 6.9 million metric tons accounted for 1.5 million metric tons of CO_2 emissions. Assuming conservative growth in consumption that does not take into account, for example, increasing infrastructure projects under the SGP, imports of cement are expected to increase to 19.1 million metric tons in 2010 and to 23.7 million metric tons in 2015, resulting in transport CO_2 emissions from cement imports of 4.2 million metric tons in 2010 and 5.2 million metric tons in 2015. Importantly, these amounts do not include any higher CO_2 emissions from foreign cement plants compared to their more regulated California counterparts. If these differences are considered, the level of emissions attributable to imported cement grows even more substantially. As a result, unless emissions corresponding to imported cement are regulated, the development of California's economy and infrastructure would have a negative impact on climate change, with California "exporting" the associated GHG emissions to the developing world.

Leakage in the cement industry occurs when (1) reductions in CO_2 emissions for the California cement industry lead to additional emissions from imports and (2) the domestic industry is precluded from expanding capacity to meet increasing consumption, which is then met by imports.

First, as discussed above, increased costs to meet reduction requirements cannot be passed on to customers. Consequently, such costs will result in either declining sales or disinvestment in the California cement industry. The result is increased imports to meet the existing California demand that can no longer be met by domestic production, with leakage in the form of transport CO_2 emissions from cement imports and from the operation of any less regulated foreign cement plants.

Second, unless an approach is found to account for the GHG emissions of cement imports in order to maintain relative competitiveness, the California cement industry will be effectively precluded from making any new investments to expand capacity to meet increasing demand. Instead, this increasing demand will be met by increasing imports. As a result, any reductions in

GHG emissions in the California cement industry will be more than offset by imports filling the increasing gap between domestic capacity and demand.

ARB must consider both of these types of leakage in implementing AB32.

V. PRESERVING CALIFORNIA CEMENT MANUFACTURING CAPACITY IS CRITICAL TO THE CALIFORNIA ECONOMY AND TO ACHIEVING CLIMATE CHANGE OBJECTIVES

A. The California Cement Industry Contributes Significantly To The California Economy

As shown in **Exhibit 5**, the California cement industry is composed of 11 plants located throughout the state. According to the Portland Cement Association ("PCA"), shipments of these plants were valued at $1.5 billion in 2006.[12] California also has 483 ready-mix facilities and over 5,800 other establishments in the cement and related industries.[13]

Jobs in the cement and related industries account for 2.7 percent of California employment, with almost half a million workers employed in the sector in California.[14] According to California's Employment Development Department, over 20,000 Californians are employed in cement and concrete product manufacturing, including those workers that are employed directly in highly skilled and highly compensated cement manufacturing jobs.[15]

[12] Portland Cement Association, *Summary of Cement-Based Products Industry Statistics (California)* (available at www.cement.org/econ/ind_stats.asp) ("PCA California Statistics").

[13] *Id.*

[14] California Employment Development Department, Labor Market Information, *List of Occupations Employed in Cement & Concrete Product Manufacturing* (available at www.calmis.ca.gov/file/iomatrix/Staffing-Patterns3.cfm?IOFlag=Ind&SIC=327300).

[15] *See* PCA California Statistics.

B. Cement Consumption In California Has Grown, And Will Continue To Grow, To Meet The Needs Of The California Economy

Cement consumption in California in 2006 was 15.2 million metric tons.[16] This represents an increase of over 20 percent compared to 2002 and an increase of 45 percent compared to 1990.[17] Future demand for cement in California is expected to increase by approximately 4 to 5 percent per year, with consumption reaching 19.1 million tons in 2010 and 23.7 million tons by 2015.[18] These consumption estimates may be conservative, given that they may not account for any increases in demand attributable to, as discussed in the next section, new California infrastructure initiatives, the accelerated replacement of bridges, the increased use of cement in infrastructure projects to achieve climate change objectives, or any unforeseen natural disasters, such as earthquakes.

C. Cement Is Critical To Meet California's Infrastructure Requirements

California has extensive plans to replace and repair aging infrastructure, including roads, bridges, schools, water distribution facilities, and prisons. The federal government has also earmarked funding for infrastructure improvements in California. All of these projects will require the flexibility, responsiveness, and continuity afforded by domestic cement production in California. Over reliance on imports to achieve these objectives will not only cause leakage but will also risk severe shortages, which was the case in many parts of the nation during the last construction boom.

In January 2006, Governor Schwarzenegger proposed a Strategic Growth Plan ("SGP") to "invest in California's transportation, education, water, public safety and public service

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[16] *Id. See also* **Exhibit 2**.

[17] *See* **Exhibit 2**.

[18] Douglas M. Queen, Inc., *The North American Cement Review* (May 2006), at 77.

infrastructure to ensure the state is prepared to meet the needs of its people into the 21st century."[19] According to the Governor's office:

> Over the next 20 years, California's population is expected to increase by as much as 30 percent and it is estimated the state faces more that {sic} $500 billion in infrastructure needs over the same period. Governor Schwarzenegger's Strategic Growth Plan is the first phase of a 20-year investment to meet these expected needs in California.[20]

A release by California's Department of Transportation describes the SGP as "a $222 billion infrastructure improvement program to fortify the state's transportation system, education, housing and waterways."[21] According to this release, the SGP provides $107 billion in transportation infrastructure in the next decade, including, *inter alia*, 550 new HOV lane miles, 750 new highway lane miles, 9,000 lane miles rehabilitated, 600 miles of new commuter lines, and 8,500 miles of separated bike and pedestrian paths.[22]

More specifically, as shown in **Exhibit 8**, the SGP includes:

- $10.4 billion for K-12 and Higher Education, including new construction, modernization of existing structures, replacement of portable classrooms with new hard construction permanent facilities, and seismic safety programs;

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[19] Office of the Governor, *Governor Schwarzenegger Proposes Strategic Growth Plan For California's Future*, Press Release (Jan. 5, 2006) (attached as **Exhibit 6**).

[20] *Id.*

[21] *Governor Arnold Schwarzenegger's Strategic Growth Plan: Transportation Investments For Mobility And Quality Of Life* (May 2007) (available at www.dot.ca.gov/docs/strategicgrowth.pdf) (attached as **Exhibit 7**).

[22] *Id.*

- $2.85 billion for housing, including affordable rental housing construction, homeless permanent housing construction, and homeless shelter housing construction;
- $4.09 billion to repair and maintain levees and improve flood control systems, including urgent repair and essential improvements and other new dam, levee, flood corridor, and bypass construction; and
- $19.9 billion in transportation-related funding, including expansion of roads to relieve congestion, improvement to public transit infrastructure, improvement of sea, land, and airport infrastructure, improvement of a 400 mile stretch of Route 99, repair and rehabilitation of local roads, highway rehabilitation and pavement preservation projects, seismic retrofits on local bridges, ramps, and overpasses, and construction of bridges over rail lines.[23]

All of these projects require cement, and thus, California's SGP cannot succeed without preserving a healthy California cement industry.

Importantly, as of August 10, 2007, the California Department of Transportation also identified 217 bridges that are structurally deficient or functionally obsolete.[24] The replacement or repair of these bridges, which has become increasingly important following the recent bridge collapse in Minneapolis, will necessarily require additional supplies of cement, over and above the enormous demand contemplated under the SGP.

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[23] **Exhibit 9** provides a more complete description of the SGP from the Governor's Budget Summary 2007-08.

[24] California Department of Transportation, *Priority Bridge Needs List*, August 10, 2007 (available at www.dot.ca.gov/bridge.htm) (attached as **Exhibit 10**).

In addition to state projects, the federal government continues to earmark funding for infrastructure projects. For example, the federal transportation act (SAFETEA-LU), enacted in August 2005, will provide California with $23.4 billion in federal funds through 2009 for highways, transit, and transportation safety.[25] This funding represents a 40 percent increase per year over the previous federal program.[26] The funding includes substantial highway construction projects, including over $3.7 billion for earmarked projects.[27] The President's Fiscal 2007 budget also includes other infrastructure funding, such as over $98 million for projects in California by the Army Corps of Engineers.[28] Again, all of these projects will require cement, highlighting the critical importance of preserving domestic cement manufacturing in California.

D. Cement Is A Key Component To Achieving GHG Reductions

In addition to the infrastructure projects identified above, cement is also critical for meeting climate change objectives under AB32. As stated in its Work Plan for U.S. Cement Industry's Climate Change Program, PCA identified product application as providing the greatest promise for CO_2 reductions, including:

- Energy-Efficient Structures: commercial and residential structures built with concrete exterior walls to enhance their energy efficiency.
- Urban Heat Island Mitigation: light-colored concrete absorbs less and radiates more light energy than dark

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[25] Elizabeth G. Hill, Legislative Analyst's Office, *Funding for Transportation: What The New Federal Act Means For California* (Jan. 19, 2006), at 1 (available at www.lao.ca.gov/LAOApp/PubDetails.aspx?id=1365) (excerpts attached as **Exhibit 11**).

[26] *Id.*

[27] *Id.* at Figure 8.

[28] The California Institute for Federal Policy Research, *Special Report: President's Budget Proposal For Fiscal Year 2007, California Implications* (Feb. 7, 2006) at 17 (excerpt attached as **Exhibit 12**).

materials -- whether on pavement, roofs, or other surfaces -- thereby reducing radiated heat energy and thus ambient temperatures.

- Vehicle Fuel Efficiency: studies indicate that because of its rigidity, concrete pavement enhances fuel efficiency of vehicles when compared to flexible pavements.

- Lifecycle Analysis: because of the three applications above, and other benefits, cement-based concrete compares favorably to competing products; these results should be taken into account in product-selection guidance.[29]

Federal and state agencies have confirmed the importance of concrete (and, thus, cement) in addressing climate change issues. For example, in recommending alternatives to address the "heat island effect" in urban areas, the U.S. EPA refers to "cool coatings" containing cement particles as well as to concrete tile.[30] Under California's Building Energy Efficiency Standards, the California Energy Commission similarly recommends concrete tiles as one type of "cool roofing" product.[31] Other organizations have also promoted the use of concrete for climate change benefits, including in the context of the "Cool Communities" partnership[32] and as a

[29] Portland Cement Association, *Work Plan For U.S. Cement Industry's Climate Change Program* (available at http://www.climatevision.gov/sectors/cement/work_plans.html), at 3 (attached as **Exhibit 13**). *See also* American Concrete Pavement Association, *Why Is Concrete Such A Great Pavement Choice?* (available at www.pavement.com) (attached as **Exhibit 14**).

[30] U.S. Environmental Protection Agency, Heat Island Effect, *Frequent Questions* (available at www.epa.gov/heatisland/resources/faq.html) (attached as **Exhibit 15**).

[31] Consumer Energy Center, California Energy Commission, *Frequently Asked Questions About Cool Roofs* (available at www.consumerenergycenter.org/coolroof/faq.html) (attached as **Exhibit 16**).

[32] Environmental Council of Concrete Organizations, *Shining A Light On "Cool Communities,"*(available at www.ecco.org) (attached as **Exhibit 17**).

means for earning certification under the Leadership in Energy and Environmental Design ("LEED") program.[33]

With respect to concrete pavements, the Cool Pavement Report prepared for the U.S. EPA confirms that concrete exhibits much more favorable "cooling" characteristics than any other materials examined, most notably asphalt.[34] Studies have also demonstrated that concrete roads actually increase truck fuel efficiency.[35] In addition, concrete roads have an average life span of 30 years (compared to 10-12 years for asphalt) and require less repair and maintenance. The significantly greater life expectancy and greater long-term resiliency of concrete roads means that road re-surfacing, re-building, and maintenance are conducted less often, using less materials, and less GHG-emitting construction equipment. All of these savings contribute to reductions in GHG emissions that are in addition to the benefits attributable to "cooler" pavement and enhanced fuel efficiency.

Notably, in its "Proposed Early Actions to Mitigate Climate Change in California," ARB has already identified both "cool roofs" and "light-colored paving" as options for GHG reductions.[36] As the key ingredient in concrete, the availability of cement is necessary for California to implement these early actions and to take advantage of other climate change

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[33] Environmental Council of Concrete Organizations, *LEED Green Building Rating System And Concrete* (available at www.ecco.org) (attached as **Exhibit 18**).

[34] Cambridge Systematics, Inc., *Cool Pavement Report*, EPA Cool Pavements Study - Task 5 (June 2005), at 14 (Figure 4.2) (attached as **Exhibit 19**).

[35] *See* Centre for Surface Transportation Technology, National Research Council of Canada, *Test Report: Effects Of Pavement Structure On Vehicle Fuel Consumption - Phase III* (Jan. 27, 2006) (executive summary attached as **Exhibit 20**); Environmental Council of Concrete Organizations, *A Bright Idea: Specify Concrete* (available at www.ecco.org) (attached as **Exhibit 21**).

[36] Air Resources Board, California Environmental Protection Agency, *Proposed Early Actions To Mitigate Climate Change In California* (Apr. 20, 2007), at 7 (Table 2).

benefits attributable to concrete. Thus, preservation of California cement capacity is critical for lowering GHG emissions and contributing to California's overall climate change objectives.

VI. RECOMMENDATIONS

Based on the concerns about leakage that are elaborated in this paper, we have the following recommendations about the AB32 regulatory approach:

1) Expand the GHG inventory and mandatory reporting regulations for the cement industry to include all cement sold in California rather than just the cement manufactured in California;

2) Include historical data on cement imports in assessing future growth projections for the cement industry and also consider ongoing infrastructure needs for replacement of existing structures or for GHG-related upgrades;

3) Impose a border adjustment measure, a requirement that imports hold appropriate allowances, or other suitable alternative to ensure that the same burden is placed on imports as is placed on domestic cement production;

4) Provide for the free allocation of allowances to the cement industry under any cap-and-trade approach to account for the unique characteristics of the industry, including high import competition and the inability to pass-through costs to customers.

LIST OF EXHIBITS

Exhibit 15	U.S. Environmental Protection Agency, Heat Island Effect, *Frequent Questions* (available at www.epa.gov/heatisland/resources/faq.html)
Exhibit 16	Consumer Energy Center, California Energy Commission, *Frequently Asked Questions About Cool Roofs* (available at www.consumerenergycenter.org/coolroof/faq.html)
Exhibit 17	Environmental Council of Concrete Organizations, *Shining A Light On "Cool Communities,"*(available at www.ecco.org)
Exhibit 18	Environmental Council of Concrete Organizations, *LEED Green Building Rating System And Concrete* (available at www.ecco.org)
Exhibit 19	Cambridge Systematics, Inc., *Cool Pavement Report*, EPA Cool Pavements Study - Task 5 (June 2005), at 14 (Figure 4.2)
Exhibit 20	Executive Summary, Centre for Surface Transportation Technology, National Research Council of Canada, *Test Report: Effects Of Pavement Structure On Vehicle Fuel Consumption - Phase III* (Jan. 27, 2006)
Exhibit 21	Environmental Council of Concrete Organizations, A Bright Idea: Specify Concrete (available at www.ecco.org)

EXHIBIT 1

Capital Expenditures Per Employee for Selected Industries, 1996

Rank	SIC	Industry	Total Capital Expenditures	Employees	Capital Expenditures per Employee
1	29	Petroleum and coal products	5,572,200,000	106,000	$52,568
2	**324**	**Cement, hydraulic**	**494,800,000**	**16,900**	**$29,278**
3	28	Chemicals and allied products	20,041,000,000	824,400	$24,310
4	321	Flat glass	248,000,000	11,500	$21,565
5	21	Tobacco products	648,900,000	31,400	$20,666
6	26	Paper and allied products	9,301,600,000	630,600	$14,750
7	322	Glass and glassware, pressed or blown	853,300,000	59,500	$14,341
8	36	Electronic and other electric equipment	20,867,400,000	1,556,500	$13,407
9	33	Primary metal industries	7,299,100,000	687,400	$10,618
10	37	Transportation equipment	13,498,000,000	1,466,900	$9,202
11	32	Stone, clay, and glass products	4,157,400,000	520,400	$7,989
12	323	Products of purchased glass	492,500,000	63,500	$7,756
13	20	Food and kindred products	$11,717,300,000	1,516,600	$7,726
14	30	Rubber and misc. plastics products	7,021,700,000	1,017,900	$6,898
15	329	Misc. nonmetallic mineral products	464,000,000	71,500	$6,490
16	325	Structural clay products	201,300,000	31,200	$6,452
17	38	Instruments and related products	5,273,800,000	820,700	$6,426
18	327	Concrete, gypsum, and plaster products	1,199,500,000	204,500	$5,866
19	35	Industrial machinery and equipment	11,450,700,000	1,980,500	$5,782
20	34	Fabricated metal products	6,873,500,000	1,483,000	$4,635
21	22	Textile mill products	2,665,700,000	576,400	$4,625
22	24	Lumber and wood products	3,305,100,000	738,700	$4,474
23	27	Printing and publishing	5,912,200,000	1,515,000	$3,902
24	39	Miscellaneous manufacturing industries	1,372,700,000	397,300	$3,455
25	326	Pottery and related products	153,500,000	44,800	$3,426
26	328	Cut stone and stone products	50,400,000	17,100	$2,947
27	25	Furniture and fixtures	1,252,400,000	514,500	$2,434
28	31	Leather and leather products	127,800,000	77,200	$1,655
29	23	Apparel and other textile products	964,200,000	864,900	$1,115

Source: U.S. Census Bureau, 1996 Annual Survey of Manufactures, "Statistics for Industry Groups and Industries."
Note: This includes all 2-digit SIC codes 20-39 and 3-digit SIC codes 321-329.

EXHIBIT 2

California Cement Production, Consumption, And Imports

Metric Tons (1,000)

Year	Clinker Capacity[1]	Clinker Production[1]	Capacity Utilization (percent)	Grinding Capacity[2]	Cement Production[2]	Capacity Utilization (percent)	Consumption[3]	Imports[4]
1990	10,391	8,874	85.4	10,843	9,126	90.0	10,580	2,531
1991	9,193	8,178	80.0	10,933	8,262	80.8	8,378	1,431
1992	8,805	7,819	88.8	10,992	8,169	79.5	7,976	510
1993	8,842	8,024	90.7	11,327	8,511	80.4	7,666	446
1994	9,803	9,123	93.1	11,453	9,639	90.0	8,200	409
1995	9,734	9,227	94.8	11,514	9,362	87.0	8,102	229
1996	9,066	9,543	105.3	11,574	9,907	91.5	8,381	387
1997	11,114	9,821	88.4	11,501	10,261	95.4	9,470	1,044
1998	10,991	9,964	90.7	11,468	10,017	93.4	10,245	2,225
1999	11,501	10,645	92.6	11,953	10,289	92.1	11,741	3,092
2000	11,851	10,618	89.6	12,721	10,877	91.4	12,665	3,167
2001	13,469	10,148	75.3	12,600	10,069	85.5	12,592	3,884
2002	12,630	11,187	88.6	14,017	11,166	85.2	12,633	3,210
2003	12,880	11,283	87.6	14,095	11,592	88.0	13,255	3,472
2004	13,260	11,593	87.4	14,377	11,928	88.7	14,221	4,919
2005	12,920	11,466	88.7	14,057	11,564	88.0	15,322	6,132
2006[5]	12,290	8,829	88.7	[6]	11,007	[6]	15,193	6,942
Est. 2007[5]	*12,515*	*10,622*	*84.9*	[6]	*10,982*	[6]	15,476	[6]

Percent Change	Clinker Capacity	Clinker Production		Grinding Capacity[7]	Cement Production		Consumption	Imports
1990-2006	18.3	-0.5		29.6	26.7		44.8	142.3
2002-2006	-2.7	-21.1		0.3	-1.4		20.3	116.2

[1] Source: U.S.G.S., Minerals Yearbook Table 2 1983-97; Table 3 1983-94, 1998-03; Table 4 1995-97, Tables 5 1998-2005.
[2] Source: U.S.G.S., Minerals Yearbook Table 2 1983-97; Table 3 1983-94, 1998-03; Table 4 1995-97, Tables 3 1998-2005.
[3] Source: U.S.G.S., Minerals Yearbook Table 13 1983-90; Table 9 1990; Table 11 for 1991-93; Table 8 1992-97; Table 9 1998-2005.
[4] Source: ITC Dataweb, HTS Nos. 2523.10, 2523.21, 2523.29, and 2523.90
[5] 2006 and estimated 2007 clinker capacity and consumption are based on PCA's Summary of Cement-Based Products Industry Statistics (California) (available at www.cement.org/econ/ind_stats.asp). 2006 and estimated 2007 clinker production and cement production are derived from U.S.G.S. Mineral Industry Survey, May 2007, with data annualized by dividing Jan.-May by 5 and multiplying by 12.
[6] Data not yet available.
[7] Change is from 1990-2005, and 2002-2005.

Doc.# 878689
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California Imports Of Portland Cement And Clinker

Metric Tons (1,000)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
China	0	0	0	0	0	0	0	0	170	1,873	2,595	2,603	2,405	1,483	1,187	1,546	2,545	3,626
Thailand	0	0	0	0	0	0	0	0	0	81	407	406	925	1,611	1,665	1,610	1,597	2,079
Taiwan	69	0	0	0	0	0	0	0	0	0	0	81	551	115	395	1,068	963	1,044
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	630	865	111
Mexico	832	921	612	483	376	355	228	386	28	28	45	30	3	0	0	58	153	76
U.A.E.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	2
Japan	1,603	1,212	0	0	0	0	0	0	0	14	29	33	0	0	223	0	2	2
All Others	504	397	819	26	71	54	1	1	847	230	16	12	0	1	2	4	3	1
World	3,008	2,531	1,431	510	446	409	229	387	1,044	2,225	3,092	3,167	3,884	3,210	3,472	4,919	6,132	6,942

Source: ITC Dataweb, HTS Nos. 2523.10, 2523.21, 2523.29, and 2523.90

Doc.# 879050

8/27/2007

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EXHIBIT 3

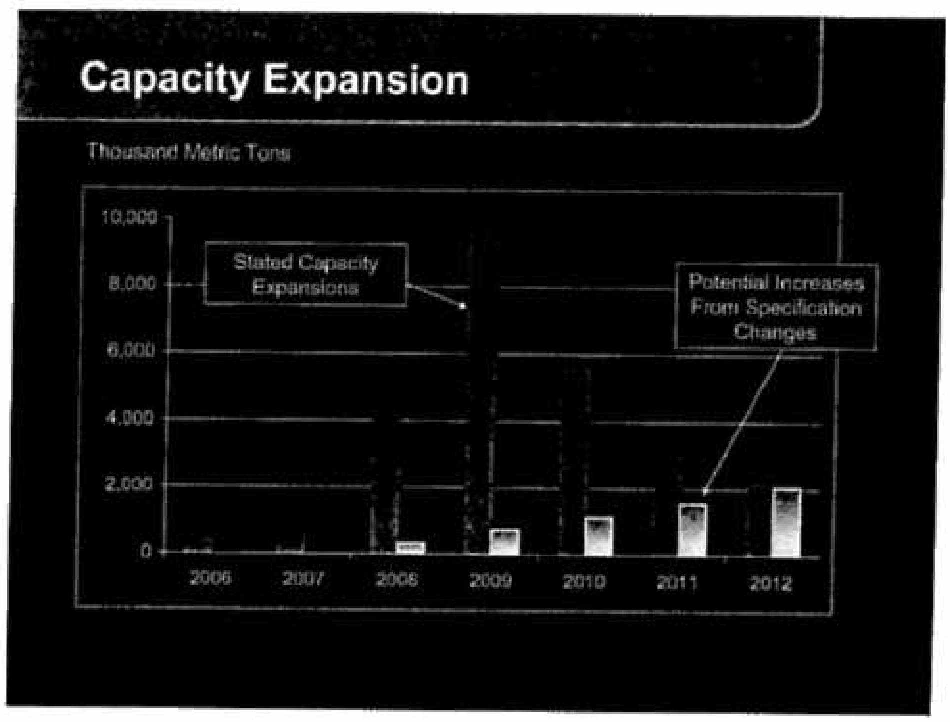
PCA
Portland Cement Association
THE Monitor Flash Report
Breaking Analysis of the Economy, Construction and Cement Industries
Contact: > Ed Sullivan, Chief Economist 847.972.9006 > esullivan@cement.org

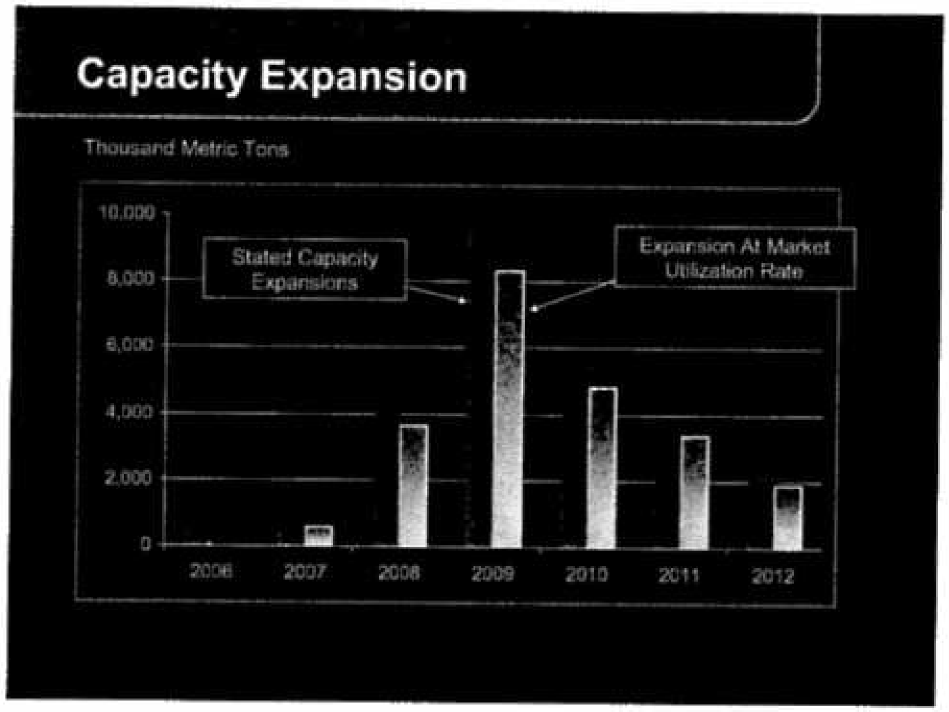
September 28, 2007

Capacity Expansion Update

While the industry has been expanding modestly during the past few years, significant increases in capacity are expected to materialize during 2008-2012. The United States cement industry has announced plans to increase clinker capacity by nearly 25 million metric tons between 2007 and 2012. The aggressive capacity expansion reflects a $5.9 billion investment. This investment will increase capacity 27% over United States' 2006 clinker capacity. The expansion affects 25 plants with a mix of greenfield sites (7), as well as expansions of existing facilities (18) (See table).

In addition to capacity expansions, changes in U.S. specifications allowing for the use of limestone in portland cement could increase the potential domestic supply even further. Depending on how plants elect to exercise the option to use limestone, domestic cement supply could increase by as much as 2 million additional tons by 2012. Finally, increases in EPA production variances could add the potential of another 1.1 million metric tons of domestic supply. Taking all factors into consideration and compared to 2006 levels, total domestic supply could increase by as much as 28 million metric tons by 2012.

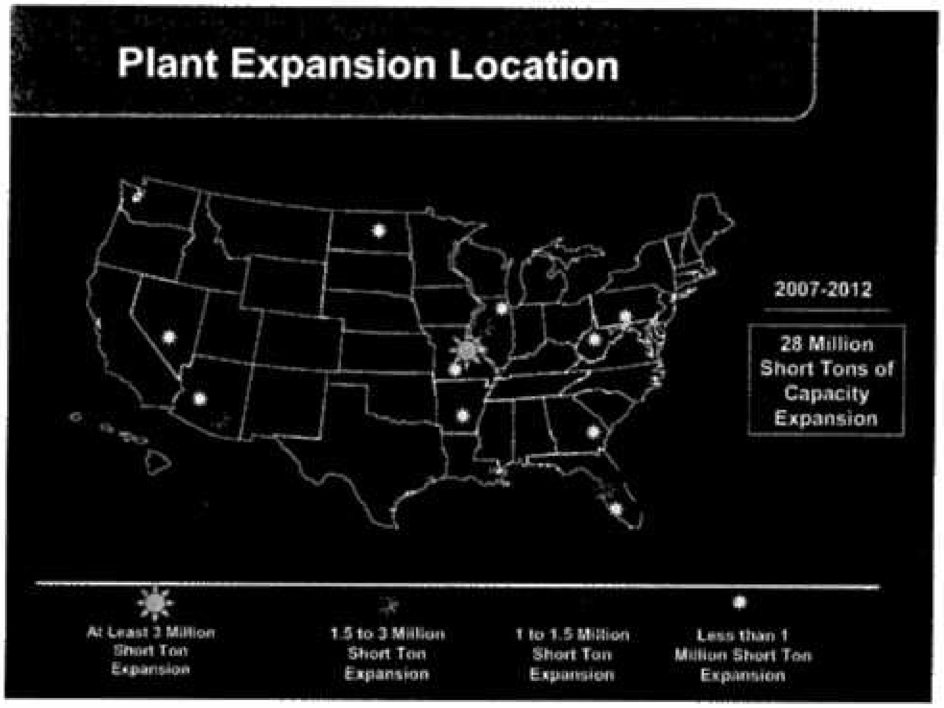




The potential increase in domestic supply during 2007-2012 is probably overstated by raw capacity announcements. The capacity volume estimated to come on line through 2012 is based on 100% kiln utilization. An 85% to 90% utilization rate is probably closer to real world operating conditions. This implies that the likely increase in new domestic supply from capacity expansion is closer in-line to 21 to 23 million metric tons rather the than 25 million metric tons implied by raw capacity announcements and the total domestic supply tons increase would be closer in-line to 23 to 25 million metric tons.

In addition, some rationalization of older plants may materialize. While no announcements have been made, this could partially offset the increase in the total net expansion of U.S. cement capacity. In the context of market weakness and sustained high energy prices, some older and less efficient wet kiln plants could become candidates for closure. The possibility of enactment of climate change laws could disproportionately raise compliance costs for wet kilns – potentially accelerating the closures of these plants. Since 2000, roughly 1 million tons of wet kiln capacity has been retired annually. Keep in mind the youngest wet kiln in operation is 33 years old and nearing the end of its economic life. Based on PCA's Plant Information Survey, there is currently more than 14 million metric tons of wet kiln capacity – all of which could be a risk for closure within the next ten years. Such potential closures could moderate the net capacity expansion and reduce domestic supply by 4-5 million metric tons.

Considering the expansions and offsets, the effective increase in domestic supply by 2012 will probably be closer to 19 to 20 million metric tons rather than the 25 million metric tons suggested by capacity announcements.

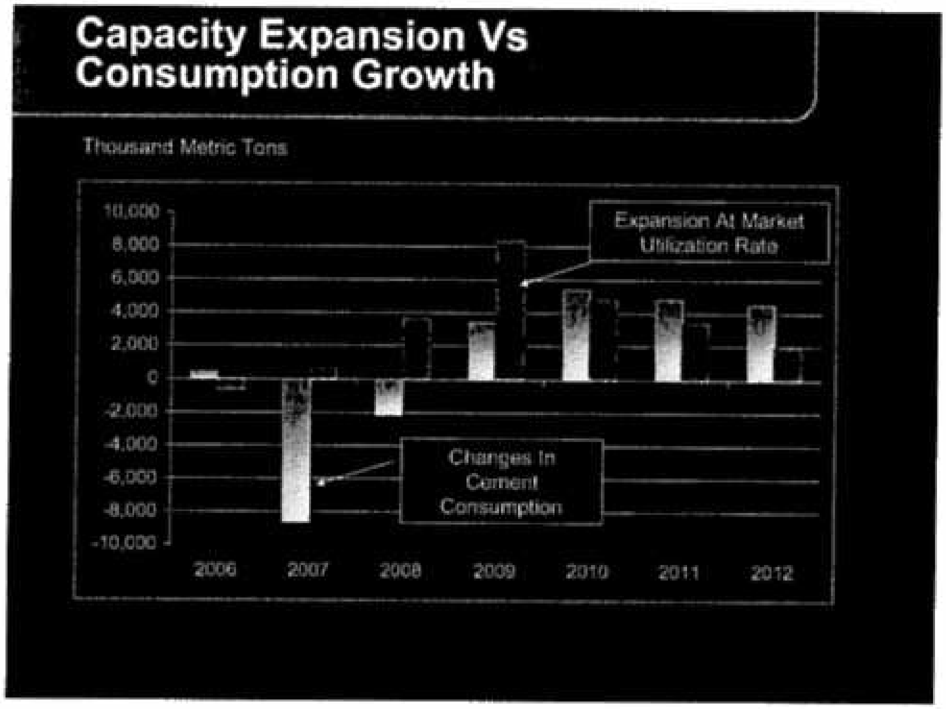


Regions characterized by strong demographic growth and a vibrant economic base dominate the location of capacity expansions. Population and job growth will dictate strong gains in private sector construction including residential and nonresidential building activity. It is expected that these regions will also have a relatively strong tax base, enabling strong growth in infrastructure spending – although entitlement spending could act as a significant draw from funds dedicated to construction in these states.

The Mountain region accounts for nearly 20% of total capacity expansions (see table). The rapidly growing populations of Arizona, Nevada and Colorado played a role in these capacity expansion decisions. Texas and surrounding states account for 8% of total capacity expansions. Florida accounts for nearly 16% of total capacity expansions. EPA production variances may potentially add to Florida's domestic supply.

The largest increase in capacity expansion, however, is expected to materialize in the central region of the United States – accounting for 30% of total capacity increases. The key characteristic of the central region is access to the Mississippi River – allowing plants access to a much broader market compared to landlocked plants that characterize the rest of the nation. This regional increase is dominated by one large greenfield plant expected to come on-line in 2009. The central region is not among the most dynamic cement markets in the United States.

Unfortunately, increases in domestic cement capacity coincide with the cyclical erosion in economic conditions. The current cyclical downturn is expected to reach a trough during 2008. According to PCA's baseline cement consumption scenario the current peak to tough reflects nearly a 12 million metric ton reduction or a 9.1% decline (2005-2008). Past cyclical peak consumption levels (2005) are not expected to be matched until 2011. A relatively slow recovery in cement consumption is anticipated during 2009. It is likely that domestic



capacity increases will outstrip growth in cement consumption during 2007-2009. Reduction in imports, lower capacity utilization rates, and potentially higher than desired inventory levels may characterize this time period.

The likelihood of weaker near term cement consumption, coupled with the aggressive expansion in capacity may result in lower kiln utilization rates. During the height of the past cyclical peak (2005), PCA calculated kiln utilization rates at 95%. Utilization rates could slip to a range of 85%-87% during 2008-2009. A one percent reduction in utilization rate translates roughly into a 1 million metric ton reduction in domestic supply.

Imports typically enter the United States market as supplements to domestic production. According to PCA estimates, 93% of all imports flow through import terminals owned by companies operating plants in the United States. If required to maintain high operating rates at domestic plants, import volumes could be reduced. Compared to peak import levels of 35.8 million metric tons (2006), PCA expects imports will decline to less than 20 million metric tons during 2008-2010.

With the improvement in economic conditions, sustained growth in cement consumption is expected to materialize during 2009-2012. By 2010, growth in cement consumption is expected to outstrip announced capacity expansion – resulting in a sustained increase in the utilization rates and/or import levels compared to 2009 levels.

Net Capacity Expansion Estimates

(Clinker, Thousands of Short Tons)

Company	Location	Year On Stream	Capacity	2007	2008	2009	2010	2011	2012	Total
				Net Expansion						
Total Expansion				**680**	**4,450**	**10,610**	**6,163**	**3,763**	**1,900**	**27,565**
- Estimated Dollar Investment ($ Millions)				**$146**	**$957**	**$2,281**	**$1,325**	**$809**	**$409**	**$5,926**
2007										
Eagle Materials	LaSalle, Illinois	2007	430	430	0	0	0	0	0	430
Texas Industries	Oro Grande, California	2007	1,000	250	750	0	0	0	0	1,000
2008										
American Cement Company	Sumterville, Florida (G)	2008	1,100	0	550	550	0	0	0	1,100
Buzzi Cement	Festus, Missouri	2008	1,000	0	500	500	0	0	0	1,000
Continental Cement	Hannibal, Missouri	2008	600	0	600	0	0	0	0	600
Eagle Materials	Laramie, Wyoming	2008	400	0	100	300	0	0	0	400
Eagle Materials	Fernley, Nevada	2008	500	0	125	375	0	0	0	500
Essroc Cement	Martinsburg, West Virginia	2008	700	0	350	350	0	0	0	700
Florida Rock	Newberry, Florida	2008	750	0	750	0	0	0	0	750
Giant Cement/Keystone	Bath, PA	2008	300	0	225	75	0	0	0	300
Cemex	Brooksville, Florida	2008	1,000	0	500	500	0	0	0	1,000
2009										
Ash Grove Cement	Foreman, Arkansas	2009	700	0	0	200	500	0	0	700
Cemex	New Braunfels, Texas	2009	1,100	0	0	1,100	0	0	0	1,100
California Portland	Rillito, Arizona	2009	1,000	0	0	500	500	0	0	1,000
Drake Cement	Paulden, Azrizona (G)	2009	660	0	0	660	0	0	0	660
GCC of America	Pueblo, Colorado (G)	2009	1,000	0	0	1,000	0	0	0	1,000
Holcim Cement	St. Genevieve, Missouri (G)	2009	4,400	0	0	3,000	1,400	0	0	4,400
Sumter Cement Company	Center Hill, Florida (G)	2009	1,500	0	0	1,500	0	0	0	1,500
2010										
Houston American Cement	Perry, Georgia (G)	2010	900	0	0	0	450	450	0	900
LaFarge	Exshaw, Alberta	2010	900	0	0	0	450	450	0	900
LaFarge	Grand Chain, Illinois	2010	1,825	0	0	0	913	913	0	1,825
LaFarge	Harleyville, South Carolina	2010	1,400	0	0	0	700	700	0	1,400
National Cement	Ragland, Alabama	2010	1,300	0	0	0	650	650	0	1,300
Texas Industries Inc	New Braunfels, Texas	2010	1,200	0	0	0	600	600	0	1,200
2012										
Cemex	Seligman, Arizona (G)	2012	1,900	0	0	0	0	0	1,900	1,900
Increased EPA Permit Variances *										
Titan America	Medley, Florida	2006	600	0	0	0	0	0	0	600
Holcim	Devils Slide, Utah	2006	130	0	0	0	0	0	0	130
Texas Industries Inc	Midlothian, Texas	2006	500	0	0	0	0	0	0	500
Net North American Capacity Changes (Expansions Plus Variances)				680	4,450	10,610	6,163	3,763	1,900	28,795
Net United States Capacity Changes (Expansions Plus Variances)				680	4,450	10,610	5,713	3,313	1,900	27,895
Net Canadian Capacity Changes (Expansions Plus Variances)				0	0	0	450	450	0	900

Updated 9-15-07

* EPA variances allow cement producer to produce more at specified plant according to local or national EPA allowances. Not necessarily exercised.

* (G) designates a greenfield plant. All other listings reflect expansions.

Net Capacity Expansion Estimates

(Clinker, Thousands of Metric Tons)

Company	Location	Year On Stream	Capacity	Net Expansion 2007	2008	2009	2010	2011	2012	Total
Total Expansion				**612**	**4,005**	**9,549**	**5,546**	**3,386**	**1,710**	**24,809**
- Estimated Dollar Investment ($ Millions)				**$146**	**$957**	**$2,281**	**$1,325**	**$809**	**$409**	**$5,926**
2007										
Eagle Materials	LaSalle, Illinois	2007	387	387	0	0	0	0	0	387
Texas Industries	Oro Grande, California	2007	900	225	675	0	0	0	0	900
2008										
American Cement Company	Sumterville, Florida (G)	2008	990	0	495	495	0	0	0	990
Buzzi Cement	Festus, Missouri	2008	900	0	450	450	0	0	0	900
Continental Cement	Hannibal, Missouri	2008	540	0	540	0	0	0	0	540
Eagle Materials	Laramie, Wyoming	2008	360	0	90	270	0	0	0	360
Eagle Materials	Fernley, Nevada	2008	450	0	113	338	0	0	0	450
Essroc Cement	Martinsburg, West Virginia	2008	630	0	315	315	0	0	0	630
Florida Rock	Newberry, Florida	2008	675	0	675	0	0	0	0	675
Giant Cement/Keystone	Bath, PA	2008	270	0	203	68	0	0	0	270
Cemex	Brooksville, Florida	2008	900	0	450	450	0	0	0	900
2009										
Ash Grove Cement	Foreman, Arkansas	2009	630	0	0	180	450	0	0	630
Cemex	New Braunfels, Texas	2009	990	0	0	990	0	0	0	990
California Portland	Rillito, Arizona	2009	900	0	0	450	450	0	0	900
Drake Cement	Paulden, Azrizona (G)	2009	594	0	0	594	0	0	0	594
GCC of America	Pueblo, Colorado (G)	2009	900	0	0	900	0	0	0	900
Holcim Cement	St. Genevieve, Missouri (G)	2009	3,960	0	0	2,700	1,260	0	0	3,960
Sumter Cement Company	Center Hill, Florida (G)	2009	1,350	0	0	1,350	0	0	0	1,350
2010										
Houston American Cement	Perry, Georgia (G)	2010	405	0	0	0	405	405	0	810
LaFarge	Exshaw, Alberta	2010	405	0	0	0	405	405	0	810
LaFarge	Grand chain, Illinois	2010	821	0	0	0	821	821	0	1,643
LaFarge	Harleyville, South Carolina	2010	630	0	0	0	630	630	0	1,260
National Cement	Ragland, Alabama	2010	585	0	0	0	585	585	0	1,170
Texas Industries Inc	New Braunfel, Texas	2010	540	0	0	0	540	540	0	1,080
2012										
Cemex	Seligman, Arizona (G)	2012	0	0	0	0	0	0	1,710	1,710
Increased EPA Permit Variances										
Titan America	Medley, Florida	2006	540	0	0	0	0	0	0	540
Holcim	Devils Slide, Utah	2008	117	0	0	0	0	0	0	117
Texas Industries Inc	Midlothian, Texas	2006	450	0	0	0	0	0	0	450
Net North American Capacity Changes (Expansions Plus Variances)				612	4,005	9,549	5,546	3,386	1,710	**25,916**
Net United States Capacity Changes (Expansions Plus Variances)				612	4,005	9,549	5,141	2,981	1,710	25,106
Net Canadian Capacity Changes (Expansions Plus Variances)				0	0	0	405	405	0	810

Updated 9-15-07

* EPA variances allow cement producer to produce more at specified plant according to local or national EPA allowances. Not necessarily exercised.

* (G) designates a greenfield plant. All other listings reflect expansions.

Regional Capacity Expansion Estimates

(Clinker, Thousands of Short Tons)

Company	Location	Year On Stream	Capacity	Net Expansion 2007	2008	2009	2010	2011*	2012	Total
Total Expansion				**680**	**4,450**	**10,610**	**5,713**	**3,313**	**1,900**	**26,665**
- Estimated Dollar Investment ($ Millions)				**$146**	**$957**	**$2,281**	**$1,228**	**$712**	**$409**	**$5,733**
New England										
Middle Atlantic										
Giant Cement/Keystone	Bath, PA	2008	300	0	225	75	0	0	0	300
Subtotal										**300**
East North Central										
Eagle Materials	LaSalle, Illinois	2007	430	430	0	0	0	0	0	430
LaFarge	Grand Chain, Illinois	2010	1,825	0	0	0	913	913	0	1,825
Subtotal										**2,255**
West North Central										
Buzzi Cement	Festus, Missouri	2008	1,000	0	500	500	0	0	0	1,000
Continental Cement	Hannibal, Missouri	2008	600	0	600	0	0	0	0	600
Holcim Cement	St. Genevieve, Missouri (G)	2009	4,400	0	0	3,000	1,400	0	0	4,400
										6,000
South Atlantic										
American Cement Company	Sumterville, Florida (G)	2008	1100	0	550	550	0	0	0	1100
Essroc Cement	Martinsburg, West Virginia	2008	700	0	350	350	0	0	0	700
Florida Rock	Newberry, Florida	2008	750	0	750	0	0	0	0	750
Cemex	Brooksville, Florida	2008	1000	0	500	500	0	0	0	1000
Sumter Cement Company	Center Hill, Florida (G)	2009	1500	0	0	1500	0	0	0	1500
Houston American Cement	Perry, Georgia (G)	2010	900	0	0	0	450	450	0	900
LaFarge	Harleyville, South Carolina	2010	1400	0	0	0	700	700	0	1400
Subtotal										**7350**
East South Central										
National Cement	Ragland, Alabama	2010	1,300	0	0	0	650	650	0	1,300
Subtotal										**1,300**
West South Central										
Ash Grove Cement	Foreman, Arkansas	2009	700	0	0	200	500	0	0	700
Cemex	New Braunfels, Texas	2009	1,100	0	0	1,100	0	0	0	1,100
Texas Industries Inc	New Braunfels, Texas	2010	1,200	0	0	0	600	600	0	1,200
Subtotal										**3,000**
Mountain										
Eagle Materials	Laramie, Wyoming	2008	400	0	100	300	0	0	0	400
Eagle Materials	Fernley, Nevada	2008	500	0	125	375	0	0	0	500
California Portland	Rillito, Arizona	2009	1,000	0	0	500	500	0	0	1,000
Drake Cement	Paulden, Azrizona (G)	2009	660	0	0	660	0	0	0	660
GCC of America	Pueblo, Colorado (G)	2009	1,000	0	0	1,000	0	0	0	1,000
Cemex	Seligman, Arizona (G)	2012	1,900	0	0	0	0	0	1,900	1,900
Subtotal										**5,460**
Pacific										
Texas Industries	Oro Grande, California	2007	1,000	250	750	0	0	0	0	1,000
Subtotal										**1,000**
Total				**680**	**4,450**	**10,610**	**5,713**	**3,313**	**1,900**	**26,665**

*2010 and 2011 total expansions excludes 450 short tons from Alberta Ca

Regional Capacity Expansion Estimates

(Clinker, Thousands of Metric Tons)

Company	Location	Year On Stream	Capacity	Net Expansion 2007	2008	2009	2010	2011*	2012	Total
Total Expansion				**612**	**4,005**	**9,549**	**5,141**	**2,981**	**1,710**	**23,999**
- Estimated Dollar investment ($ Millions)				**$146**	**$957**	**$2,281**	**$1,228**	**$712**	**$409**	**$5,733**
New England										
Middle Atlantic										
Giant Cement/Keystone	Bath, PA	2008	270	0	203	68	0	0	0	270
Subtotal										**270**
East North Central										
Eagle Materials	LaSalle, Illinois	2007	387	387	0	0	0	0	0	387
LaFarge	Grand Chain, Illinois	2010	1,643	0	0	0	821	821	0	1,643
Subtotal										**2,030**
West North Central										
Buzzi Cement	Festus, Missouri	2008	900	0	450	450	0	0	0	900
Continental Cement	Hannibal, Missouri	2008	540	0	540	0	0	0	0	540
Holcim Cement	St. Genevieve, Missouri (G)	2009	3,960	0	0	2,700	1,260	0	0	3,960
										5,400
South Atlantic										
American Cement Company	Sumterville, Florida (G)	2008	990	0	495	495	0	0	0	990
Essroc Cement	Martinsburg, West Virginia	2008	630	0	315	315	0	0	0	630
Florida Rock	Newberry, Florida	2008	675	0	675	0	0	0	0	675
Cemex	Brooksville, Florida	2008	900	0	450	450	0	0	0	900
Sumter Cement Company	Center Hill, Florida (G)	2009	1350	0	0	1350	0	0	0	1350
Houston American Cement	Perry, Georgia (G)	2010	810	0	0	0	405	405	0	810
LaFarge	Harleyville, South Carolina	2010	1260	0	0	0	630	630	0	1260
Subtotal										**6615**
East South Central										
National Cement	Ragland, Alabama	2010	1,170	0	0	0	585	585	0	1,170
Subtotal										**1,170**
West South Central										
Ash Grove Cement	Foreman, Arkansas	2009	630	0	0	180	450	0	0	630
Cemex	New Braunfels, Texas	2009	990	0	0	990	0	0	0	990
Texas Industries Inc	New Braunfels, Texas	2010	1,080	0	0	0	540	540	0	1,080
Subtotal										**2,700**
Mountain										
Eagle Materials	Laramie, Wyoming	2008	360	0	90	270	0	0	0	360
Eagle Materials	Fernley, Nevada	2008	450	0	113	338	0	0	0	450
California Portland	Rillito, Arizona	2009	900	0	0	450	450	0	0	900
Drake Cement	Paulden, Azrizona (G)	2009	594	0	0	594	0	0	0	594
GCC of America	Pueblo, Colorado (G)	2009	900	0	0	900	0	0	0	900
Cemex	Seligman, Arizona (G)	2012	1,710	0	0	0	0	0	1,710	1,710
Subtotal										**4,914**
Pacific										
Texas Industries	Oro Grande, California	2007	900	225	675	0	0	0	0	900
Subtotal										**900**
Total				**612**	**4,005**	**9,549**	**5,141**	**2,981**	**1,710**	**23,999**

*2010 and 2011 total expansions excludes 450 short tons from Alberta Ca

EXHIBIT 4

GREENHOUSE GAS EMISSIONS FROM CEMENT IMPORTING FOR NATIONAL CEMENT COMPANY OF CALIFORNIA 15821 VENTURA BOULEVARD, SUITE 475 ENCINO, CALIFORNIA 91436

Prepared for

National Cement Company of California
15821 Ventura Boulevard, Suite 475
Encino, California

Prepared by

ENVIRON International Corporation
707 Wilshire Blvd. Suite 4950
Los Angeles, CA 90017

October 23, 2007

Project #: 04-8004D

CONTENTS

TABLES

FIGURE

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1.0 EXECUTIVE SUMMARY

1.1 Background

ENVIRON International Corporation (ENVIRON) was retained by National Cement Company of California (NCCC) to estimate the greenhouse gas (GHG) emissions associated with importing cement into California.

This study was conducted as a proactive approach to quantify the potential impact on GHG emissions resulting from switching from in-state cement manufacturing to importing cement from overseas.

In 2006, California imported approximately 6.9 million metric tons of Portland cement (equivalent to 50% of the total California consumption). More than half of the total imports came from China. For this reason, ENVIRON focused the study on emissions caused by the importation of cement from China.

According to Assembly Bill 32 (AB-32), the GHGs that are to be tracked in the near future by the state of California include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6). Since the primary GHG that is emitted from cement manufacturing and transportation operations is CO_2, this study is limited to CO_2 emissions. [1]

1.2 Objectives

The objective of this study was to evaluate and compare the GHG emissions generated by California-based cement facilities with those from China-based cement facilities whose cement is imported into California. The results of this study were to assist in assessing the GHG impact from importing cement from China to California.

1.3 Summary of Results

ENVIRON estimated the CO_2 emissions associated with importing cement from China into California to be approximately **441 lbs/ton cement.** For purposes of this report we have assumed conservatively that CO_2 emissions associated with manufacturing the cement are the same in China as they are in California at 1800 lbs/ ton of cement. Therefore, overall emissions from the manufacture and importation of cement from China are 25% greater than emissions associated with the manufacture of cement in California.

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[1] California Climate Action Registry. URL: http://www.climateregistry.org/PROTOCOLS/

For the year 2006, 3.6 million metric tons of cement (4 million short tons) were imported from China into California. This corresponds to **1.8 billion pounds of CO_2** (794,000 metric tons) produced from shipping operations.

The break-down of these emissions is as follows:

Electricity generation	**125 lb/ton cement**
Ground transport (within China):	**9 lb/ton cement**
Cement load/unload (at China and California ports):	**7 lb/ton cement**
Maritime transport (China to California):	**300 lb/ton cement**
TOTAL	**441 lb/short ton cement**

Assuming that China and California both use the same type of coal-fired kilns, and that the average kiln will emit approximately 1,800 lbs CO_2 per ton of cement produced, ENVIRON estimates that China-based cement imported to California produces **25% more CO_2 emissions** by the time the cement arrives in California than California-produced cement.

Detailed calculations are presented in the Calculation Support section.

2.0 DISCUSSION OF FINDINGS

2.1 Methodology

In order to quantify and compare the GHG emissions, ENVIRON used the California Climate Action Registry (CCAR) Cement Reporting Protocol (CRP) guidance as a reference document. Although cement companies produce GHG emissions from multiple sources – e.g., trucks, heaters, kilns – the cement protocol focuses on CO_2 emissions associated with manufacturing cement (the calcining of raw materials). The following contributing sources were accounted for in this study:

1) CO_2 emissions from the Portland cement manufacturing process:
ENVIRON estimated the direct CO_2 emissions per ton of cement produced from typical cement plants based on the EPA Emission Factor Documentation for AP-42. These theoretical estimates include emissions from the reduction of carbonate in the feed material to calcium oxide (CaO) and from the oxidation of carbon in the fuel. It is important to note that even though three quarters of the total Chinese cement production comes from a less energy efficient kiln configuration (vertical shaft kilns in comparison with rotary kilns in most of California), this study assumes conservatively that the Portland cement manufacturing process is the same in China as in California. This assumption is warranted because China is currently going through a strict reform of its cement industry and most of the small vertical shaft kilns producing low grade cement will be phased out slowly and most likely replaced by newer and more efficient rotary kilns.[2] Additional research would be required if we were to compare emissions from specific cement facilities.

2) Indirect CO_2 emissions from the Portland cement manufacturing process (purchased electricity):
ENVIRON calculated the indirect CO_2 emissions associated with purchasing electricity for the Portland cement manufacturing process. These emissions vary depending on the fuels and methods used to generate the electricity. ENVIRON found that more than 70% of the electricity generated in China comes from conventional coal thermal sources. In contrast, California electric generators use cleaner fuels (e.g., natural gas) and achieve CO_2 emissions that are 50% lower.

[2] Mason H. Soule, Jeffrey S. Logan, and Todd A. Stewart. March 2002. Trends, Challenges, and Opportunities in China's Cement Industry.

3) CO₂ emissions associated with the transport of China-based cement into California:
ENVIRON conducted research on the Chinese cement industry and found that 75% of that country's large cement plants (with an annual capacity greater than 1 million tons) are located in coastal regions. Therefore, the transport to the maritime terminal is likely to be fairly short. ENVIRON assumed that the cement is transported from the cement plant to the harbor by train and from the harbor to California by cement cargo vessels.

ENVIRON estimated the distance from China's two major cement producing provinces (Guangdong and Shandong) to the China harbor, and calculated an average distance of 170 statute miles. This average distance together with train fuel consumption data from the Association of American Railroads was used to estimate the CO_2 emissions associated with the ground transport of cement to the maritime terminal.

ENVIRON also estimated the emissions from cargo vessels during transport from the Chinese maritime terminal to California (Long Beach). These emissions vary considerably depending on the cargo vessel characteristics. Therefore, ENVIRON estimated emission factors for eleven active large cement cargo vessels and averaged their emission factors to come up with an average emission factor for cement cargo vessels. We believe that the emission factor we estimated is representative of the fleet that transports cement from China too California. This emission factor assumes a round trip from China to California, and that the vessel goes back to China empty (which is another conservative assumption).

4) Indirect emissions from loading/unloading the cement to/from the cargo vessels:
Once the cement has arrived at the port, the cement needs to be transferred into cargo vessels. Typically, cement is handled and conveyed by medium-phase pneumatic conveying systems. For the purpose of this study, ENVIRON calculated the indirect CO_2 emissions using the energy consumption for pneumatic conveying systems and the estimated CO_2 emissions rate from generating units at China and California electric generating plants.

5) CO_2 emissions comparison:
ENVIRON compared the overall CO_2 emissions per ton of cement produced in California to emissions connected with each ton of cement delivered to California from Chinese facilities. We then calculated the excess CO_2 emissions associated with cement imports during the year 2006.

Assumptions

ENVIRON used the following assumptions in this study:

- The CRP requires that direct emissions from fugitive sources of GHGs be included. Leaks in refrigerant systems are the most likely source of fugitive GHG emissions for cement production operations. However, because of the randomness of these (non-CO_2) refrigerant leaks and because their contribution to overall GHG emissions per ton of cement produced is likely to be negligible, ENVIRON did not include fugitive refrigerant emissions in this analysis.

- Transportation-related emissions outside the gates of California cement manufacturing facilities were not included, as the CRP's reporting requirements stop at the gate. The corollary of this is that emissions from the transport of imported cement from the point of offloading at a California harbor were not included either (direct and indirect shore-side GHG emissions related to offloading of imported cement were included in the analysis).

- Methane and nitrous oxide emissions were ignored as these will be negligible. If the California Air Resources Board does end up establishing default factors for these and fugitive refrigerant emissions, then the results of the analysis may have to be adjusted slightly at that time.

2.2 Calculations

1) <u>CO_2 emissions from the Portland cement manufacturing process itself:</u>

ENVIRON's estimated direct emissions from stationary combustion for Long dry process kilns were about **1,800 lbs/ton of cement produced.**[3] This emission factor is based on the theoretical CO_2 released from the reduction of carbonate in the feed material plus the estimated CO_2 released from burning process fuel. The emissions associated with fuel burning depend on the energy efficiency of the kiln and the type of fuel used. For this study, ENVIRON assumed the kilns to be coal-fired.

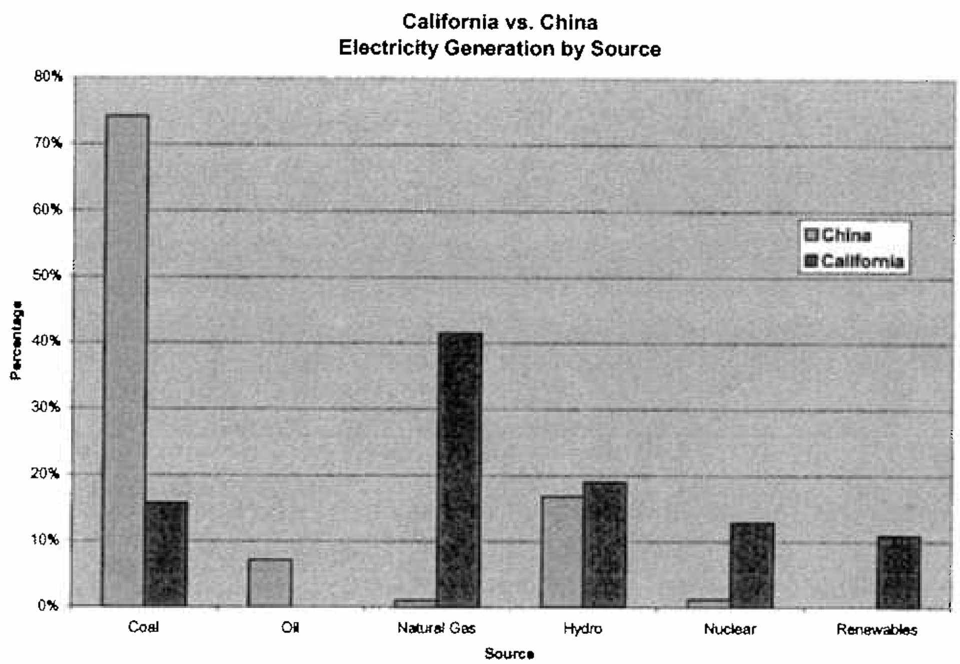
2) <u>Indirect CO_2 emissions from the Portland cement manufacturing process as a result of the use of purchased electricity:</u>

ENVIRON found a significant difference between China and California regarding the respective fleets of electric generating plants. More than 80% of the electricity generated in China comes from conventional thermal sources (mostly coal and oil). In contrast, California energy suppliers use cleaner fuels and processes, achieving 50% less CO_2

[3] USEPA. AP-42, Section 11.6 Table 11.6-8 Emission factors for Portland cement manufacturing.

emissions per unit of power produced. Graph 1 shows the distribution of energy sources for California and China.

GRAPH 1: Electricity Generation Source Distribution for California and China.[4]



ENVIRON calculated indirect CO_2 emissions associated with electricity purchases based on an electricity consumption of 509,729 Btu per ton of clinker produced.[5] For the purpose of this study ENVIRON used a clinker content of 92%. The CO_2 emission factors and calculations are shown in table 1.

TABLE 1: Indirect CO_2 Emissions from Purchased Electricity.

	China		California	
Fuel source	**Source %**	**CO_2 EF [6] (lbs/kWh)**	**Source %**	**CO_2 EF [6] (lbs/kWh)**
Coal	74%	2.158	15.7%	2.158
Oil	7%	2.396	0.0%	2.396
Natural Gas	1%	1.287	41.5%	1.287
Hydro	17%	0	19.0%	0

[4] Canadian Nuclear Association. 1997. Electricity in China.
URL: http://www.cna.ca/english/Articles/Electricity%20in%20China.pdf
California Energy Commission. 2006 Gross System Electricity Production.
URL: http://www.energy.ca.gov/electricity/gross_system_power.html

[5] Portland Cement Association. 2006. URL: http://www.cement.org/

[6] Department of Energy and Environmental Protection Agency. July, 2000. Carbon Dioxide Emissions from Generation of Electric Power in the United States.

TABLE 1: Indirect CO_2 Emissions from Purchased Electricity.

	China		California	
Fuel source	**Source %**	**CO_2 EF [6] (lbs/kWh)**	**Source %**	**CO_2 EF [6] (lbs/kWh)**
Nuclear	1%	0	12.9%	0
Renewables	0%	0	10.9%	0
Electricity Generation Weighted CO_2 EF (lbs/kWh)	-	1.785	-	0.873
Kiln electricity consumption (Btu/ton clinker)	509,729		509,729	
CO_2 Emissions (lbs/ton cement)	**245**		**120**	

ENVIRON estimates that, due to purchased electricity, China's cement industry emits **125 more pounds of CO_2 per ton of cement** produced than California's cement industry.

3) CO_2 emissions associated with the transport of China-based cement into California:

a. ENVIRON assumed that the product is transported from the cement facility to the maritime terminal via train, and used the train fuel consumption rate of 2.4 gallons of diesel per 1,000 ton-statute mile to estimate CO_2 emissions.[7]

2.4 gal x 7.1 lb/gal x (44/14)/1000 = 0.05 lbs/ton-statute mile

Assuming 10% empty train movements and a 170 statute mile trip, the CO_2 emissions are estimated to be **9.3 lbs/ton cement.**

b. With regard to CO_2 emissions from transporting the product from the maritime terminal to California via cement cargo vessel, ENVIRON obtained specifications for several marine vessels from the Lloyds 2006 Registry of Marine Vessels. The following equation was used to estimate the CO_2 emission factor for a cement cargo vessel:

$$\mathbf{EF = 2 \times (CEF \times P \times L)/(S \times C) \times 2.2/1000}$$

Where:

EF = Emission Factor in lbs of CO_2 per ton-nautical mile;
CEF = CO_2 Emission Factor of 620 g/kWh (provided to ENVIRON by ARB);
P = Engine Power in kW;
L = Load Factor 0.823; [8]
S = Speed in knots;
C = Cargo capacity in metric tons of cement.

[7] Association of American Railroads. 2006. "Analysis of Class I Railroads, 2005," and RR Industry Info: Railroad and States.

[8] Starcrest Consulting Group, July, 2005. "Port of Los Angeles Baseline Air Emissions Inventory - 2001," Prepared for Port Of Los Angeles.

Table 2 shows emission factors for eleven active cement carriers that were used to calculate an average cargo ship CO_2 emission factor of 0.0357 pounds per ton-nautical mile.

TABLE 2: Active cement carriers CO_2 emission factors.

Name	Speed (knots)	Propulsion Power (kW)	Cargo capacity (net tonnage)	Cargo capacity (metric ton)	CO2 EF (g/kW-hr)	Load Factor	Emission Rate (lb/nat. mile)	CO2 emissions (lb/ton-n.mile)
GLEN VINE	14	9,636	13,875	59,171	620	0.823	774	0.0262
GOLDEN ARROW I	12.5	15,887	13,119	55,947	620	0.823	1,430	0.0511
SEABULK HOPE	13	8,495	11,367	48,476	620	0.823	735	0.0303
CAPE FLATTERY	14	5,850	10,498	44,770	620	0.823	470	0.0210
SEALO I	15.5	10,812	8,189	34,923	620	0.823	785	0.0449
COZUMEL CEMENT	14.5	7,870	8,013	34,172	620	0.823	611	0.0357
GLORY MOON	16	8,532	7,613	32,466	620	0.823	600	0.0370
MEDITERRANEAN CARRIER	14	7,939	7,357	31,375	620	0.823	638	0.0407
CARIBBEAN CARRIER	14	7,944	7,357	31,375	620	0.823	638	0.0407
ALCEM LUGAIT	14	5,517	6,750	28,786	620	0.823	443	0.0308
GLORY SUN	13.5	5,296	6,086	25,954	620	0.823	441	0.0340
AVERAGE	**14.09**	**8,525**	**9,111**	**38,856**	**620**	**0.823**	**688**	**0.0357**

Notes: One 'net ton' is equivalent to 100 cubic feet. As defined in the Lloyd's 2006 Registry of marine vessels.
Density of bulk Portland cement = 1.506 metric ton / cubic meter.

Assuming 8400 nautical miles between China and California, the total CO_2 emitted from transporting one ton of cement from China to California is **300 pounds**.

c. To estimate indirect CO_2 emissions from loading/unloading the product to/from the cargo vessel, ENVIRON assumed a pneumatic conveying system with a total power rate of 279 Kilowatts, transferring 100 tons per hour, and a conveying length of 200 meters,[9] which results in the following estimate of total energy required to convey 32,988 tons of cement :

33,000 tons cement / 100 Tph x 279 kW = 92,000 kWh

Using the previously calculated CO_2 emission factor of 1.785 pounds per Kilowatt-hour for Chinese generated power (Table 1), the total CO_2 indirect emissions from loading the vessels in China are 164,000 pounds of CO_2 or **5.0 lbs/ton cement**. Using the previously calculated CO_2 emission factor of 0.873 pounds per Kilowatt-hour for California generated power (Table 1), the total CO_2 indirect emissions from

[9] Gregory J. Steel. Dynamic Air Inc. 2005. Dense Phase Pneumatic Conveying. World Cement Bulk Materials Handling Review 2005.

unloading the vessels in California are 80,000 pounds of CO_2 or **2.4 lbs/ton cement**. The total unloading and loading emissions are therefore **7.4 lbs/ton cement**.

4) Excess CO_2 emissions from 2006 China Imports:

According to the United States International Trade Commission, California imported 3.7 million metric tons (4 million short tons) of cement from China in 2006. Considering that about 441 lb CO_2 were emitted per ton of cement that was imported into California, we estimate a total of 1.8 billion pounds of CO_2 (794,000 metric tons) released from shipping operations involving the importation of cement from China into California during 2006.

3.0 CONCLUSIONS

1) An estimated 441 lbs of CO_2 are emitted during the transport of one ton of cement from China to California. These emissions include those connected with the cement transport from the China-based facility to the shipping harbor via train; the conveying of cement to and from the cement cargo ship; the indirect emissions from purchased electricity during the on- and off-loading processes; and the maritime transport from China to California.

2) It is therefore estimated that China-based cement imported into California creates 25% more CO_2 emissions than California-based cement as a result of import operations.

4.0 REPORT APPLICABILITY

This report and its emission estimates were calculated based mostly on United States emissions data. Therefore, since the regulatory framework is more stringent in the United States than in China (and even more stringent in California), the results of this study are likely to be conservative and may not account for less efficient kilns or pollution control devices used in China. Additional research will be necessary if specific Chinese cement producing facilities were to be characterized for comparison against specific California cement producing facilities.

EXHIBIT 5

Cement Plants in California

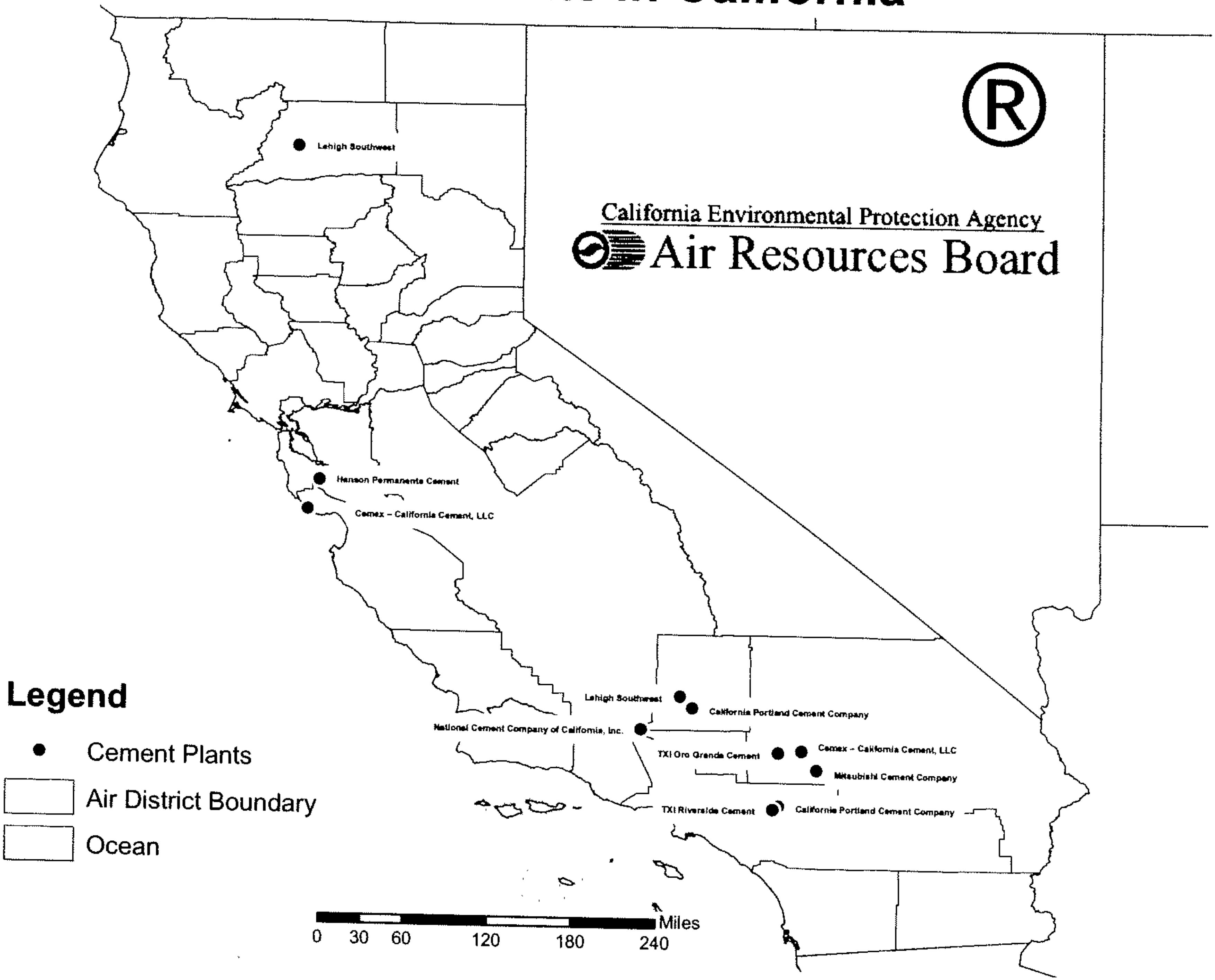


EXHIBIT 6

Press Release

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Governor Schwarzenegger Proposes Strategic Growth Plan for California's Future

Governor Arnold Schwarzenegger, delivering his annual State of the State address before a joint session of the California State Legislature tonight, proposed a bold and comprehensive Strategic Growth Plan to invest in California's transportation, education, water, public safety and public service infrastructure to ensure the state is prepared to meet the needs of its people into the 21st century.

"A new California is coming whether we plan for it or not. We must build a California eager to meet the challenges of the 21st Century without reluctance or fear. Our plan must not only expand the concrete highways that connect Los Angeles to San Francisco and Stockton-but the digital ones that connect Stockton to Shanghai, Sydney and Seoul," said Governor Schwarzenegger. "We will need more roads, more hospitals, more schools, more nurses, more teachers, more police and fire, more water, more energy, more ports and the need is urgent. In recent decades, California has invested piecemeal, crisis by crisis, traffic jam by traffic jam. We can lay the foundation for the next generation, just as our predecessors did 50 years ago. I believe that together we can improve our schools, our roads, our environment, our health care and our future."

Over the next 20 years, California's population is expected to increase by as much as 30 percent and it is estimated the state faces more that $500 billion in infrastructure needs over that same period. Governor Schwarzenegger's Strategic Growth Plan is the first phase of a 20-year investment to meet these expected needs for Californians. The plan leverages $68 billion dollars in bonds over the next 10 years to invest more than $222 billion in the state's infrastructure without raising taxes.

"We cannot spend more than we have; but at the same time we cannot afford costly delay in investing in critical infrastructure. Things will be tight, but funding our future is the fiscally responsible thing to do. Not to do so is to abandon the people," continued the Governor. "Our ability to pay for these investments is directly tied to the fiscal discipline of the past two years and that discipline must continue. The investments must go hand-in-hand with budget reform because autopilot spending will fly us into the ground, not into the future. I ask the Legislature to work with me on a new proposal, to work with me on harnessing private sector investment and to work with me to invest in California's future growth and prosperity."

The Governor also called upon the Legislature to adopt a debt ceiling to keep the state's debt service ratio below a prudent six percent. The Department of Finance's conservative projections estimate the increase in debt service costs as a result of the Strategic Growth Plan will be a change of about one percentage point. In addition, the Governor's plan is consistent with the user-pay principal, requiring beneficiaries of new infrastructure improvements to pay the costs of these improvements and it utilizes innovative financing mechanisms such as maximizing federal resources and public-private partnerships to fund and deliver projects.

The following details the specifics of the Governor's Strategic Growth Plan:

Transportation & Air Quality

Since the 1960s, the total number of registered vehicles in California has increased from 9 million to 30 million and vehicle miles traveled in the state have increased from 33.3 billion to 183.7 billion each year. The Department of Transportation expects a 35 percent increase in congestion over the next 10 years. The Governor's Strategic Growth Plan is designed to address these problems by reducing congestion by 18 percent over the next decade by building 1200 miles of new highway and HOV lanes in congested areas and adding 600 miles of mass transit.

To fund and protect this investment, the Governor's Strategic Growth Plan includes:

- $107 billion total investment in transportation infrastructure over the next decade

  o $47 billion from existing funding sources such as Proposition 42 and federal funds.
  o $48 billion in new funding is proposed from leveraging existing funds.
  o $12 billion in new bond funds to attract increased federal, local and private funding. These bonds would be approved by California voters in two $6 billion authorizations in 2006 and 2008.

- Protecting Proposition 42 permanently through a constitutional amendment to eliminate the option for future governors and legislatures to suspend funding.
- Using design-build contracting and design-sequencing construction to deliver projects more quickly and efficiently.
- Pursuing public-private partnerships to complete projects such as high occupancy toll lanes, regular toll lanes, truck lanes and freight movement facilities where a predictable revenue stream will be created to re-pay capital investments.
- Road and port congestion produces pollution which decreases productivity and increases health care costs. For this reason, the Governor's plan also includes $1 billion in bonds to be matched by $1 billion in funding from other sources to reduce goods-movement related pollution.

Education

Over the next 10 years, a quarter of a million more students will be attending our California's schools and an increase of more than half a million students is projected for the state's colleges and universities. In addition, the more than 8,000 school sites in the K-12 system continue to age and require modernization while the growth in enrollment in higher education has created the need for more classrooms, libraries, labs and hundreds of new buildings. The Governor proposes constructing more than 2,000 small schools and 40,000 classrooms and modernizing another 141,000 in addition to significant construction and expansion at University of California, California State University and California Community College campuses.

To fund this investment, the Governor's Strategic Growth Plan includes:

- $26.3 billion total investment in K-12 education over the next decade through general obligation bonds.

o The initial $7 billion bond would come before voters in 2006.
o Subsequent bond measures are proposed for the general elections every two years beginning in 2008 and ending in 2014.

- $11.7 billion total investment in higher education over the next decade.

o The plan calls for $5.2 billion in bonds over the next five years, $6.1 billion from 2011 to 2016 and $400 million to fund the expansion of University of California telemedicine programs.

Water and Flood Control

In 1960 the California State Water Project (SWP) provided $1.75 billion to build California's current water infrastructure. Today the SWP provides drinking water for 23 million Californians and irrigation for 750,000 acres of agricultural land. Little has been done since that time, when California's population was less than half of what it is today, to expand the state's water supply. In addition, the state's levee system has not been updated in decades leading to flooding in recent years. The Governor's Strategic Growth Plan will increase California's water supply to serve 8.5 million more people, support the agricultural industry and double the amount of flood protection in the Sacramento region.

To fund and protect this investment, the Governor's Strategic Growth Plan includes:

- $9 billion in general obligation bonds to be issued in two installments, one $3 billion installment in 2006 and $6 billion in 2010.
- $26 billion in non-state funding resources.
- Establishing a Water Resources Investment Fund for additional water management efforts.
- Implementing legislation to reform flood management and the financing of flood control improvements and to allow flood management projects to proceed more quickly.

Public Safety

State prisons are facing significant overcrowding resulting in unsafe conditions for staff and inmates. Local jails are similarly overcrowded leading to the early release of felons in those facilities and difficulty booking serious misdemeanants. The Governor's Strategic Growth Plan creates a groundbreaking partnership between state and local agencies to manage the inmate population while providing for two new prisons, a new crime lab, emergency response facilities and space for 83,000 prisoners at the state and local level over the next ten years.

To fund this investment, the Governor's Strategic Growth Plan includes:

- $14.8 billion in total investment to protect public safety.

o An initial $6 billion bond for local jail construction to provide beds for approximately 45,000 offenders. This bond is proposed for the first five years.
o A second $6 billion bond in the second five years also for local jail construction.
o $1.1 billion in bonds to build new prisons and juvenile facilities for the California Department of Corrections and Rehabilitation.

o $600 million in bonds in the first five years and $1.1 billion in bonds in the second five years to fund critical public safety projects in the Department of Forestry and Fire Protection, a DNA lab for the Department of Justice and to improve the Military Department's facilities.

Courts and Other Public Services

In 1997, legislation transferred the responsibility of funding trial court operations in California from the counties to the state. Many of the state's 58 superior courts are in need of security and facility improvements. To meet these needs, the Strategic Growth Plan includes new courts, renovations and expansions of courts. In addition, the Governor's plan includes funding to invest in other public service needs.

To fund this investment, the Governor's Strategic Growth Plan includes:

- $1.8 billion in bonds over the next decade for trial courts, $800 million in bonds for fiscal years 2006-07 through 2010-11 and $1 billion in bonds for years 2011-12 through 2015-16.
- $400 million in bonds over the next five years to seismically retrofit other high-risk state buildings and address health and safety needs at state park facilities.

In addition to setting forth his vision to build for the future needs of our state, the Governor also called upon the Legislature to join him in taking action this year to improve the lives of Californians in 2006.

"While planning ahead, we must also focus on making people's lives better this year," said Governor Schwarzenegger. "I believe we can find common ground on issues that can improve the lives of millions of Californians. If we work together, there is no problem that cannot be solved - even some of the issues we struggled with last year."

The Governor asked the Legislature to increase the minimum wage, fund education at record levels, support after school programs, eliminate planned tuition hikes for college students, approve legislation to protect children from sex offenders and to work with him to move forward with budget reform, pension reform, redistricting reform and other issues. In addition, he called upon the federal government to allow consumers to safely import prescription drugs from other countries while he also pursues options at the state level to make prescription drugs more affordable.

Specifically, the Governor proposed:

- Minimum Wage Increase: The Governor's proposal calls for a one dollar an hour increase in the minimum wage over the next 18 months, 50 cents in September 2006 and 50 cents in July 2007. Increasing the state's minimum wage could boost the paychecks of 2 million of California's lowest wage earners by more than $2 billion.
- Record Education Funding: The Governor announced that his 2006-07 budget proposal will call for a $ 4 billion increase in education funding over the 2005-06 budget. The budget the Governor will introduce next week will propose immediate repayment of 1.67 billion dollars in Prop 98 money. This, in addition to an automatic budget increase of 2.3 billion dollars, will be the largest increase in funding in education's history.
- Supporting After-School Programs: The Governor announced that California's Prop 49 after-school initiative will go into effect for the first time this year providing $428 million in new money for after-school activities. This will make California the only state in the nation to offer comprehensive after-school programs to its students.
- Keeping California Colleges & Universities Affordable: To reduce the burden on families who send children to the University of California, California State University and California Community Colleges, the Governor asked the Legislature to eliminate the increase in tuition and fees scheduled to take effect this year as part of his 2006-07 budget proposal.
- Protecting Children from Sex Offenders: Calling upon the Legislature to take action to protect public safety, the Governor asked lawmakers to pass Jessica's Law, the toughest sex offender

law in the history of California. Jessica's Law strengthens punishments, expands parole periods, keeps sex offenders away from schools and places where children frequently play, provides tools for tracking and control of paroled offenders and toughens punishments for the use of "date rape" drugs, child pornography and using the internet to lure children into sex crimes.

- Lowering Prescription Drug Costs: As part of his ongoing effort to provide greater access to lower cost prescription drugs, the Governor called upon the federal government to permit the safe importation of prescription drugs. In a letter to Congressional leadership earlier this week, he asked Congress to demand an end to price controls in other countries and pass a law that allows for drug importation while protecting patient safety and respecting intellectual property rights.

Link to the text of the Governor's State of the State Address.

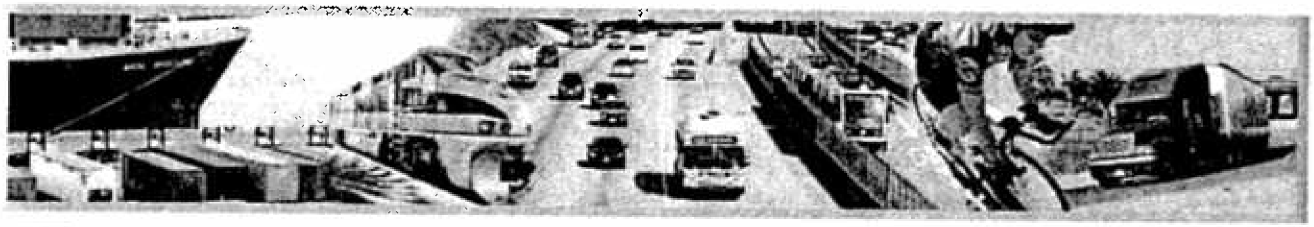
Link to a detailed overview of the Governor's Strategic Growth Plan.

Link to a working list of proposed transportation projects

Link to a detailed description of Jessica's law

Link full text of the Governor's letter to Congressional leadership calling for a change in federal law to allow consumers to safely import prescription drugs

EXHIBIT 7



Governor Arnold Schwarzenegger's Strategic Growth Plan: Transportation Investments for Mobility and Quality of Life

A Plan for the Future

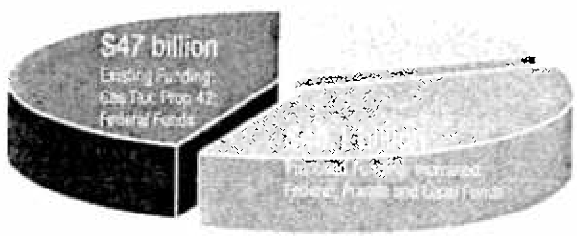
Governor Arnold Schwarzenegger's Strategic Growth Plan (SGP) calls for a $222 billion infrastructure improvement program to fortify the state's transportation system, education, housing and waterways.

The SGP includes a historic and comprehensive transportation investment package designed to decrease congestion, improve travel times and increase safety, while accommodating future growth in the population and the economy.

This SGP deploys demand-management strategies, such as dedicated truck lanes and high occupancy toll lanes, and builds new capacity. It will enable more traffic to move through existing roadways, rehabilitate thousands of lane miles of roads, add new lanes and increase public transportation ridership. This requires innovation in transportation planning, construction and management, sustained coordination between regional transportation agencies and the state and dedicated funding.

The SGP presents a bold vision of mobility improvements and investments. The initiative is performance-based and outcome-driven, targeting significant reduction in congestion, improved quality of life for Californians, and a world-class transportation system that supports a globally-competitive economy and promotes prosperity.

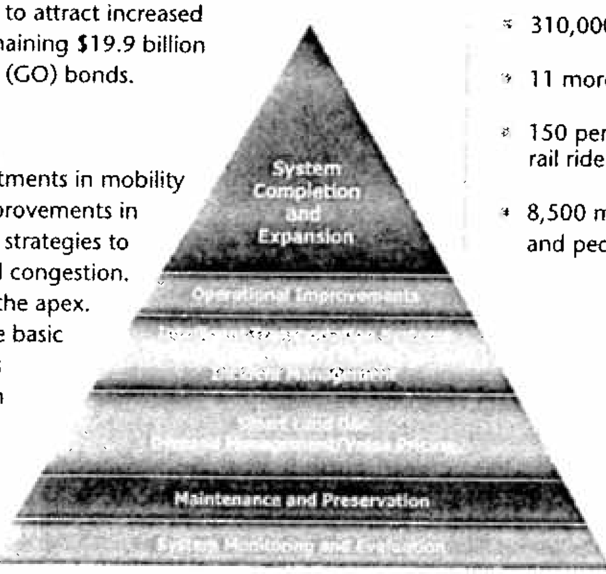
Investments for the Future



The SGP calls for investing $107 billion in transportation infrastructure during the next decade. Funding includes $47 billion in existing transportation funding sources such as the gas tax, sales tax on gasoline, and federal funds. A total of $40.1 billion in new funding is proposed from other fund sources and leveraging existing funds to attract increased federal, private, and local funding. The remaining $19.9 billion of need will come from General Obligation (GO) bonds.

Complete System Approach

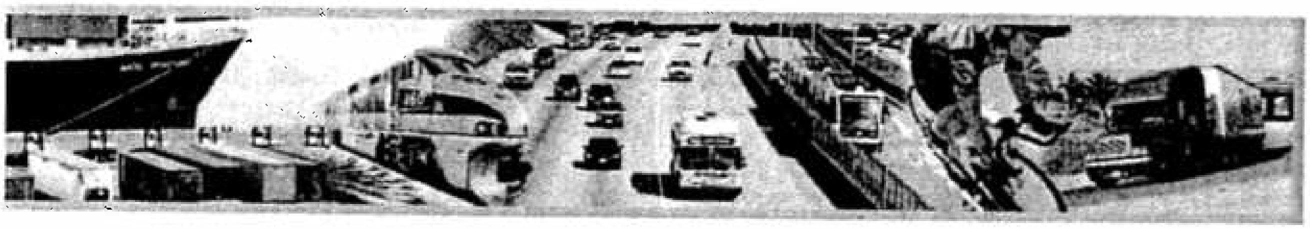
The SGP is based on the premise that investments in mobility throughout the system yield significant improvements in congestion relief. This pyramid outlines the strategies to be used to achieve the outcome of reduced congestion. The base of the pyramid is as important as the apex. System monitoring and preservation are the basic foundation upon which the other strategies are built. System expansion and completion will provide the desired mobility benefits to the extent that investments in and implementation of the strategies below it establish a solid platform.



Performance-Based, Outcome-Driven

The SGP targets a significant decrease in traffic congestion below today's levels. This will occur even while accommodating growth in population and the economy over the decade. Over the next ten years, daily congestion (measured by daily hours of delay) is projected to increase 35% from 558,143 hours in 2005 to 753,000 hours in 2016 based on current trends. With the SGP, congestion levels are estimated to be 454,000 hours daily in 2016, a reduction of more than 100,000 hours (18.7%) below today's levels. Capacity or "throughput" will increase by 15 percent. In addition to congestion relief, the $107 billion investment also results in:

- 550 New HOV lane miles
- 750 new highway lane miles
- 9,000 lane miles rehabilitated
- 15 percent increase in throughput
- 600 miles new commuter lines
- 310,000 more transit ridership
- 11 more intercity rail round trips
- 150 percent increase in intercity rail ridership
- 8,500 miles of separated bike and pedestrian paths



Strategic Growth Plan (SGP) Reforms

- Provide authority to deliver projects more quickly and efficiently through the use of design-build contracting and design-sequencing
- Enable broader authority for public-private partnerships to attract private capital that can fund priority infrastructure projects

Funding the Right Improvements

The SGP relies on continued cooperative partnerships with the California Transportation Commission (CTC), regional transportation agencies, and local governments to achieve the performance objectives. Increased accountability for outcomes, particularly congestion reduction, is a centerpiece of the transportation portion of the SGP.

Proposition 1B - Highway Safety, Traffic Reduction, Air Quality, and Port Security

Category of Investment	Total Bonds (In Billions)
Corridor Mobility Improvement Account	$4.5
State Route 99 Corridor	$1.0
Trade Corridors/Ports Infrastructure, Security and Air Quality	$3.1
School Bus Retrofit for Air Quality	$0.2
State Transportation Improvement Program (STIP) Augmentation	$2.0
Public Transportation Modernization, Improvement, and Service Enhancement	$4.0
Transit System Safety, Security, and Disaster Response Account	$1.0
State-Local Partnership Program Account	$1.0
Local Bridge Seismic Retrofit	$0.125
Highway-Railroad Crossing Safety Account	$0.25
State Highway Operation and Protection Program (SHOPP)	$0.75
Local Street and Roads, Congestion Relief, and Traffic Safety Account of 2006	$2.0
	$19.9 Billion

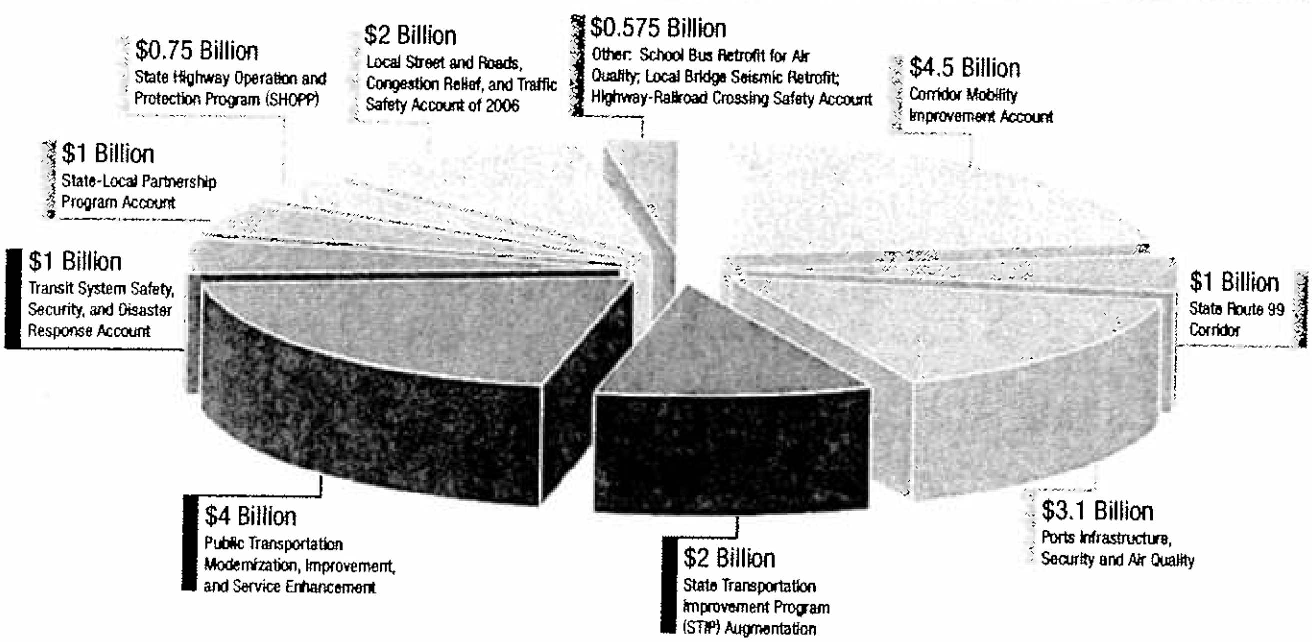


EXHIBIT 8

Strategic Growth Plan THE GOVERNOR'S PLAN FOR INVESTING IN CALIFORNIA

- Home
- About SGP
- Levees
- Education
- Housing
- Transportation
- News

About the Strategic Growth Plan

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On Friday morning, the California Legislature approved a historic infrastructure package. The following is more information on four general obligation bonds: education, housing, levee repair/flood control and transportation.

The Strategic Growth Plan education proposal authorizes the placement of a $10.4 billion general obligation bond to fund K-12 and Higher Education on the November 2006 ballot.

Highlights

Career Technical Education: Provides $500 million in supplemental grants for facilities.

- This is the first time in state history that funding for Career Technical Education is included in a state bond.
- Funding will be applied to new facility construction and reconfiguration.

Charter Schools: Provides $500 million for facilities.

- This is the largest state bond funding for charter school facilities in California history.
- The bond's requirements limit the reduction of school district eligibility when new charter facility construction is authorized, and requires school districts to consider existing surplus facilities in accordance with current law.

Overcrowded Schools: Authorizes the State Allocation Board to make grants to overcrowded schools.

- The bond is expected to fully fund all projects in the pipeline in 2006-2008 bond cycle, accommodating the anticipated rise in student population over this timeframe.

- Grants would be available to replace a portion of portable classrooms at overcrowded schools with new hard construction permanent facilities.
- Overcrowded is defined as having a pupil density equal to or greater than 175% of the current guidelines.

Seismic Safety: Creates a new seismic safety program with up to $200 million made available to those schools identified as having the highest risk for potential seismic damage.

Higher Education: Provides $3.087 billion to public college and university facilities.

- $1.580 billion for the University of California and California State University systems.
- $1.5 billion for California Community Colleges. This is the highest bond allocation to community colleges in state history.

K-12

Program / Total Funding

- New Construction / $1.9 billion
- Modernization - $3.3 billion
- Career Technical - $500 million
- Charter Schools - $500 million
- Overcrowded Portables - $1 billion
- Small Schools - $200 million*
- Seismic Safety - $200 million*
- Green Schools - $100 million
- Joint Use Facilities - $29 million
- Total ($ in billions) - $7.329

*Amounts for small schools and seismic safety are not added to totals, but are set-aside within the new construction and modernization amounts.

Higher Education Institution

Total Funding University of California $890 million

California State University $690 million

Community Colleges $1.5 billion

Total ($ in billions) $3.087

Housing Program

The Strategic Growth Plan housing proposal authorizes that a $2.85 billion general obligation bond providing homeownership, rental, and permanent housing opportunities be placed on the November 2006 ballot.

Highlights

- Affordable Homeownership: $725 million to help an estimated 23,600 families become or remain homeowners.
    - Includes funding for the Building Equity in Neighborhoods Program, CalHome, and the.California Downpayment Assistance Program.
- Affordable Rental Housing Construction: $345 million to provide affordable rental housing to an estimated 4,000 families.
    - Includes rental housing for lower income workers, the elderly, the disabled, and veterans.
- Farm Worker Housing: $135 million to provide rental and affordable ownership opportunities for over 2,800 farm worker families.
- Homeless Permanent Housing Construction: $245 million to build over 2,400 permanent housing units for the homeless, those transitioning out of homelessness, and foster care youth.
- Homeless shelter housing construction: $50 million to construct and expand shelter of last resorts and transitional housing for the homeless.

An investment of $1.8 billion

- Could produce homes and shelter spaces for more than 32,000 families or individuals.
- Would leverage an estimated $8.9 billion in other private and local funding.
- Would create an estimated 87,000 full time jobs, almost $3.3 billion in wages, and approximately $506 million in combined federal, State, and local tax revenues over the award and construction period.

Levee Repair and Flood Control

The Strategic Growth Plan levee proposal authorizes the placement of a $4.09 billion general obligation bond to repair and maintain levees and improve the flood control systems in the state on the November 2006 ballot.

Highlights

Evaluation, Repair and Delta Levee Maintenance: $3 billion

- Will fund urgent repairs and essential improvements of levees and other flood control facilities in the Central Valley and Sacramento-San Joaquin Delta.
- Funds will also leverage federal and local dollars to fund flood prevention projects and improve disaster preparedness.
- Bond funds will be used for programs such as:

Evaluation and repair of the State/federal flood control system, addressing ongoing erosion, seepage, and stability distress.

Modifications and improvements to increase flood protection for urban areas, such as Folsom Dam modifications, American River Common features, South Sacramento streams and other projects.
Ongoing local assistance for Delta Levee Subventions and special flood control projects to reduce the risk of Delta levee failure.

Flood Control Subventions: $500 Million

- Will help pay the state's share of flood control projects outside the Central Valley. Currently, the State owes approximately $160 million to projects that are already underway or have been completed. Bond funding, combined with other funding mechanisms, would cover anticipated subvention payments for the next 10 years.

Flood Protection Corridor, Bypasses and Mapping: $290 million
Could be used for:

- Creation of new levees, and the construction and preservation of setback levees, flood corridors, and bypasses.
- Completion of flood hazard and alluvial fan floodplain mapping necessary for proper flood infrastructure investments.

Storm Water Flood Management: $300 Million

- Will provide grants to local entities to cost share storm water runoff projects, consistent with an integrated regional water management plan.
- Projects in the State Plan of Flood Control are not eligible for these funds.

Levee repair and flood control

Program / Total Funding

Evaluation, Repair and Levee Maintenance: $3 billion

Flood Control Subventions: $500 Million

Flood Protection Corridor, Bypasses and Mapping: $290 million

Storm Water Flood Management: $300 million

Total ($ in billions): $4.09

Transportation

The Strategic Growth Plan transportation proposal authorizes the placement of an $19.9 billion general obligation bond to fund repairs, reduce congestion, improve bridge safety, expand public transit and improve port security on the November 2006 ballot. The bond proposal also authorizes public/private transportation partnerships, application of the Design-Build method for these projects, and legislation to streamline the environmental review process.

Highlights

Relieving congestion: $4.5 billion

- Funds will expand capacity, enhance operations, and improve travel times in high-congestion travel corridors.

Public transit: $4.0 billion for public transit, intercity and commuter rail, and waterborne transit operations.

- Projects include new capital outlay, rehabilitation, capital service enhancements and improvements to safety, modernization, and bus rapid transit projects.

Sea, land, and airport infrastructure: $3.1 billion to relieve traffic congestion along major trade corridors, improve freight rail facilities, and enhance the movement of goods from port to marketplace.

- $1.0 billion is designated for air quality improvements that will achieve emission reductions from activities related to port operations and freight movement.
- $100 million will also be available for port, harbor, and ferry terminal security improvements.

State Transportation Improvement Program (STIP): $2.0 billion to augment funds for STIP, a five-year capital improvement program for state and regional transportation projects.

Route 99: $1.0 billion for improvements to this 400 mile stretch of highway through the Central Valley.

Local streets and roads: $2.0 billion for improvements to local transportation facilities that will repair and rehabilitate local streets and roads, reduce local traffic congestion, improve traffic flow or increase traffic safety.

Transit safety, security, and disaster response: $1.0 billion to provide increased protection against security and safety threats.

- Funds will also increase the capacity of transit operations to move people, goods, emergency personnel, and equipment during and after a disaster.

Matching funds for counties: $1.0 billion for counties that have raised local money for transportation projects.

Highways: $750 million for highway safety, rehabilitation, and pavement preservation projects.

- Includes $250 million for traffic light synchronization projects and other technology-based improvements to improve safety operations and the capacity of local streets and roads.

School bus retrofit and replacement: $200 million for to reduce air pollution and to reduce children's exposure to diesel exhaust.

Matching funds for seismic safety: $125 million to provide to complete seismic retrofits on local bridges, ramps, and overpasses.

Railroad infrastructure: $250 million for railroad crossings and the construction of bridges over rail lines.

Transportation Program

General Obligation Spending

Congestion reduction: $4.5 billion

Public Transit: $4.0 billion

Seaports, land ports, airports: $3.1 billion

State Transportation Improvement Program: $2.0 billion

Route 99: $1.0 billion

Local streets and roads: $2.0 billion

Transit safety, security and disaster response: $1.0 billion

Matching county funds: $1.0 billion

Highways: $750 million

School bus retrofit: $200 million

Matching seismic funds: $125 million

Railroad infrastructure: $250 million

Total ($ in billions): $19.9 billion

EXHIBIT 9

THE CALIFORNIA STRATEGIC GROWTH PLAN

Last year, the Governor and Legislature initiated the first phase of a comprehensive Strategic Growth Plan (SGP) to address California's critical infrastructure needs over the next 20 years. California faces over $500 billion in infrastructure needs to meet the demands of a population expected to increase by 23 percent over the next two decades. In November 2006, the voters approved the first installment of that 20-year vision to rebuild California. The Governor's Budget includes $13.7 billion of the recently approved bonds to immediately begin building California for future generations.

Much progress will be made with this initial funding. Thousands of new and renovated classrooms will be built throughout the state, transportation construction projects will begin to reduce congestion of goods and traffic, and work on dozens of critical levee improvements is already underway.

This year, we must complete the first phase of this Strategic Growth Plan by addressing critical gaps that remain in California's infrastructure:

- California's dangerously overcrowded prison and jail systems require significant expansion and rehabilitation to protect public safety, as well as ensure the safety of the correctional staff and rehabilitation and safety of inmates.
- The state's K-12 schools need funding beyond the two years of financing provided by the current bonds to prepare for enrollment growth, reduce overcrowding, and repair dilapidated classrooms in compliance with the settlement agreement in Williams v. State of California.

- The state's higher education systems need funding beyond the two years of financing provided by the current bonds to prepare for future enrollment growth and maintain the world renowned research capabilities of California's universities.
- The state's water supply and management systems need to be expanded to meet the needs of population growth and manage the effects of climate change on California's hydrology and water delivery systems.
- Expanded authority is needed to leverage existing tax dollars and recently approved bond dollars to attract billions of additional dollars in transportation funding through public-private partnerships.
- California's court system is in need of substantial expansion and repair to address significant caseload increases and reduce delays.

To complete the Strategic Growth Plan, the Administration proposes additional funding for critical infrastructure improvements between now and 2016. With these augmentations, the SGP will fulfill the comprehensive ten-year infrastructure financing plan to rebuild California begun last year. This infrastructure financing plan is the first phase of a 20-year vision to rebuild the foundation of California's unique quality of life and the platform for its powerful economic engine.

As reflected in Figure INF-01 $29.4 billion of new general obligation bonds and $13.9 billion of additional lease-revenue and self-liquidating revenue bonds are proposed to augment the existing funds for the SGP through 2016. Coupled with additional authority to engage in public-private partnerships and utilize design-build concepts, the already authorized and proposed new bonds will leverage an additional $20 billion in significant infrastructure investment. The SGP proposes that the new general obligation bonds be placed on the ballot in the 2008 and 2010 elections as shown in Figure INF-02 and that all bonds be issued in a manner that maintains a prudent debt ratio.

PUBLIC SAFETY

California's prison population is expected to surpass 175,000 inmates in 2007, nearly double the number the system was designed to handle. To secure these offenders, the California Department of Corrections and Rehabilitation (CDCR) is housing inmates in workrooms and dayrooms and triple-bunking some in gymnasiums and dormitories. Gyms and dayrooms were not designed to house inmates, and this severe overcrowding creates major safety and security concerns for officers, staff and inmates. Under a declaration of emergency issued by

Figure INF-01
Strategic Growth Plan
2006-2016
(Dollars in Billions)

Program	Proposed New Bonds: General Obligation	Lease[1] Revenue	Self-[2] Liquidating Revenue	Other Funding Sources: Existing[3]	New[4]	Total
Public Safety		9.5[5]		0.3	1.1	10.9
Education-K-12	11.6			17.4[6]		29.0
Education-Higher Ed	11.5	0.1		10.1		21.7
Flood Control/Water Supply	4.0		2.0	25.0		31.0
Transportation				87.3	17.0	104.3
Judiciary	2.0				2.0	4.0
Other Natural Resources				3.1		3.1
Housing				2.9		2.9
Other Public Service Infrastructure	0.3	2.3		2.2		4.8
Totals	**$29.4**	**$11.9**	**$2.0**	**$148.2**	**$20.1**	**$211.6**

[1] Lease revenue bonds are supported by rental payments that result from leasing the financed asset.

[2] Self-liquidating revenue bonds are supported from a new revenue stream generated by the financed asset.

[3] Existing Funding Sources column includes already authorized bonds, special funds, General Fund and estimated federal and local matching dollars from existing shared funding programs.

[4] New Fund Sources includes estimated additional funding from public-private partnerships and new state-local shared programs.

[5] Included in this amount is an amount that may be used to pay debt service on local facilities.

[6] In addition, K-12 will provide $5 billion in local match over multiple years beyond the SGP period for the Charter School Facilities and Career Technical Education Facilities programs, as authorized in statute.

Figure INF-02
Strategic Growth Plan
2006-2016
Election Year Proposals
General Obligation Bonds
(Dollars in Billions)

Program	2008	2010	2012	2014	Totals
Education-K-12	$6.5	$5.1			$11.6
Education-Higher Ed	7.2	4.3			11.5
Water Supply	4.0				4.0
Judiciary	2.0				2.0
Other Public Service Infrastructure	0.3				0.3
Total	**$20.0**	**$9.4**	**$0.0**	**$0.0**	**$29.4**

the Governor on October 4, 2006, the CDCR has begun temporarily transferring inmates to prison facilities in other states.

Overcrowding in local jails is just as serious. Space is so limited in local jail facilities that 33 counties are under court-ordered or self-imposed population caps. As many as 18,000 arrestees every month are released from jail early or avoid jail altogether as a result of population caps.

The CDCR and local jurisdictions continue to face increasing pressure from courts to address the public safety population crisis. CDCR is facing three lawsuits attempting to impose a mandatory cap on population in state prisons. If such a cap were imposed by a court, it would result in tens of thousands of felons being released into California communities. This phase of the Strategic Growth Plan represents an integrated approach to the issue of incarceration capacity statewide; a partnership between counties and the state to effectively manage a growing problem and challenges in our shared criminal justice system.

Failure on parole is a significant factor driving the overcrowding of our jails and prisons. Currently, seven out of every ten parolees are returned either to state prisons or local jails within three years—the highest recidivism rate in the nation. To reduce post-release criminal behavior of high-risk offenders, the CDCR proposes to operate secure re-entry facilities with the enhanced services for parolees to increase their chances for success outside of prison. Successful implementation of these facilities and programs requires a collaborative partnership between CDCR, local law enforcement, and local community social service providers. Through the re-entry program, inmates and revoked parolees will spend up to 12 months of their prison term in a secure facility close to the area in which they will be released. They will receive counseling and risk assessment, housing assistance, drug treatment and other services to reduce the likelihood of re-offending and returning to custody.

A second feature of the proposed state-local partnership addresses juvenile offenders. The CDCR Division of Juvenile Justice (DJJ) will implement changes to shift the population of juvenile offenders housed in state facilities to locals and provide resources sufficient to support county programs for juvenile offenders. Less than one percent of juveniles arrested in California end up in DJJ facilities; the rest are retained at the local level. The DJJ will reduce its population, so only the most serious and violent juvenile offenders are housed in DJJ facilities. The DJJ will accomplish this by narrowing the scope of intake and phasing out a portion of its current population. By keeping them locally, juvenile offenders will benefit from rehabilitative programs in their own communities and be closer to potential support networks. To facilitate this shift, the SGP includes funding to increase the capacity of local jurisdictions to house juvenile offenders.

In addition to these state-local partnership efforts, the CDCR must provide increased health care services, including medical, mental health, and dental services for all inmates. CDCR's health care system has long struggled to comply with three federal lawsuits: Plata v. Schwarzenegger, which has jurisdiction over the provision of medical services; Coleman v. Schwarzenegger, which has jurisdiction over the provision of mental health services, and Perez v. Tilton, which has jurisdiction over dental services. One reason for the continuing compliance issues has been a lack of available space to treat inmates with specialized needs, and house the necessary clinicians and support staff. The CDCR has attempted to mitigate some of the most egregious compliance issues by utilizing less-than-ideal settings, such as temporary housing situations and treatment rooms, but these solutions are not sufficient and do not provide a long term solution. Although all of the remedial actions the state will have to take to alleviate the health care situation have not yet been identified or approved by the courts, the SGP includes a funding set-aside for the facilities that will be a part of those actions.

The SGP includes $10.9 billion for public safety:

- Expand capacity at existing facilities—$2.7 billion ($0.3 billon General Fund and $2.4 billion lease-revenue bonds). This funding will add 16,238 additional prison beds at existing facilities and expand existing power, water, and wastewater treatment facilities to handle a larger population. Funding is also included for a new Southern California training facility.
- Local jails and juvenile facilities—$5.5 billion ($4.4 billion lease-revenue bonds or state-funded local debt service payments and $1.1 billion local matching funds). To help local governments expand statewide jail capacity for adult and juvenile offenders, funding will be provided to help finance construction for 45,000 new jail beds and 5,000 beds for juvenile offenders.
- Re-entry facilities—$1.6 billion (lease-revenue bonds and/or contracting authority). In coordination with local governments, re-entry facilities will be constructed to provide 5,000 to 7,000 beds for inmates and revoked parolees.
- San Quentin Condemned Inmate Complex—$117 million (lease-revenue bonds). This project has faced rising construction costs and additional funding must be provided to complete construction of this new secure facility for the state's condemned population.

- Health Care facilities—$1.0 billion (lease-revenue bonds). In order to provide specialized beds and treatment and program space for mental health and dental services, and for medical services as directed by the court-appointed Receiver in Plata v. Schwarzenegger a $1 billion set aside is included until cost estimates of specific projects become available from the Receiver.

K-12 EDUCATION

K-12 schools will experience net increases in student enrollment of approximately 158,000 students by 2015-16. While some schools are experiencing declining enrollments, many other high-growth areas lack the schools necessary to accommodate increased enrollment. Some large declining enrollment districts have very overcrowded sites requiring new construction to adequately house students. Most notably, in order to meet the requirements of the recent settlement in the Williams lawsuit, the Los Angeles Unified School District along with three other school districts must relieve the most critically overcrowded schools (also know as "Concept 6" schools) by 2012. Thus, the need for new schools will continue to exceed net student growth projected during this period. As our system of over 8,000 school sites continues to age, the need for modernization assistance to keep classrooms current continues to increase during this period. Finally, because our primary and secondary school system helps develop tomorrow's workforce, it is important to both ensure facilities for Charter Schools to stimulate innovation and for Career Technical Education to ensure all students have the opportunity to participate in the high skill technical jobs that will fuel the economy of the future. Because Career Technical Education (CTE) has languished in the public school system for many years and the demand for Charter Schools is growing, the SGP continues the emphasis on assisting schools in meeting these special facility needs.

TOTAL K-12 PROGRAM PROPOSES $11.6 BILLION

The SGP proposes $11.6 billion of additional general obligation bonds to provide state bond funding for schools into 2012-13. The $11.6 billion is proposed to be split between the 2008 and 2010 elections. This total amount of funding, when combined with the $7.3 billion contained in Proposition 1D on last November's ballot is estimated to provide for approximately 32,000 new classrooms to house approximately 826,000 students and almost 79,000 renovated classrooms providing state-of-the-art facilities for over 2 million students.

2006 Bond Provided $7.3 Billion

Proposition 1D, designed to meet needs through 2008-09, will provide approximately 9,800 new classrooms housing almost 255,000 students and approximately 38,400 renovated classrooms to serve 989,000 students through the following components:

- New Construction—$1.9 billion
- Modernization—$3.3 billion
- Charter schools—$500 million
- Career Technical Education—$500 million
- Overcrowding relief in certain districts—$1 billion
- Incentives to meet high performance school design standards—$100 million
- Joint use facilities—$29 million

Of the amounts for new construction and modernization above, up to $200 million is available for small high schools and up to $200 million is available for seismic safety projects.

2008 Education Bond Measure Proposes $6.47 Billion for K-12

The next bond measure, proposed for the 2008 election cycle, is estimated to fund construction through 2010-11 and provide approximately 12,800 new classrooms housing approximately 330,000 students and over 25,300 renovated classrooms providing state-of-the-art capacity for approximately 653,000 students. The bonds are proposed to be allocated as follows:

- New Construction—$2.931 billion to assist high-growth school districts that are projected to have increases in enrollment through 2010-11. This amount is predicated on grant reductions calculated to revise the traditional 50-percent state / 50-percent local cost-sharing ratio to 40-percent state / 60-percent local. This assumes the state's assistance for acquisition of sites will be restricted to a participation level assuming 150 percent of current site density planning standards.
- Modernization—$1.539 billion to addresses rehabilitation needs for buildings that are over 20 to 25 years old recognizing that teaching techniques, building codes, and technology change over time. This component assists schools with major building system replacements that cannot be funded completely through normal deferred maintenance and operating funds, and is predicated on grant reductions calculated to

revise the cost sharing ratio to 40-percent state / 60-percent local funding, similar to new construction.

- Charter School—$1.0 billion to provide dedicated funding for Charter Schools as a part of addressing the educational needs of K-12 students and housing enrollment growth. Charter Schools provide an added dimension to parental choices in ensuring an appropriate environment for their child's education. These funds are predicated on a 50-percent state / 50-percent local sharing ratio because Charters do not have the ability to levy local bonds. Instead, state bond funds are used to advance the local share and are paid back with operating or other revenue over time.

- Career Technical Education Facilities—$1.0 billion to provide a dedicated fund source for matching grants to provide state of the art technical education facilities to ensure our comprehensive high schools can provide the cutting edge skills essential to the high wage technical sectors of our state economy. These funds are predicated on a 50-percent state / 50-percent local sharing ratio to provide added incentive to build these high cost classrooms.

2010 Bond Measure Proposes $5.13 Billion for K-12

The revised plan proposes a subsequent bond measure for K-12 schools in 2010 to address needs extending into 2012-13. This increment will provide for the same purposes as the 2008 bond and is predicated on continuation of the cost containment measures described previously. This level of funding is estimated to provide over 9,300 new classrooms serving 241,000 students and almost 15,000 renovated classrooms serving about 387,000 students.

- New Construction—$2.13 billion

- Modernization—$1 billion

- Charter Schools—$1 billion

- Career Technical Education Facilities—$1 billion

Needs Beyond 2012-13

Competing statewide infrastructure needs make current funding policies for K-12 school construction unsustainable within a prudent debt service ratio. While the proposed SGP provides state general obligation bond assistance for funding the needs into 2012-13, assuming specified state cost containment measures, it will be necessary for schools to plan for additional bond measures and alternative financing strategies for financially troubled districts to ensure every student is housed in an appropriate classroom. Finally, the Administration proposes to review the overall financing structure for schools, including consideration of public-private partnerships, to ensure sustainable funding of school facilities in the long run.

HIGHER EDUCATION

The Higher Education Compact calls for state funding of $345 million per year, per segment, for the University of California (UC) and the California State University (CSU). The voters approved this level of infrastructure funding for the UC and the CSU through 2007-08 by approving Proposition 1D. In addition to funding for the compact, $200 million was included in Proposition 1D for the expansion of the UC telemedicine program. Telemedicine provides video-conferencing for medical services in rural areas. This enables rural doctors to work with specialists in elite teaching hospitals and provide better treatment to patients. The infusion of infrastructure funding for this program is enabling all five medical schools to create or expand its telemedicine program.

Proposition 1D also provides $750 million per year for the California Community Colleges (CCC), which resulted in a total of $3.1 billion for all of the higher education segments for a two-year period. The SGP proposes to continue this level of state support for the UC, CSU and CCC beyond 2007-08 through additional bond measures on the 2008 and 2010 ballots, totaling $11.5 billion. These funds will be used to meet an increased student enrollment of approximately 130,000 at the UC and CSU campuses and to continue the current level of CCC support. Furthermore, the SGP proposes $70 million (lease-revenue bonds) to help fund new facilities that will place the UC at the vanguard of research into alternative fuels and energy conservation.

Proposed new SGP funding for higher education includes:

- University of California—$2.8 billion ($2.7 billion general obligation bonds and $70 million lease-revenue bonds). This funding will help the UC system deal with an increased enrollment of approximately 50,000 students over the ten-year vision of the SGP. Facilities must be built or renovated to meet this high level of demand. In addition, $70 million (lease revenue bonds) are provided to ensure the UC becomes the premier institution for alternative energy and fuels research. This includes $30 million for a new energy and nanotechnology Helios Research Facility to conduct research on the conversion of solar energy into a carbon-neutral form of energy and $40 million to establish the Energy Biosciences Institute dedicated to bioscience research.

- California State University—$2.7 billion (general obligation bonds). This funding will help the system deal with an increased enrollment of approximately 80,000 students over the ten years.
- California Community Colleges—$6 billion (general obligation bonds). This funding will help the 72 districts who provide services at 110 colleges and 65 off-campus centers provide services to their approximately 2.5 million students.

FLOOD CONTROL AND WATER SUPPLY

As a result of the Governor's emergency declaration for California's levee system in February 2006 and funding provided by the Legislature in the 2006-07 Budget, key repairs to 33 critical erosion sites protecting Central Valley communities were completed in record time. The State is now advancing funds and working with the federal government to repair 71 additional levee erosion sites damaged in last year's floods. An unprecedented effort to evaluate 350 miles of urban levees for hidden defects has begun, and the state is leading a coordinated effort involving federal and local agencies to avoid a major flood disaster in California.

In 2005, the Administration published the California Water Plan Update which called for implementation of two initiatives to ensure reliable water supplies: integrated regional water management and improved statewide water management systems. In January 2005, eight months before Hurricane Katrina flooded New Orleans, the Governor issued Flood Warnings: Responding to California's Flood Crisis, calling for a variety of flood management improvements and reforms to reduce the potential for such disasters in California. In 2006, the Administration published Progress on Incorporating Climate Change Into Management of California's Water Resources, the first detailed analysis of the effects that climate change is expected to have on water and flood management in the state.

The infrastructure package approved by the voters in November 2006 includes $4.59 billion for levee repair and flood management (Proposition 1E) and approximately $1.5 billion for integrated regional water management including wastewater recycling, groundwater storage, conservation, and other water management actions (Proposition 84). Together, these investments provide substantial funding toward addressing California's flood and water management challenges.

Two critical areas remain unaddressed that are vital to ensuring California has reliable water supplies and is able to cope with the effects that climate change will have on water supply and flood protection: storage and conveyance, California must expand its water management and delivery system, including surface storage, groundwater storage and conveyance facilities. In this phase of the Strategic Growth Plan the Administration proposes a total of $5.95 billion through 2016. Of this amount, general obligation bonds will provide $3.95 billion and revenue bonds will provide $2.0 billion. The proposal consists of four parts:

- Water Storage—$4.5 billion ($2.5 billion general obligation bonds and $2.0 billion revenue bonds). This funding will be dedicated to the development of additional storage, which, when combined with the Regional Water Management investments of Proposition 84 and the flood system improvements of Proposition 1E, will help to offset the climate change impacts of reduced snow pack and higher flood flows. This strategy includes construction at the two most likely locations for surface storage in the state, Sites and Temperance Flat Reservoirs. The water supply yield from the two reservoirs could provide up to 500,000 acre-feet per year. In addition to this increased water supply, the reservoirs provide other benefits, such as enhanced flood management capability, improved Delta water quality, and improved wildlife habitat. The water storage costs would be shared with the state's taxpayers providing up to 50 percent and the non-state entities investing in the direct benefits from the reservoirs. The state's share of the cost for the storage projects would be funded with $2.0 billion in general obligation bonds for benefits such as flood control, ecosystem restoration, and water quality improvements that serve the whole state. The non-state portion would be funded from $2.0 billion in revenue bonds secured by contract payments to the state from the water suppliers who would benefit from the new storage. In addition to investments in surface storage, $500 million in general obligation bonds will be dedicated for grants to augment local investment in groundwater storage projects, providing an additional 500,000 acre-feet of annual yield.

- Delta Sustainability—$1.0 billion (general obligation bonds). Leveraging anticipated federal and local funding sources, this funding will be dedicated to implementing a sustainable resource management plan for the Delta. To assure the reliability of the state's major water supply systems, investments will be made in improving water conveyance, water quality, and the Delta ecosystem, as well as strategic improvements in Delta levees. These investments would eliminate the seismic risk to water supplies derived from the Delta, protect drinking water quality and reduce conflict between water management and environmental protection.

- Water Resources Stewardship—$250 million (general obligation bonds). This funding would support implementation of a settlement on the Klamath River, provide for elements of Salton Sea restoration identified in the Salton Sea Restoration Act and related legislation enacted in 2003, contribute to restoration actions on the San Joaquin River, and supplement successful restoration projects on the Sacramento River and its tributaries as well as in the Delta.

- Water Conservation—$200 million (general obligation bonds). This funding will augment $1 billion in funding provided by Proposition 84 and support the Integrated Regional Water Management (IRWM) program. IRWM is designed to encourage integrated regional strategies for management of water resources that will protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water. The proposed funding will provide targeted water conservation grants to local communities that coordinate the planning of their shared water resources. These investments in water conservation will yield an additional 200,000 acre-feet per year, protect water quality and will reduce energy use, urban and agricultural runoff, and urban effluent.

TRANSPORTATION

The transportation component of the Strategic Growth Plan is the cornerstone of a 20-year vision to rebuild and maintain a transportation system that can keep pace with California's growing population and economy. Boosted by voter approval of Propositions 1A and 1B on the November 2006 ballot, investment in long-overdue transportation improvements will help overcome decades of chronic underinvestment in one of the state's most important economic assets. However, construction will be delayed and $1 billion more costly if the design-build authority requested by Caltrans to streamline design and permitting for transportation projects is not authorized. The Administration will be re-introducing legislation seeking design-build authority in conjunction with appropriation of Proposition 1B funding.

Additionally, the $19.9 billion in general obligation bonds authorized in Proposition 1B represents only one-fifth of the funding available for transportation infrastructure investments. If leveraged successfully with federal, local and private-sector resources, Proposition 1B funds could produce over $100 billion in total funding for traffic congestion relief and goods movement over the next 10 years. Maximizing the use of Prop 1B dollars requires additional statutory authority to require matching funds and enter into public-private partnerships. The Administration will be re-introducing legislation seeking expanded authority to enter into public-private partnerships in conjunction with appropriation of Proposition 1B funding.

The inadequacies of California's current funding methods have contributed to the underinvestment in the state's transportation network. Per-gallon taxes on gasoline and diesel fuel and truck weight fees are the dominant sources of funding for transportation system maintenance and expansion. While increasing vehicle efficiency over the years provides valuable energy and environmental benefits, declining revenues per vehicle mile traveled, coupled with inflation and skyrocketing construction costs, cause revenue sources to fall short of the state's transportation system needs. Consequently, chronic underinvestment increases congestion and has resulted in California having some of the most distressed highway and road conditions in the United States.

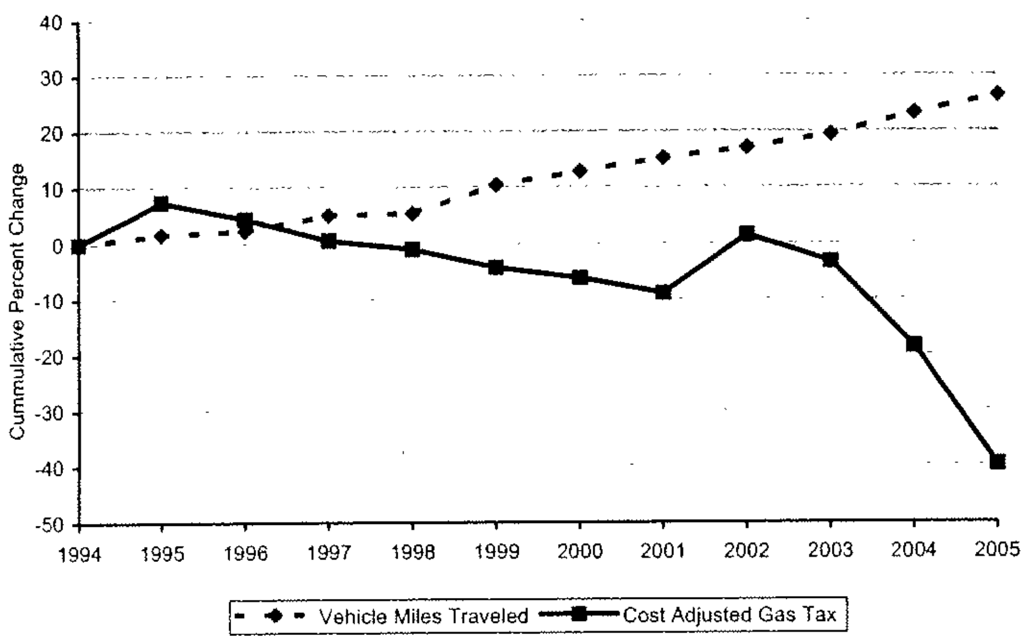
Part of the gap has been filled with voter-approved local-option sales taxes and the Proposition 42 sales tax on gasoline. In addition, passage of Proposition 1A by California voters in November 2006 ensures that Proposition 42 revenues will be directed solely for transportation purposes. However, these sources are far from sufficient. Between 1994, when gas tax rates were last adjusted, and 2005-06, travel on the State Highway System increased by 27 percent, from 144.2 billion to 183.4 billion vehicle miles traveled. Similarly, vehicle miles traveled on local streets and roads increased 12 percent over the same period from 127.6 billion to 143 billion. Collectively, state highways and local streets and roads support nearly 20 percent more traffic today than just 12 years ago.

Over the same timeframe, while state gas tax revenues have increased about 21 percent, transportation system construction costs have far exceeded inflation. The California Highway Construction Cost Index compiled by Caltrans shows that actual construction costs have increased by 200 percent in the same period. As shown in Figure INF-03, the ongoing

Figure INF-03

Percent Change in Travel and Transportation Revenues

Adjusted for Construction Costs



revenue shortfall for both new construction and maintenance at the state and local levels, causes the state's transportation system to fall further and further behind each year relative to needed improvements.

Recognizing these structural realities, the Administration has developed the transportation element of the Strategic Growth Plan to better leverage investment in the state's transportation system, improve utilization of existing assets and improve maintenance. The integration of these activities will reduce congestion levels over the next decade while accommodating future population growth and facilitate continued economic growth. The Administration's original proposal was estimated to reduce congestion by 18 percent. Caltrans estimates that the plan as currently funded will reduce congestion an overall 11.0 percent from 2005 levels by 2015-16. The Administration proposes to maximize the leverage of state and local funding with public-private partnerships and achieve a minimum of 14.5 percent congestion reduction.

The approval by voters of Proposition 1A and the $19.9 billion transportation bond measure of Proposition 1B in November 2006 provides a substantial down payment on meeting California's long-term transportation needs.

PROPOSITION 1B AUTHORIZES THE FOLLOWING PROGRAMS:

- Congestion relief (corridor mobility)—$4.5 billion to expand capacity and improve travel times in high-congestion travel corridors.
- Local transit and intercity rail—$4.0 billion for public transit, intercity and commuter rail, and waterborne transit operations.
- Goods movement—$3.1 billion to relieve traffic congestion along major trade corridors, improve freight rail facilities, and enhance the movement of goods from port to marketplace. $1.0 billion is for air quality improvements that will reduce emissions and green house gases from activities related to port operations and freight movement. $100 million is for port security improvements. The Strategic Growth Plan proposes that these goods movement funds be used to attract at least $10 billion of private investment and other funding.
- State Transportation Improvement Program—$2.0 billion to augment funds for this existing program that provides capital funding allocated on a formula basis to every region of the state.
- State Route 99—$1.0 billion for improvements to this 400-mile highway through the heart of the Central Valley.

- Local streets and roads—$2.0 billion for improvements to local transportation facilities to construct, repair and rehabilitate streets and roads.
- Transit safety, security, and disaster response—$1.0 billion to improve protection against security and safety threats and to increase the capacity of transit operations to move people, goods, emergency personnel, and equipment during and after a disaster.
- State-Local Partnership—$1.0 billion to match local agencies that raise new funds for transportation projects.
- Highway rehabilitation and operational improvements—$750 million for highway safety, rehabilitation, and pavement preservation projects. This amount includes $250 million for traffic light synchronization projects and other technology-based improvements to enhance safety operations and the capacity of local streets and roads.
- School bus retrofit and replacement—$200 million to reduce air pollution and minimize children's exposure to diesel exhaust.
- Local bridge seismic projects—$125 million to complete seismic retrofits or replacements of local bridges, ramps, and overpasses.
- Railroad grade crossings—$250 million for improvements to railroad crossings and the construction of bridges over rail lines.

The 2007-08 Governor's Budget proposes a total of $7.7 billion in appropriations from these bonds to be allocated to projects over the next three years. Additionally, $523 million is proposed to be appropriated for high-benefit projects that are ready to construct in 2006-07. While many of the programs funded by Proposition 1B bonds are new and will require implementing legislation, project nominations for the corridor mobility program are in progress and initial project approvals will occur in February. Other programs will begin implementation later in the spring or in 2007-08. As projects are selected for funding, appropriation levels and expenditure estimates will need to be adjusted.

The Administration is proposing legislation that will ensure that this historically large investment in transportation is used for the projects that produce the most congestion relief, safety, pollution reduction, and improvement of system operation. Legislation will require agencies responsible for these programs to ensure that projects are evaluated objectively for potential performance, that there are sufficient funds to construct, operate and maintain the projects, that the public has substantial opportunities for input, and that performance is documented and reported on an ongoing basis. Competitive programs will provide priority to projects that leverage more matching funds and can be completed sooner.

These new resources will be used in conjunction with existing transportation revenues from state and federal gas taxes, weight fees, tribal gaming funds, and Proposition 42 funds totaling $14.75 billion in capital spending in 2007-08. In the next ten years, the transportation component of the SGP is projected to result in 515 new High Occupancy Vehicle lanes, 700 new highway lane-miles, 4,760 miles of rehabilitated lanes, 480 miles of new commuter lines, 240,000 more transit riders, and a 120-percent increase in intercity rail riders.

Public-Private Partnerships and Design-Build

Legislation approved in the last session authorizing the use of public-private partnerships was not sufficient to allow effective use of public-private partnerships to bring substantial private capital and savings to transportation projects. Additionally, legislation providing general design-build authority was not enacted. The public-private partnership legislation limited use to a few projects that primarily serve large trucks and that require individual approval by the Legislature. There are significant opportunities to bring substantial new resources into the state through user fees and private-sector project delivery and operation.

Many forms of public-private partnerships have been developed worldwide and are increasingly being used by other states to substantially increase current capital investment and provide for long-term efficiencies and better performance in the operation of public infrastructure. Broad authorizing legislation, leveraging the Proposition 1B bond funds and authorizing tolls, container fees or other user fees, could bring in as much as $17 billion to fund goods movement projects, construct high occupancy/toll lanes, and fund pollution-reduction projects associated with goods movement. The legislation must allow substantial flexibility for administering agencies to negotiate the best possible deals for the state. The legislation should also authorize public-public partnerships and public-private partnerships that do not involve user tolls but provide for performance-based payments from public funds. Caltrans estimates these arrangements could provide an additional 3.5-percent reduction in congestion and 210 more highway lane-miles over the performance outcomes that can be achieved without these new financing and project delivery tools. Without such flexibility, it is likely that these potentially large resources will not be available to California, and congestion and pollution in urban areas-especially near the state's major ports-will not be materially improved.

Maintaining What We Build

While the bonds and the funds they can leverage will provide substantial congestion relief, state and local needs for maintenance, rehabilitation and operation cannot be adequately funded with currently available resources. State-owned distressed pavement has increased from roughly 21 percent of the total system in 2001 to 27 percent in 2006, and could increase to 40 percent by 2015-16 unless planned efforts to focus existing resources on pavement rehabilitation are undertaken. Even when these planned actions are implemented, however, about a third of the State Highway System will remain in distress unless additional resources are identified. Local street and road maintenance backlogs of many billions of dollars reportedly exist and are growing. The Department's State Highway Operations and Protection Program (SHOPP) does not have sufficient resources to adequately and effectively operate and preserve the State Highway System. Most of the funds in the bonds and Proposition 42 cannot be used for these purposes. Fuel tax revenues, which are the primary source of funding for these purposes, are likely to increase slowly or actually decline with the growing use of alternative fuels and increasing fuel efficiency in new vehicles. As the SGP is implemented, the Administration will work with interested parties and the Legislature to develop more information about the scope of the problem and long-term solutions.

JUDICIAL

The Trial Court Facilities Act of 2002 provided for the transfer of local court facilities to the state to ensure consistency in the provision of justice and to ensure that facilities are managed in a way that provides safe and secure courts. Since that time, the Judicial Branch has worked to complete the transfers and to create an organization that will be responsible for the design, construction and operation of a unified statewide court system. As of January 2006, the Judicial Council plans to complete 18 court facility transfers from 11 counties. The Administrative Office of the Courts (AOC) is working with counties to transfer approximately 100 additional court facilities by the end of the 2006-07 fiscal year.

The state's court system is supported by a substantial infrastructure inventory, including 451 trial court facilities, 11 appellate court facilities and 3 Supreme Court facilities. A significant number of these facilities do not meet current guidelines for efficient and safe court environments and, overall, the facilities are overcrowded with no capacity to handle growth in judicial workload. The AOC estimates that $9.6 billion is needed to bring all the courts up to secure and safe standards and accommodate growth. The SGP proposes $2 billion of new general obligation bond authority to address these infrastructure issues. While this amount will not fund all facility needs identified by the AOC over the next decade, it will provide immediate funding to handle the most critical infrastructure issues. In addition, this funding will enable the courts to significantly leverage private funding through public-private partnerships. These partnerships might include (but not be limited to) arrangements such as:

- Exchanging outdated and inefficient court facilities located on valuable urban property for new court facilities on less prominently located property.
- Co-locating revenue-generating commercial space (e.g., law offices) in newly constructed court buildings.
- As demonstrated in Canada, the UK and elsewhere, design-build-operate contracts in which the private sector constructs and operates a court building in exchange for lease payments.

With an asset inventory as large as the court system's, there are very likely many opportunities for successful public-private partnerships that would increase the resources available to the court system for its facility needs. Because of the formative nature of the court system's public-private partnership efforts, it is difficult to estimate the amount of resources that will be leveraged. However, $2 billion over the next several years appears to be a reasonable target.

In addition, the court system receives about $125 million per year from certain fine and fee revenues that are dedicated to addressing facility needs. The ongoing nature of this revenue stream will continue to be an important part of the court system's multiple funding approach to addressing its infrastructure needs.

OTHER NATURAL RESOURCES

In recent years, California voters have approved a series of bonds to preserve and enhance the state's natural resources. Propositions 12, 13, 40, and 50 have made available a total of $10.1 billion dollars that have been used by local governments and state agencies for a wide variety of activities such as water conservation, acquisition of land to protect wildlife habitats, and restoration of damaged ecosystems.

In November 2006, Proposition 84 was approved by the voters authorizing an additional $5.4 billion in general obligation bonds for water, flood control, natural resources, park, and conservation projects. Proposition 84 will provide the following amounts:

- Drinking water and water quality projects—$1.5 billion
- Flood control, water planning and project design—$900 million
- Protection of rivers, lakes, and streams—$900 million
- Forest and wildlife conservation—$500 million

- Protection of beaches, bays, and coastal waters—$500 million
- Parks and nature education facilities—$500 million
- Sustainable communities and climate change reduction—$600 million

The Resources Agency has developed a multi-year expenditure plan for Proposition 84 based on specific projects and the historical pattern of previous natural resources bond expenditures. The Governor's Budget appropriates $1.1 billion to 18 departments from Proposition 84. For more information on efforts to protect California's natural resources, see the Resources chapter.

HOUSING

California has had high housing prices for many years and lags the nation in affordability. Restrictions on land available for development and additional costs imposed by government are the primary reasons for high prices. This has led to a chronic undersupply of housing affordable to most Californians. State bond funding, tax credits and redevelopment funds are used to help create additional housing, primarily for low-income Californians.

Proposition 1C, adopted by the voters in November 2006, provides $2.85 billion for housing-related programs.

- Affordable housing loans and grants—$1.4 billion. This funding will provide for multifamily housing ($345 million), homeless youth housing ($50 million), emergency housing ($50 million), supportive housing ($195 million) farm worker housing ($135 million) CalHome ($300 million), down payment assistance ($200 million), and the BEGIN program ($125 million). These are existing programs and funding will start to be allocated from many of them in 2006-07. Over their life these programs are projected to assist in the creation of over 31,000 new housing units and 2,350 shelter spaces.
- New Housing Incentive Programs—$1.45 billion. This funding will support new programs to provide incentives to permit housing development and to stimulate innovation in housing creation. These programs will require further legislative and administrative program development. The Administration is proposing that these funds be granted on a competitive basis, with priority given to localities that increase housing production over recent trends, produce more affordable housing, and do so with less negative impacts by siting housing near transit and within existing urbanized areas. Several of these programs provide funding for parks and other community infrastructure

needed for new housing. These programs will incentivize construction of housing; expected to result in 87,000 additional housing units.

Most of the Proposition 1C funds are available to the Department of Housing and Community Development immediately, without further legislative action. $160 million of awards are expected in 2006-07. The Budget reflects $653 million of awards for these programs in 2007-08.

Proposition 46

During 2006-07 and 2007-08, the remaining $344.4 million from this $2.1 billion bond are expected to be awarded. This bond has already assisted in the creation or permitting of over 100,000 housing units and will help finance over 30,000 housing units with the remaining funds.

The Administration will continue to support structural changes in planning law, environmental law, redevelopment law, and building standards to facilitate more affordable housing creation in areas close to jobs and developed infrastructure. Structural changes could increase the supply of affordable housing more than the state can through subsidy programs

Other Public Service

State government provides many services to California's citizenry. Delivery of these services depends upon a variety of capital facilities such as general office space, forest fire stations, homes for veterans, crime labs, beds for mental health patients, agricultural inspection stations and special schools for the deaf, to name only a few. This broad array of facilities must provide adequate functionality and capacity to enable the delivery of services to the public.

The SGP proposes $2.3 billion (lease-revenue bonds) and $300 million (general obligation bonds) of new financing authority, as well as $2.2 billion of special funds to address the state's critical facility needs. A few of the more significant features of the bond funding include:

- Department of Forestry and Fire Protection—$600 million to replace or renovate 75 emergency response facilities, including fire stations, air attack bases, and conservation camps.
- Department of Mental Health—$500 million for additional capacity to meet the requirements of Jessica's law.

- Department of Justice-$400 million for a new DNA laboratory.
- Seismic Retrofit of Existing State Buildings—$300 million to complete the renovation of 29 facilities.
- State Special Schools—$100 million to replace or renovate classrooms and dormitories at the School for the Blind and School for the Deaf.

Details underlying this other public infrastructure, as well as the larger infrastructure components discussed in this chapter, will be laid out in the 2007 Five-Year Infrastructure Plan. That plan will be published by March 1, 2007.

ACCOUNTABILITY

To assure that public funds are utilized as efficiently as possible and in a manner consistent with the stated intent of already authorized and proposed future bond measures, firm accountability requirements will govern the expenditure of funds. Prior to any funding being expended from existing or future bonds, the responsible state agencies must develop performance and outcome measures for each program and project that would be funded from the bonds. Regular audits will be conducted to ensure that funds are being allocated according to those outcome criteria and that the implemented programs and projects did in fact achieve the intended outcomes. It is imperative that the public be able to access this information. The voters have an absolute right to know how the bonds they authorized are being spent. Therefore, outcome and performance criteria, as well as audit results, will be made readily available to the public.

AFFORDABILITY

The single most important indicator of a state's creditworthiness and ability to carry debt is the existence of a balanced budget capable of handling its debt load without the need to cut other existing programs to pay debt service. While the SGP will increase the state's debt load over the next 10 years, under this plan state debt service will remain within prudent bounds into the foreseeable future. Last year's original proposal for a Strategic Growth Plan proposed a 6-percent cap on the state's debt service ratio (the percentage of General Fund revenue committed to making debt service payments). However, at that time, the state was still facing a structural budget deficit. But this budget does not propose to spend more on ongoing programs than the state receives from ongoing revenues.

In 2009-10 the state will have made its final payment on the Economic Recovery Bonds (ERBs). Payment on those bonds is about 1.5 percent of General Fund revenues. The revenue dedicated to paying the ERBs is not dedicated to any other expenditure when the ERBs are retired. Consequently, that revenue could be allocated toward debt service without adversely affecting the ability of the General Fund to continue supporting other state programs. Since debt service in the year prior to repayment of the ERBs will account for slightly more than 5 percent of the General Fund revenue, a debt service ratio of 6.5 percent is affordable. Debt service under SGP will remain within this affordability limit. Figure INF-04 displays the state's debt payments and debt ratio into the future under the SGP.

Figure INF-04
Strategic Growth Plan
Debt Affordability
(Dollars in Millions)

		Base		Strategic Growth Plan	
Year	Revenue	Debt Service	Debt Service Ratio	Debt Service	Debt Service Ratio
2006 - 07	$94,519.0	$4,071.5	4.31%	$4,071.5	4.31%
2007 - 08	101,277.0	4,690.5	4.63%	4,690.5	4.63%
2008 - 09	105,187.0	5,352.4	5.09%	5,356.3	5.09%
2009 - 10	113,175.0	6,210.9	5.49%	6,269.0	5.54%
2010 - 11	120,536.0	7,053.6	$\boxed{5.85\%}$	7,268.8	6.03%
2011 - 12	128,671.0	7,413.9	5.76%	7,933.1	6.17%
2012 - 13	136,197.0	7,553.4	5.55%	8,496.4	6.24%
2013 - 14	144,405.0	7,685.7	5.32%	9,087.2	6.29%
2014 - 15	151,625.3	7,782.1	5.13%	9,629.2	$\boxed{6.35\%}$
2015 - 16	159,206.5	7,727.1	4.85%	9,957.2	6.25%
2016 - 17	167,166.8	8,004.0	4.79%	10,449.8	6.25%
2017 - 18	175,525.2	8,047.1	4.58%	10,677.4	6.08%
2018 - 19	184,301.4	7,742.4	4.20%	10,452.0	5.67%
2019 - 20	193,516.5	7,754.4	4.01%	10,527.6	5.44%
2020 - 21	203,192.3	7,505.3	3.69%	10,329.3	5.08%
2021 - 22	213,352.0	7,517.3	3.52%	10,389.2	4.87%
2022 - 23	224,019.6	7,451.2	3.33%	10,368.1	4.63%
2023 - 24	235,220.5	7,388.8	3.14%	10,338.9	4.40%
2024 - 25	246,981.6	7,396.9	2.99%	10,346.2	4.19%
2025 - 26	259,330.6	7,397.2	2.85%	10,345.6	3.99%

Assumptions:
Sales are based on the estimated needs or evenly spread if no needs data was available.
No High Speed Rail bonds are sold.
Assumes an interest rate of 5.75%.
Maturity life of a General Obligation Bond is 30 years.
Maturity life of a Lease Revenue Bond is 25 years.

EXHIBIT 10

Priority Structurally Deficient Bridge List and Sufficiency Rating 50 or Less

Bridge ID	Structure Name	Location	SD* or FO**	SR***	SD Control	Description of Need	Project Status
01 0008	HARDSCRABBLE CRK (VIGGO "VIC" MEE	01-DN-199-11.01	FO	50	None	Rail	Replacement Underway
01 0015	MIDDLE FORK SMITH RIVER	01-DN-199-24.08	FO	46.8	None	Functional Improvement	
01 0021	ELK CREEK	01-DN-101-26.15-CRC	SD	50	Culvert	Culvert Repair	
01 0028	KLAMATH RIVER	01-DN-101-R4.04		50	None	Superstructure	Programmed Repair
02 0015	KLAMATH RIVER	02-SIS-263-57.07	SD	47	Deck	Deck/Superstructure	Proposed Replacement
02 0059	LOST RIVER	02-SIS-161-19.18	SD	44.6	Deck	Deck/superstructure	Replacement Underway
03 0003Z	RUSH CREEK	02-MOD-299-6.32	SD	4.1	Deck	Deck/Substructure	
04 0015	EEL RIVER BOH	01-HUM-283-.12	FO	44.2	None	Functional Improvement	
04 0025R	MAD RIVER	01-HUM-101-89.63	SD	49.8	Deck	Deck/Substructure	Programmed Replacement
04 0042	REDWOOD CREEK	01-HUM-299-R22.33	SD	48	Deck	Deck Joints	Repair Underway
04 0134	EEL RIVER (FERNBRIDGE)	01-HUM-211-78.1	FO	32	None	Functional Improvement	
04 0135	WILLOW CREEK	01-HUM-096-.24		49.4	None	Paint	
06 0031Z	SHOTGUN CREEK	02-SHA-005-R55.57	SD	39	Super	Superstructure	
06 0052	LAKE BRITTON	02-SHA-089-29.19	SD	30	Deck	Deck/Superstructure	Proposed Replacement
06 0089	SACRAMENTO RIVER (ANTLER)	02-SHA-005-R40.16	SD	50	Deck	Deck/Superstructure	Programmed Replacement
06 0096	WHISKEY CREEK	02-SHA-299-14.17		50	None	Deck Condition	Programmed Repair
08 0068	DEER CREEK	02-TEH-032-12.91		45.3	None	Low Load Capacity	
09 0002	NORTH FORK FEATHER RIVER	02-PLU-070-3.07	FO	45.9	None	Functional Improvement	
09 0003	NORTH FORK FEATHER RIVER	02-PLU-070-5.58	FO	34.5	None	Functional Improvement	
09 0004	NORTH FORK FEATHER RIVER	02-PLU-070-6.99	FO	49.6	None	Functional Improvement	
09 0062	SPRING GARDEN BOH	02-PLU-070-51.21	SD	46	Deck	Deck/Rail	Programmed Repair
10 0036	MC COY CREEK	01-MEN-271-17.88		47.2	None	Low Load Capacity	
10 0053	JITNEY GULCH	01-MEN-101-93.01	SD	49.8	Deck	Deck Condition	Repair Underway
10 0134	SALMON CREEK	01-MEN-001-43	SD	49.7	Deck	Deck Joints	Programmed Repair
10 0154	JUG HANDLE CREEK	01-MEN-001-56.73	SD	33.8	Sub	Substructure	
10 0161	TEN MILE RIVER	01-MEN-001-69.69	SD	42.1	Super	Superstructure	Replacement Underway
10 0181	GUALALA RIVER	01-MEN-001-.01	FO	48	None	Functional Improvement	
10 0263Z	WILSON GULCH (SUPERCEDED ALIGNME	01-MEN-101-62.69	SD	32	Deck	Deck/Superstructure/Substructure	
12 0102	LINE CANAL	03-BUT-099-.01	FO	43	None	Functional Improvement	
12 0104Y	JUNCTION DRAW	03-BUT-099-13.16	FO	48.2	None	Functional Improvement	
12 0141L	FEATHER RIVER	03-BUT-070-14.83-OV	FO	43.4	None	Superstructure	Programmed Repair
13 0005	DOWNIE RIVER	03-SIE-049-16.75	FO	38.9	None	Functional Improvement	
15 0030	BEAR CREEK	03-COL-020-3.28	SD	35	Super	Superstructure	Programmed Replacement
19 0055	COLFAX OH	03-PLA-174-.62-CFX	SD	49	Deck	Deck Condition	
19 0090	LONG RAVINE UC	03-PLA-080-34.99	SD	34	Deck	Deck/Superstructure	Proposed Replacement
19 0091	CAPE HORN UC	03-PLA-080-36.86	SD	50	Deck	Deck/Superstructure	Proposed Replacement
20 0015L	COPELAND CREEK	04-SON-101-13.51-RN	SD	40.4	Str Appr	Inventory Rating	
20 0021	YELLOW CREEK	04-SON-121-6.52	FO	48.6	None	Functional Improvement	
20 0023	ARROYO SECO	04-SON-121-8.43	FO	50	None	Functional Improvement	Proposed Replacement
20 0035	LAGUNA DE SANTA ROSA	04-SON-012-9.63	FO	31	None	Substructure	Programmed Replacement

8/10/2007

* - Structurally Deficient
** - Functionally Obsolete
*** - Sufficiency Rating

Priority Structurally Deficient Bridge List and Sufficiency Rating 50 or Less

Bridge ID	Structure Name	Location	SD* or FO**	SR***	SD Control	Description of Need	Project Status
20 0043	REDWOOD CREEK	04-SON-128-21.76	FO	49.8	None	Functional Improvement	Programmed Replacement
20 0092	GREEN VALLEY CREEK	04-SON-116-18.66	SD	38.9	Deck	Deck/Superstructure	Proposed Repair
20 0121	BRANCH ARROYO SECO	04-SON-121-8.51	FO	46.6	None	Rail	Proposed Repair
20 0185	WINDSOR CREEK	04-SON-101-29.5	SD	43	Culvert	Culvert Repair	
21 0003	TULUCAY CREEK	04-NAP-121-6.42-NAP	SD	48.1	Str Appr	Inventory Rating	Programmed Replacement
21 0004	TROUTDALE CREEK	04-NAP-029-47.11	SD	24.4	Str Appr	Inventory Rating	Programmed Replacement
21 0008	SARCO CREEK	04-NAP-121-9.3	SD	38.6	Str Appr	Inventory Rating	Programmed Replacement
21 0009	CAPELL CREEK	04-NAP-121-20.29		43	None	Substructure	Programmed Replacement
21 0062	SODA CREEK	04-NAP-128-18.55	FO	39.8	None	Substructure	Programmed Replacement
21 0081	WRAGG CREEK	04-NAP-128-27.9	SD	44	Culvert	Culvert Repair	
22 0024	TAYLOR CREEK	03-YOL-016-20.3	SD	21.6	Str Appr	Inventory Rating	
22 0040	SACRAMENTO RIVER (KNIGHTS LANDING	03-YOL-113-22.02	SD	15	Super	Paint/Superstructure	Proposed Repair
23 0004G	N680-E80 CONNECTOR	04-SOL-680-13.14-FR	SD	24.4	Deck	Deck/Superstructure	Proposed Repair
23 0015L	CARQUINEZ LT	04-SOL-080-.01	SD	48.1	Deck	Deck/Substructure	Proposed Repair
23 0022	WELL CREEK	04-SOL-012-22.91	FO	33	None	Rail	Proposed Repair
23 0024	SACRAMENTO RIVER (RIO VISTA) BR & S	04-SOL-012-26.24-RV	SD	32	Deck	Deck/Superstructure	Programmed Repair
23 0031	DRY ARROYO	04-SOL-505-R7.5		47	None	Low Load Capacity	
23 0035	MINER SLOUGH	04-SOL-084-12.09	FO	33.6	None	Superstructure	Proposed Repair
23 0037	STEAMBOAT SLOUGH FERRY	04-SOL-220-3.10	SD	39.5	Str Appr	Paint/Superstructure	Proposed Repair
23 0148	MIDWAY ROAD OC	04-SOL-080-32.62	SD	36	Deck	Deck/ Substructure	Programmed Repair
24 0001L	AMERICAN RIVER	03-SAC-160-R44.47-S	FO	49.9	None	Deck Condition	Programmed Repair
24 0051	SACRAMENTO RIVER (ISLETON)	03-SAC-160-5.86	SD	11	Deck	Deck/Superstructure	Repair Underway
24 0052	STEAMBOAT SLOUGH	03-SAC-160-19.76	FO	47.5	None	DeckSubstructure	Proposed Repair
24 0053	SACRAMENTO RIVER (PAINTERSVILLE)	03-SAC-160-20.87	SD	1	Super	Deck/Superstructure/Substruc	Proposed Repair
24 0121	THREE MILE SLOUGH	03-SAC-160-6.98	SD	38	Super	Paint/Deck/Superstructure	Proposed Repair
24 0267	SOUTH CONNECTOR UC	03-SAC-005-22.42-SA	SD	48.5	Deck	Deck Condition	Programmed Repair
25 0044	ECHO SUMMIT SIDEHILL VIADUCT	03-ED-050-67.3	SD	39	Super	Superstructure	Proposed Replacement
27 0021	OLEMA CREEK	04-MRN-001-22.96	SD	44.5	Deck	Deck/Substructure	Proposed Repair
27 0023	LAGUNITAS CREEK	04-MRN-001-28.51	SD	35.8	Super	Rail/Superstructure	Proposed Repair
27 0028	ESTERO AMERICANO	04-MRN-001-50.47	SD	41.4	Deck	Deck/Substructure	Proposed Replacement
28 0113R	HILLTOP DRIVE OC	04-CC-080-5.98-RCH	SD	47	Deck	Deck/Superstructure	Programmed Replacement
29 0013L	STANISLAUS RIVER	10-SJ-099-0	SD	14	Deck	Deck/Superstructure	Proposed Replacement
29 0016F	W120-S5 CONNECTOR	10-SJ-120-T.11	SD	13.1	Deck	Deck/Superstructure	
29 0043	MOKELUMNE RIVER	10-SJ-012-.01	FO	44.9	None	Deck/Superstructure	Repair Underway
29 0045	OLD RIVER	10-SJ-004-.01	FO	45.1	None	Paint/Rail	Proposed Repair
29 0049	MIDDLE RIVER	10-SJ-004-4.42	SD	42.6	Deck	Deck/Substructure	Programmed Repair
29 0050	SAN JOAQUIN RIVER (GARWOODS)	10-SJ-004-14.15	SD	36	Deck	Rail/Deck/Superstructure	Proposed Repair
29 0120G	E26-N99 CONNECTOR OC	10-SJ-026-1.08-STKN	SD	47	Super	Superstructure	
29 0208	HANSEN ROAD OC	10-SJ-205-2.38	SD	49.4	Super	Paint/Superstructure	Proposed Repair
32 0010	SOUTH FORK STANISLAUS RIVER	10-TUO-108-31.24	FO	43.6	None	Rail	Proposed Repair

8/10/2007

* - Structurally Deficient
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Priority Structurally Deficient Bridge List and Sufficiency Rating 50 or Less

Bridge ID	Structure Name	Location	SD* or FO**	SR***	SD Control	Description of Need	Project Status
33 0023	UNIVERSITY AVENUE OC	04-ALA-080-5.82-BER	FO	50	None	Deck Condition	Programmed Repair
33 0025	SFOBB EAST BAY	04-ALA-080-1.15-OAK	SD	15.1	Super	Paint/Superstructure	Replacement Underway
33 0027	FIFTH AVENUE OVERHEAD	04-ALA-880-30.38-OA	SD	47	Deck	Paint/Deck/Superstructure	Programmed Replacement
33 0040L	HIGH STREET SEPARATION & OH	04-ALA-880-27.63-OA	SD	26	Deck	Paint/Deck/Superstructure	Programmed Replacement
33 0040R	HIGH STREET SEPARATION & OH	04-ALA-880-27.63-OA	SD	32	Deck	Paint/Deck/Superstructure	Programmed Replacement
33 0190F	W80-S13 CONNECTOR OC	04-ALA-080-4.45-EMV	SD	45	Deck	Rail/Deck/Superstructure	Programmed Repair
34 0003	SFOBB WEST BAY	04-SF-080-6.35-SF	FO	49.3	Deck	Deck/Superstructure	Proposed Repair
34 0014	MARINA VIADUCT	04-SF-101-8.33-SF	SD	24.8	Deck	Deck/Superstructure	Proposed Replacement
34 0015	WEST PACIFIC AVENUE UC	04-SF-001-6.18-SF	SD	47	Deck	Deck Condition	Programmed Repair
34 0018	RUCKMAN AVENUE UC	04-SF-001-6.86-SF	SD	31.3	Deck	Deck/Superstructure	Proposed Repair
34 0019	PRESIDIO VIADUCT	04-SF-101-9.14-SF	SD	2	Deck	Paint/Deck/Superstructure	Proposed Replacement
34 0088	BAYSHORE VIADUCT	04-SF-101-4.12-SF	SD	49	Deck	Deck Condition	Programmed Repair
34 0118L	SFOBB-APPROACH-UPPER DECK	04-SF-080-4.95-SF	FO	29	None	Substructure	Replacement Underway
34 0118R	SFOBB-APPROACH LOWER DECK	04-SF-080-4.95-SF	FO	49	None	Substructure	Replacement Underway
35 0003	COLMA CREEK	04-SM-082-22.36-CLM		46	None	Rail	Proposed Repair
35 0044	WEST UNION CREEK	04-SM-084-19.89-WDS	SD	28	Str Appr	Rail	Proposed Repair
35 0088	PENINSULA AVENUE OC	04-SM-101-14.69-SM	SD	47	Deck	Deck Condition	Programmed Replacement
36 0007	BOULDER CREEK	05-SCR-236-2.86	FO	39	None	Rail	Proposed Repair
36 0009	BOULDER CREEK	05-SCR-236-1.61	FO	39	None	Rail	Proposed Repair
36 0010	BOULDER CREEK	05-SCR-236-1.03	FO	39	None	Rail	Proposed Repair
36 0031	SCOTT CREEK	05-SCR-001-31.55	SD	48.1	Deck	Deck Condition	Programmed Replacement
36 0046	SAN LORENZO RIVER	05-SCR-009-7.76	FO	47.4	None	Rail	Proposed Repair
36 0065	WADDELL CREEK	05-SCR-001-36.3	SD	48.7	Deck	Deck Condition	Programmed Replacement
37 0006R	SARGENT BRIDGE & OH	04-SCL-101-R.81	SD	32	Deck	Rail/Deck/Superstructure	Programmed Repair
37 0074	SARATOGA CREEK	04-SCL-009-4.85	FO	29.1	None	Superstructure	Proposed Replacement
37 0095	TULLY ROAD OC	04-SCL-101-33.03-SJS	SD	45	Deck	Deck/Superstructure	Programmed Repair
37 0107	HESTER PUC	04-SCL-082-9-SJS		45	None	Low Load Capacity	
37 0301	YOSEMITE DRIVE OC	04-SCL-680-M6.98-MP	FO	50	None	Functional Improvement	
37 0380L	CALAVERAS BOULEVARD OH	04-SCL-237-10.2-MPS	SD	48.2	Deck	Deck Condition	Programmed repair
39 0066	BRANCH BLACK RASCAL CANAL	10-MER-059-16.01	FO	49.5	None	Rail	Programmed Repair
39 0084	FRANKLIN ROAD OC	10-MER-099-18.51	SD	49.4	Super	Superstructure	
39 0127	APPLEGATE ROAD OC	10-MER-099-22.76-AT	SD	48.6	Super	Superstructure	
39 0131L	WEST MERCED OVERHEAD	10-MER-099-16.54	SD	38.2	Super	Paint/Superstructure	Proposed Repair
39 0131R	WEST MERCED OVERHEAD	10-MER-099-16.54	SD	45.9	Super	Paint/Superstructure	Proposed Repair
39 0211	SAN JOAQUIN RIVER	10-MER-165-25.61	SD	45.7	Sub	Substructure	Programmed Replacement
39 0216	EAST SIDE CANAL	10-MER-165-28.14	SD	48.2	Culvert	Culvert Repair	Proposed Repair
40 0005	BEAR CREEK	10-MPA-140-34.08	FO	50	None	Rail	Proposed Repair
40 0006	SLATE GULCH	10-MPA-140-37.09	FO	39	None	Functional Improvement	
42 0019	WARTHAN CREEK	06-FRE-198-1.82	FO	45.6	None	Functional Improvement	
42 0041	FRESNO SLOUGH (KINGS RIVER - WHITE	06-FRE-180-26.95	SD	39	Sub	Substructure	Proposed Repair

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Priority Structurally Deficient Bridge List and Sufficiency Rating 50 or Less

Bridge ID	Structure Name	Location	SD* or FO**	SR***	SD Control	Description of Need	Project Status
42 0074	KINGS RIVER OVERFLOW	06-FRE-180-77.19	SD	31.2	Deck	Deck/Superstructure	Proposed Replacement
42 0239L	CANTUA CREEK	06-FRE-005-28.5	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0239R	CANTUA CREEK	06-FRE-005-28.5	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0242L	THREE ROCKS ROAD UC	06-FRE-005-35.26	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0242R	THREE ROCKS ROAD UC	06-FRE-005-35.26	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0259L	FIVE POINTS UC	06-FRE-005-15.96	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0259R	FIVE POINTS UC	06-FRE-005-15.96	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0271L	DOMENGINE UC	06-FRE-005-22.85	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0271R	DOMENGINE UC	06-FRE-005-22.85	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0275L	PARKHURST EQUIPMENT UC	06-FRE-005-26.8	SD	36	Deck	Deck/Superstructure	Repair Completed
42 0275R	PARKHURST EQUIPMENT UC	06-FRE-005-26.8	SD	36	Deck	Deck/Superstructure	Repair Completed
44 0012	GRANITE CANYON	05-MON-001-64.33	FO	48.8	None	Rail	Proposed Repair
44 0019	BIXBY CREEK	05-MON-001-59.37	FO	50	None	Rail	Proposed Repair
44 0035	CASTRO CANYON	05-MON-001-43.12	FO	47.2	None	Deck/Rail	Proposed Repair
44 0036	ROCKY CREEK	05-MON-001-60.05	FO	46.3	None	Deck/Rail	Proposed Repair
44 0056	BIG CREEK	05-MON-001-28.09	FO	50	None	Rail	Proposed Repair
44 0062	MILL CREEK	05-MON-001-18.46	FO	49.2	None	Rail	Proposed Repair
44 0130	W LAUREL DRIVE OC	05-MON-101-R89.27	SD	50	Deck	Deck Condition	Proposed Repair
46 0002	SOUTH PORTERVILLE OH	06-TUL-190-16.45-PTI	SD	37.5	Super	Superstructure	Repair Underway
46 0025	YOKOHL CREEK	06-TUL-198-21.82	SD	47.6	Deck	Deck/Superstructure	Proposed Repair
46 0028	SALT CREEK	06-TUL-198-41.23	FO	46	None	Rail	Proposed Repair
46 0029	KAWEAH RIVER	06-TUL-198-43.92	SD	31.8	Super	Superstructure	Proposed Repair
46 0149C	N99-K STREET OFF-RAMP OC	06-TUL-099-26.05	SD	28	Deck	Deck Condition	Replacement Completed
49 0148L	NORTH PASO ROBLES OH	05-SLO-101-58.76-PS	SD	21.3	Deck	Deck/Superstructure	Proposed Repair
49 0148R	NORTH PASO ROBLES OH	05-SLO-101-58.76-PS	SD	34	Deck	Deck/Superstructure	Proposed Repair
49 0149L	SOUTH PASO ROBLES OH	05-SLO-101-55.72	SD	34	Super	Superstructure	Repair Underway
49 0149R	SOUTH PASO ROBLES OH	05-SLO-101-55.67	SD	35	Super	Superstructure	Repair Underway
50 0027	GOOSE LAKE CANAL	06-KER-046-35.13	SD	41	Sub	RailSubstructure	Proposed Repair
50 0033	KERN RIVER	06-KER-204-5.61	SD	48.1	Deck	Deck/Substructure	Proposed Repair
50 0054	CANE BRAKE CREEK	06-KER-178-76.98		48.6	None	Low Load Capacity	
50 0137	SIDEHILL VIADUCT NO. 1	06-KER-178-13.74	FO	47.4	None	Rail	Proposed Repair
50 0140	SIDEHILL VIADUCT NO. 2	06-KER-178-13.76	FO	49	None	Rail	Proposed Repair
50 0182	SIDEHILL VIADUCT NO. 3	06-KER-178-13.78	FO	40.6	None	Rail	Proposed Repair
51 0049L	ARROYO PARIDA	05-SB-101-R5.63	SD	33.6	Deck	Deck/Substructure	Proposed Replacement
51 0105	MISSION CREEK	05-SB-192-3.36	FO	40.9	None	Rail	Proposed Repair
51 0108	MONTECITO CREEK	05-SB-192-8.12	FO	42.7	None	Rail	Proposed Repair
51 0113	ARROYO PARIDA	05-SB-192-15.52	SD	32.6	Str Appr	Substructure	Programmed Replacement
51 0123	HOLLISTER AVENUE OC	05-SB-101-26.91	SD	39.8	Deck	Deck/Substructure	Programmed Replacement
51 0142	RINCON CREEK	05-SB-150-2.19	FO	27.8	None	Rail	Proposed Repair
52 0102	LION CANYON CREEK	07-VEN-150-23.93	FO	34.5	None	Functional Improvement	

8/10/2007

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Bridge ID	Structure Name	Location	SD* or FO**	SR***	SD Control	Description of Need	Project Status
52 0170	CANON CREEK	07-VEN-033-20.48		49.1	None	Rail	Proposed Repair
53 0316	MAIN STREET OC	07-LA-001-35.07-SMC	SD	45.3	Str Appr	Rail	Proposed Repair
53 0407	GARAPITO CREEK	07-LA-027-6.56	SD	46.5	Str Appr	Inventory Rating	
53 0687R	SANTA CLARA RIVER	07-LA-005-R53.70-SC	SD	40.5	Deck	Deck/Substructure	Replacement Completed
53 0815	LACTC ACCESS ROAD OC	07-LA-710-10.31-LBCI	SD	37	Str Appr	Inventory Rating	
53 0840	HOBART YARD OH	07-LA-710-22.17-VER	FO	50	None	Functional Improvement	Widen
53 0842	EAST YARD OH	07-LA-710-22.66-CMR	SD	48	Deck	Deck Condition	Programmed Repair
53 0852M	CLEVELAND STREET PUC	07-LA-010-44.7-POM	FO	48	None	Functional Improvement	
53 1018M	MOUNTAIN AVENUE PUC	07-LA-010-47.24-CLA	FO	43	None	Functional Improvement	
53 1393R	EB 60/5 SEPARATION	07-LA-060-R.63-LA	SD	49	Deck	Paint/Deck/Superstructure	Proposed Repair
53 2152	TEXACO OH	07-LA-001-8.69-LA	SD	22	Sub	Substructure	Proposed Repair
53 2171	CEDAR VALLEY WAY OC	07-LA-014-R30.55	SD	38.8	Str Appr	Inventory Rating	
53 2618	SCHUYLER HEIM LIFT BRIDGE	07-LA-047-3.58-LBCH	SD	27.9	Super	Deck/Superstructure/Substruc	Programmed Replacement
53 2644L	ROUTE 10,5/101 SEPARATION	07-LA-005-16.9-LA	SD	21	Super	Superstructure	Programmed Repair
53 2993	SANTA MONICA VIADUCT "C"	07-LA-010-14.88-LA	SD	45	Deck	Deck Condition	Proposed Repair
53 2996	SANTA MONICA VIADUCT "F"	07-LA-010-17.54-LA	SD	46	Deck	Deck Condition	Proposed Repair
54 0310	BIG BEAR LAKE DAM BRIDGE	08-SBD-018-44.33	SD	37.7	Deck	Deck/Superstructure/Substruc	Programmed Replacement
54 0345	EAST FORK CITY CREEK	08-SBD-330-33.68	FO	49.1	None	Rail	Programmed Repair
54 0530	WASHINGTON AVENUE OC	08-SBD-215-2.69-COL	SD	20.2	Deck	Deck/Superstructure	Proposed Repair
54 0886L	MARBLE WASH	08-SBD-040-R80.42	SD	38.1	Super	Superstructure	Replacement Completed
54 0886R	MARBLE WASH	08-SBD-040-R80.44	SD	39.1	Super	Superstructure	Replacement Completed
54 0887L	FORTRESS WASH	08-SBD-040-R90.53	SD	39.1	Super	Superstructure	Replacement Completed
54 0887R	FORTRESS WASH	08-SBD-040-R90.52	SD	39.1	Super	Superstructure	Replacement Completed
54 0888L	NEPRUD WASH	08-SBD-040-R91.64	SD	39.1	Super	Superstructure	Replacement Completed
54 0888R	NEPRUD WASH	08-SBD-040-R91.66	SD	39.1	Super	Superstructure	Replacement Completed
54 0890L	MACDONALD WASH	08-SBD-040-R94.37	SD	39.1	Super	Superstructure	Replacement Completed
54 0890R	MACDONALD WASH	08-SBD-040-R94.37	SD	39.1	Super	Superstructure	Replacement Completed
54 0892L	CHUCKWALLA WASH	08-SBD-040-R97.14	SD	39.1	Super	Superstructure	Replacement Completed
54 0892R	CHUCKWALLA WASH	08-SBD-040-R97.14	SD	39.1	Super	Superstructure	Replacement Completed
54 0893L	MUSTANG WASH	08-SBD-040-R97.62	SD	39.1	Super	Superstructure	Replacement Completed
54 0893R	MUSTANG WASH	08-SBD-040-R97.62	SD	39.1	Super	Superstructure	Replacement Completed
54 1000	COLORADO RIVER	08-SBD-062-142.6	SD	35.9	Deck	Deck/Superstructure	Replacement Completed
55 0064	SAN JUAN CANYON	12-ORA-074-13.29-SJ	SD	6	Sub	Substructure	Programmed Repair
56 0180	STRAWBERRY CREEK	12-ORA-074-13.29-SJ	SD	24.8	Str Appr	Rail	Proposed Repair
57 0282	AGUA HEDIONDA LAGOON	08-RIV-074-53.45	FO	49.5	None	Rail	Proposed Repair
04 0025L	MAD RIVER	11-SD-005-R48.68-CB	SD	38	Deck	Deck/Substructure	Proposed Repair
04 0180	CAPPELL CREEK	01-HUM-101-89.63	SD	65	Deck	Deck/Substructure	Programmed Replacement
04 0182	MAWAH CREEK	01-HUM-169-22.37	SD	58.2	Super	Paint/Superstructure	Programmed Replacement
04 0218	RUBE RANCH CREEK	01-HUM-169-24.98	SD	70.1	Sub	Substructure	Programmed Replacement
06 0095	CRAG VIEW DRIVE UC	01-HUM-169-28.49	SD	66.1	Sub	Substructure	Programmed Replacement
		02-SHA-005-66.84	SD	69	Sub	Superstructure/Substructure	Project Underway

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Bridge ID	Structure Name	Location	SD* or FO**	SR***	SD Control	Description of Need	Project Status
08 0005	TOOMES CREEK	02-TEH-099-8.38	SD	62	Deck	Deck/Substructure	Replacement Underway
10 0146	SPRING GARDEN BOH	01-MEN-001-50.17	SD	51.7	Super	Superstructure	Proposed Project
15 0077L	FUNK SLOUGH OVERFLOW	03-COL-005-R29.02	SD	60.7	Deck	Deck/Superstructure	Proposed Project
15 0077R	FUNK SLOUGH OVERFLOW	03-COL-005-R29.02	SD	61	Deck	Deck/Superstructure	Proposed Project
19 0033	TRUCKEE RIVER	03-PLA-089-8.48	SD	52.7	Super	Superstructure	Proposed Replacement
19 0116R	PUTTS LAKE UC	03-PLA-080-54.81	SD	66	Deck	Deck/Superstructure	Programmed Replacement
22 0025L	SACRAMENTO RIVER (ELKHORN)	03-YOL-005-.01	SD	65	Super	Paint/Substructure	Proposed Project
28 0100	RICHMOND-SAN RAFAEL BRIDGE	04-CC-580-6.22-RCH	SD	66.9	Deck	Deck/Superstructure/Substruc	Proposed Project
29 0013R	STANISLAUS RIVER	10-SJ-099-0	SD	61	Deck	Deck	Proposed Replacement
29 0071L	TURNER STATION OVERHEAD	10-SJ-099-11.47	SD	57.7	Deck	Deck	Programmed Replacement
29 0071R	TURNER STATION OVERHEAD	10-SJ-099-11.47	SD	67.4	Deck	Deck	Programmed Replacement
33 0016L	ALAMO CANAL	04-ALA-580-20.56-PLE	SD	51	Deck	Deck/Superstructure	Proposed Project
34 0077	CENTRAL VIADUCT	04-SF-101-R4.25-SF	SD	52.8	Deck	Deck	Programmed Project
37 0018	SAN FRANCIS QUITO CREEK	04-SCL-082-26.36-PA	SD	59.6	Deck	Deck/Substructure	Proposed Project
42 0258L	FARM EQUIP UC	06-FRE-005-5.86	SD	52	Deck	Deck/Superstructure	Proposed Project
42 0274L	QUIST UC	06-FRE-005-1.7	SD	57.7	Deck	Deck/Superstructure	Proposed Project
45 0013	HANFORD OH	06-KIN-198-R18.13-HA	SD	55	Deck	Deck/Superstructure	Proposed Project
46 0100	ST JOHNS RIVER	06-TUL-063-10.65	SD	65.2	Sub	Substructure	Proposed Project
46 0191	AVENUE 152 OC	06-TUL-099-19.46	SD	59.1	Deck	Deck/Superstructure	Proposed Project
49 0029	CHOLAME CREEK	05-SLO-046-50.66	SD	53.9	Deck	Deck/Substructure	Proposed Project
50 0011R	FAMOSO OH	06-KER-099-R43.6	SD	57	Super	Superstructure	Proposed Project
50 0048	CUDDY CREEK	06-KER-005-R.55	SD	59.3	Deck	Deck/Superstructure	Proposed Replacement
51 0133	OAK CREEK	05-SB-101-9.66	SD	51.6	Super	Superstructure	Project Underway
52 0249	EDWARDS OC	07-VEN-126-R6.95	SD	68.6	Super	Superstructure	Proposed Project
53 0945	KANAN ROAD OC	07-LA-101-35.04-AGR	SD	65.3	Super	Superstructure	Proposed Project
53 1471	VINCENT THOMAS BRIDGE	07-LA-047-.86-LA	SD	56.7	Deck	Deck/Superstructure	Project Underway
54 0270L	OAT DITCH	08-SBD-015-R130.58	SD	67.6	Sub	Substructure	Proposed Project
56 0272R	WARM SPRINGS CREEK	08-RIV-015-7.78-TMC	SD	65.7	Sub	Substructure	Project Underway

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EXHIBIT 11

January 19, 2006

Funding for Transportation: What the New Federal Act Means for California

ELIZABETH G. HILL • LEGISLATIVE ANALYST

The new federal transportation act (SAFETEA-LU), enacted in August 2005, will provide $23.4 billion in federal funds to California through 2009 for highways, transit, and transportation safety. This represents a 40 percent increase in federal funding each year for transportation over the previous federal program. In addition to increasing federal funding to the state, SAFETEA-LU presents opportunities for financing transportation through nontraditional funding sources and expediting project delivery. There are a number of issues for the Legislature to consider when implementing the act in California. We discuss these issues and make recommendations where further legislative actions are warranted. ■

INTRODUCTION

In October 2003, the Transportation Equity Act for the 21st Century (TEA-21) expired. This act had provided federal transportation funding from 1998 through 2003, financing highway and transit projects nationwide through a combination of formula, discretionary, and earmarked funds. The act also allowed transportation agencies to shift formula funds from one grant category to another with few restrictions, thereby providing a flexible source of federal funding for transportation projects.

Congress failed to reauthorize a multiyear transportation program in 2003. Instead, it extended TEA-21 for almost two years to provide continued funding for transportation. However, on August 10, 2005, Congress reauthorized the federal transportation program through 2009 by enacting the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

This report summarizes the major provisions of the new federal act, highlights how they differ from TEA-21, and discusses the act's implications for California. The report then identifies the main issues that the Legislature should consider and where further legislative actions are warranted to facilitate implementation of SAFETEA-LU in California.

MAJOR PROVISIONS OF SAFETEA-LU NATIONWIDE

Figure 1 (see next page) highlights the major provisions of SAFETEA-LU. This section discusses these provisions in detail and compares national funding levels under SAFETEA-LU and TEA-21. (See a glossary at the end of this report for descriptions of various acronyms and terms used throughout the report).

Program Structure Relatively Unchanged, but Increases Focus on Safety. As with TEA-21, the new act directs federal funding for highways and transit. In the highway program, there continues to be six major formula funding categories—Interstate Maintenance, National Highway System, Congestion Mitigation/Air Quality Improvement (CMAQ), Surface Transportation Program (STP), Bridges, and Equity Bonus (known as Minimum Guarantee under TEA-21). In the transit program, a mixture of formula and discretionary grants is provided through the Urban Formula, Fixed Guideway Modernization, New Starts, and High Priority Bus categories.

The new act differs from TEA-21 by increasing the focus on safety. In addition to augmenting funding levels to previously established safety programs, SAFETEA-LU introduces new discretionary and formula grants aimed at reducing travel-related hazards through increased law enforcement and safety-related planning. The act increases the total authorization for highway safety programs to $5.7 billion from $3.3 billion under TEA-21. New federal safety grant programs include Highway Safety Improvement, High Risk Rural Roads, Safety Belt Performance Grants, and Safe Routes to School.

Overall Funding Level Increases Relative to TEA-21. The act authorizes $286 billion nationwide for transportation over the six-year period from 2004 through 2009. However, due to the delay in reauthorization, about $45 billion was expended by the time SAFETEA-LU was enacted. Thus, between 2005 and 2009, funding will be closer to $241 billion with $190 billion for highways, $45 billion for transit, and $5.7 billion for safety improvements. This represents approximately a 40 percent increase in average annual funding over TEA-21, with the ratio of transit to highway funds relatively unchanged.

Substantial Increase in Earmarks. The act earmarks over $26 billion for more than 6,000 projects nationwide. These projects are specified in various discretionary programs including ones that existed under TEA-21—High Priority Projects (HPP), New Starts, and High Priority Bus—as well as new programs—Projects of National and Regional Significance (PNRS), National Corridor Infrastructure Improvement (NCIIP), and Transportation Improvements (TI). The earmarked amount is a substantial increase over the $9.3 billion earmarked in TEA-21 for about 1,850 projects exclusively in the HPP program.

Formula Funds Remain Flexible, Discretionary Funds Less So. Similar to TEA-21, the new federal act provides both formula-based funds and discretionary funds. As with TEA-21, SAFETEA-LU provides the state with considerable flexibility in the use of formula funds, which account for 80 percent of total funds authorized in the act. Specifically, state and regional agencies can move up to 50 percent of funds from one formula category to another subject to various restrictions. For example, a state may transfer up to half of its CMAQ apportionment to projects eligible for Interstate Maintenance, National Highway System, STP, Bridges, or Recreational Trails grants. Furthermore, funds provided under STP and Equity Bonus—two of the largest funding categories, making up 30 percent of the $241 billion distributed through 2009—can be used for a wide variety of projects including

Figure 1

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

Major Provisions

General:

- Maintains overall structure of previous transportation act (TEA-21), but increases emphasis on safety.
- Continues TEA-21's flexibility allowing up to 50 percent of most program formula funds to be redirected.

Funding Nationwide:

- Provides 42 percent increase in average annual funding over TEA-21. Authorization of $241 billion for fiscal years 2005 through 2009 includes $190 billion for highways, $45 billion for transit, and $5.7 billion for safety enhancements.
- Earmarks over $26 billion worth of congressionally specified projects, including $14.8 billion for High Priority Projects and $1.8 billion for Projects of National and Regional Significance.

Highways:

- Guarantees "donor states" a minimum of 90.5 percent return on state fuel tax contributions in 2005 and 2006, 91.5 percent in 2007, and 92.0 percent in 2008 and 2009.
- Provides incentives for private sector participation in construction of major transportation facilities.
- Pilots include: federal delegation of environmental review responsibilities to states and toll programs on interstate highways.

Transit:

- Most discretionary funds remain available for competitive project applications.
- Provides capital funding for smaller transit projects requiring less than $75 million in federal funds.

transit, highway, local road, bridge, safety, and transportation enhancement projects at states' discretion.

Though formula grants are a flexible source of funding to meet diverse transportation needs, the new act only increases these funds by a modest amount. As Figure 2 shows, total funding to formula grant categories increased by $10 billion, or 5 percent, over TEA-21 levels.

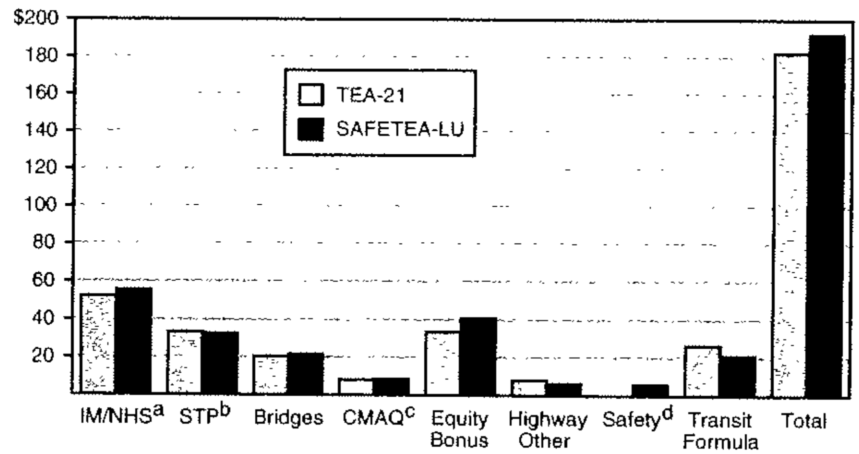
In contrast, Figure 3 shows that SAFETEA-LU provides about $35 billion in discretionary funding nationwide—about 40 percent more than the amount under TEA-21. In particular, funding for the HPP program increases from $9.3 billion to $14.8 billion. The act also creates three new discretionary grant programs for NCIIP, PNRS, and TI.

Compared to formula funds, discretionary grants are considerably less flexible. This is because many discretionary grants are nontrans-

Figure 2

Comparison of Formula Funds Nationwide TEA-21 Versus SAFETEA-LU

(In Billions)

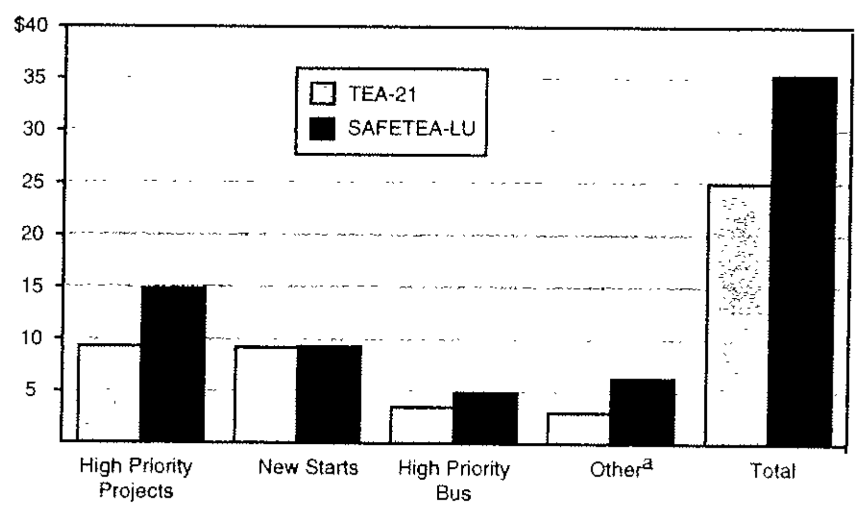


[a]IM/NHS = Interstate Maintenance and National Highway System programs.
[b]STP = Surface Transportation Program.
[c]CMAQ = Congestion Mitigation/Air Quality Improvement Program.
[d]Safety funding under TEA-21 was funded primarily through STP funds.

Figure 3

Comparison of Discretionary Funds Nationwide TEA-21 Versus SAFETEA-LU

(In Billions)



[a]Discretionary funds in SAFETEA-LU's "other" category are funds provided through the National Corridor Infrastructure Improvement, Projects of National and Regional Significance, and Transportation Improvements programs.

ferable among fund categories. For example, HPP funds cannot be applied toward NCIIP projects (included in "other" programs in Figure 3). Further intensifying this rigidity is the fact that four of the major discretionary fund categories (HPP, PNRS, NCIIP, and TI) are *completely* earmarked for specified projects. This means that there are no funds left over in these four categories for additional, nonearmarked projects.

Moreover, for a large number of specifically earmarked projects, the designated funding cannot be redirected to other projects. This further limits states' ability to direct funding to projects they deem to be of high priority within each fund category.

Equity Bonus Program Beneficial to Donor States. The Equity Bonus program (which is the equivalent to TEA-21's Minimum Guarantee program) ensures each state a minimum rate of return on its share of fuel tax contributions to the federal highway trust fund. States will receive in 2005 and 2006 a minimum level of funding equivalent to 90.5 percent of their fuel tax contributions—the same rate as guaranteed under TEA-21. The rate will increase to 91.5 percent in 2007 and to 92 percent in 2008. This represents an increase in return for donor states like California, which sends more fuel tax revenues to the federal government than it receives back. Equity Bonus funds may be used for any transportation project eligible for funding under other major highway formula programs.

Highway and Safety Funds Potentially More Reliable. Under TEA-21, funding levels for highway and safety programs were adjusted when revenues to the federal highway trust fund (HTF) fluctuated. Because fuel excise tax revenues to the HTF were lower than projected in 2003, for example, this resulted in a downward fund adjustment to many highway and safety programs. However, under the new federal act, funding to highway and safety programs would not be reduced when tax revenues decline so long as the HTF balance exceeds $6 billion. This would provide more certainty to states regarding the level of highway and safety funding to be received. However, it is estimated that the trust fund's balance will be below $6 billion in the last two years of SAFETEA-LU. As a consequence, highway and safety programs would likely still experience downward fund adjustments if revenues to the HTF are lower than projected. Transit funding is unaffected by this provision, as transit funds have always been exempt from revenue adjustments.

Other Provisions. In addition to changes already discussed, SAFETEA-LU includes a number of provisions that influence the way that transportation facilities are planned, built, and administered. Specifically, the act encourages private investments and partnerships in constructing transportation infrastructure, in addition to providing opportunities for environmental streamlining, design-build contracting, and toll road projects.

funds is quite limited. Furthermore, this limited flexibility applies primarily to a relatively small number of projects in the PNRS, NCIIP, and TI programs. Consequently, Caltrans has limited leeway in shifting funds among projects to better reflect state priorities.

In addition, earmarked amounts typically do not cover the full costs of projects. As such, state and local agencies must dedicate substantial additional funding from other sources to fully cover project costs. For example, the $130 million earmarked for carpool lanes on I-405 (in NCIIP and TI funds) does not come close to meeting full project costs, which are estimated at over $500 million. Moreover, if an earmarked project is not a state priority, dedicating other funding to fully pay for the project would further limit the state's ability to meet higher funding priorities.

New Program Funding Benefits Goods Movement. The act establishes several new programs, including the PNRS and NCIIP programs, which target funding to projects that benefit national and international commerce. The state is a major recipient of these funds. Specifically, California will receive $450 million from PNRS for high-

Figure 8

California Earmarked Projects Valued at $20 Million or More

(In Millions)

Project	County	Source	Earmark Amount
Metro Gold Line Eastside Extension	Los Angeles	New Starts	$406
Centennial Corridor Loop	Kern	NCIIP[a]	330
BART Extension	San Francisco	New Starts	280
Mission Valley East Extension	San Diego	New Starts	153
Bakersfield Beltway	Kern	PNRS[c]	140
Alameda Corridor East	SCAG[b] Region	PNRS	125
Oceanside Escondido Rail Corridor	San Diego	New Starts	114
SR-178 Bakersfield	Kern	NCIIP	100
Gerald Desmond Bridge	Los Angeles	PNRS	100
I-405 high occupancy vehicle (HOV) lane	Los Angeles	NCIIP	100
Widen a state route between San Luis Obispo County Line and I-5	Kern	HPP[d]	92
Mission Valley East Extension	San Diego	New Starts	89
Widen Rosedale Highway	Kern	NCIIP	60
Inland Empire Goods Movement Gateway	San Bernardino	PNRS	55
Increase capacity on I-80	Placer	NCIIP	50
Golden Gate Bridge	San Francisco	Highway Bridge	50
Widen SR-46	San Luis Obispo	HPP	33
Widen I-405 for HOV lane	Los Angeles	TI[e]	30
Alameda Corridor East	SCAG Region	TI	30
Transbay Terminal	San Francisco	PNRS	27
Nonmotorized Transportation Pilot Program	Marin	Nonmotorized Pilot	25
Increase capacity on I-80	Placer	HPP	22
SR-4 East Upgrade	Contra Costa	NCIIP	20
Inland Empire Goods Movement Gateway	San Bernardino	HPP	20
Total of earmarks at or exceeding $20 million each			**$2,452**
Total of earmarks less than $20 million each			**$1,271**
Total California earmarks			**$3,723**

a National Corridor Infrastructure Improvement Program.

b Southern California Association of Governments—Region includes Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties.

c Projects of National and Regional Significance.

d High Priority Projects.

e Transportation Improvements.

EXHIBIT 12

CALIFORNIA INSTITUTE

THE CALIFORNIA INSTITUTE FOR FEDERAL POLICY RESEARCH
1608 Rhode Island Avenue, NW, Suite 213, Washington, DC 20036 202-546-3700
Fax: 202-223-2330 E-mail: ransdell@calinst.org Web: http://www.calinst.org

SPECIAL REPORT: President's Budget Proposal for Fiscal Year 2007, California Implications - February 7, 2006

On Monday, February 6, 2006, President George W. Bush released the Administration's Budget Proposal for Fiscal Year 2007, which begins October 1, 2006. The Budget proposes $2.77 trillion for fiscal year 2007, and reduces non-security spending for the second straight year.

In more than 2500 pages, the budget documents outline the Administration's recommendations for discretionary and mandatory spending, as well as its revenue proposals. Developing a reliable analysis of any budget is difficult. This document attempts to provide a California-oriented analysis of the proposal, as prepared by the staff of the California Institute for Federal Policy Research. It is available on the Institute's website at http://www.calinst.org/pubs/prbdg07.htm or in Adobe Acrobat (pdf) format at http://www.calinst.org/pubs/prbdg07.pdf.

CONTENTS

DEPARTMENT OF HOMELAND SECURITY

The FY2007 programmatic Budget request for the Department of Homeland Security is $35.6 billion, an increase of $2.3 billion (7 percent) over FY 2006.

Immigration

The Budget documents state that the President's Budget request includes $10.5 billion for Customs and Border Protection and Immigration and Customs Enforcement to "improve border security and immigration enforcement, adding 1,500 Border Patrol agents (an increase of 12 percent over 2006) and more than 6,000 detention beds (an increase of 32 percent over 2006), and lays the foundation for immigration reform."

Citizenship and Immigration Services

The Budget proposes $181.9 million for Citizenship and Immigration Services (CIS) as opposed to the $114 million requested in FY06.

The Budget reiterates the President's call for a Temporary Worker Program and proposes a total of $247 million from DHS programs and offices to implement a TWP, as well as $42 million for additional immigration agents to increase worksite enforcement, and $111 million to expand the employment verification system known as the Basic Pilot Program.

United States Visitor and Immigrant Status Indicator Technology

The FY07 Budget proposes $399.5 million for the US VISIT Program, as opposed to the $340 million requested last year. The US-VISIT program collects, maintains, and shares information on foreign nationals, including biometric identifiers, through a system that determines when the individual: should be prohibited from entering the United States; has overstayed or otherwise violated the terms of admission; should be apprehended or detained for law enforcement action; or needs special protection/attention.

DEPARTMENT OF STATE

Pursuant to treaties between the United States and Mexico and U.S. law, the U.S. Section of the International Boundary and Water Commission is charged with the identification and solution of boundary and water problems arising along the 1,952-mile common border, including Southern borders of Texas, New Mexico, Arizona, and California. The Budget requests $28.5 million compared to the $28 million proposed in FY06.

SMALL BUSINESS ADMINISTRATION

For 2007, the Budget requests $624 million in new Budget authority for the Small Business Administration (SBA), a substantial increase in funding from FY06 of $534 million. The SBA's continuing operations will provide more than $28 billion in new loans to small businesses, funding for non-credit programs, and funding for the disaster loan program.

The President also proposes modest fee increases on very large loans to cover the administrative costs associated with providing Federal Government guarantees on these loans.

DEPARTMENT OF LABOR

The President's Budget proposes $10.9 billion in funding for the Department of Labor, a slight decrease from FY06 funding levels of $11.3 billion.

Job Training

The Administration proposes a significant change to the Budgetary structure of the Labor Department, proposing to combine four job training programs into a single block grant to States. The ultimate goal is to provide more flexibility in how funds can be allocated at the state level. Under the new Budget proposal, funding for job training programs will increase from FY06 funding of $2.5 billion to $2.65 billion.

Migrant and Seasonal Workers Program

For several years in a row, President Bush's Budget eliminates funding for the Migrant and Seasonal Workers Program, citing the program's ineffective rating from its PART assessment. FY06 appropriations for the program, however, are projected to be $80 million. The Budget states that the One-Stop Career Centers, also funded under the Department of Labor, provide many of the same services. California, with its large immigrant population and agriculture industry, typically receives a significant share of the Migrant and Seasonal Worker funds.

TAX PROVISIONS

R&D Tax Credit - The President's Budget proposes permanently extending the Research and Experimentation Tax Credit, commonly called the R&D tax credit, as it did in FY06. The R&D credit expired on December 31, 2005, although provisions are included in pending tax bills to extend it for two years. The Budget estimates that the cost to make the credit permanent will be about 86.4 billion through FY2016. Many of California industries strongly support making the R&D Tax Credit permanent to provide certainty in making long-term research and experimentation decisions

Orphan Drug Credit - The proposal would expand the credit by treating expenses incurred before FDA designation as an orphan drug as eligible for the credit in the same way that expenses incurred after designation are eligible.

Classroom Expenses - The Budget would permanently extend the above-the-line deduction for qualified out-of-pocket classroom expenses for teachers.

Opportunity Zones - The President's Budget proposes the creation of opportunity zones in economically distressed areas, to provide incentives for development and investment in those areas. Included in those incentives are the work opportunity tax credit and the welfare-to-work tax credit.

Brownfields - The Budget proposes permanently extending the expensing of brownfields remediation costs.

Alternative Minimum Tax - In its economic assumptions, the Budget bases future revenues on basis that Congress does not extend a so-called "patch" that reduces that impact of the alternative minimum tax on middle-income taxpayers. With incomes slightly above the national average and high home and property values and costs, Californians are becoming increasingly more likely to be subject to the provisions of the AMT, and an larger than average percentage of the state's taxpayers fall under its provisions.

ARMY CORPS OF ENGINEERS

The Budget proposes about $1.555 billion for Construction funding for FY07 and $2.258 billion in Operations and Maintenance funding.

California has a Budget of $98,232,000 for operations and maintenance in FY 2007. This amount consists of $50,043,000 for commercial navigation, $28,265,000 for flood and coastal storm reduction, $4,237,000 for environment, $15,602,000 for recreation, and $75,000 for water supply projects.

Proposed FY 2007 funding for the Corps of Engineers includes numerous California projects, including:

- American River Watershed - $46.8 million is proposed for construction.
- California Coastal Sediment Master Plan - $300,000 for surveys is proposed.
- Estudillo Canal - $600,000 for surveys is proposed.
- Guadalupe River - $5 million for construction is proposed.
- Hamilton Airfield Wetlands Restoration - $11.7 million for construction is proposed.
- Los Angeles County Drainage Area - $5,564,000 for construction is proposed.
- Matilija Dam - $400,000 for engineering and design is proposed.
- Napa River - $9 million for construction is proposed.
- Napa River, Salt Marsh Restoration - $300,000 for engineering and design is proposed.
- Oakland Harbor 50 Foot Construction Project - $43.5 million for construction is proposed.
- Port of Long Beach (Deepening) - $5.7 million for construction is proposed.
- Sacramento River Bank Protection Project - $10,960,000 for construction is proposed.
- Santa Ana River Mainstem - $54,080,000 for construction is proposed.
- South Sacramento County Streams - $7,313,000 for construction is proposed.
- Success Dam, Tule River (Dam Safety) - $25 million for construction.
- Sutter County - $339,000 for surveys is proposed.
- Upper Penitencia Creek - $319,000 for surveys is proposed.

For a complete list of Corps of Engineers projects in California, go to the Corps website at: http://www.usace.army.mil/civilworks/cecwb/Budget/Budget.pdf .

PRESIDIO TRUST

The President's FY 2007 Budget Proposal recommends $19.26 million for the Presidio Trust, compared to the $20 million proposed last year.

FORMULA GRANT PROGRAMS

A supplementary document to the President's Budget outlines current, predicted, and proposed allocations under some of the largest federal formula grant programs, and lists expenditure totals for each state. In total, 29 programs were outlined at this level of detail. Total FY 2007 federal spending for these 29 programs was estimated at $373.4 billion, which would represent approximately 85 percent of federal spending for all federal grants, of all sizes, to state and local governments. (Only $366.4 billion of the $373.4 billion was estimated to be actually distributed to state and local governments; the balance was either not distributed or flowed to inallocable national accounts.)

California was expected to receive $43.3 billion from those 29 programs in 2007, which would represent an increase from $42.5 billion in 2006 (although both years would represent a decrease from $44.0 billion in 2005).

According to the Budget documents, California's predicted share of those 29 programs was expected to decline from 12.0 percent in 2006 to 11.8 percent in 2007 (after having already fallen from 12.6 percent in 2005). However, the 2007 predictions were based on the assumption that the President's proposals, including significant changes in the Medicaid program, would be fully adopted by Congress.

In fact, the Budget suggests that California's predicted percentage share of federal formula grant spending would be expected to either remain stable or increase for nearly every other grant program, except Medicaid. But Medicaid is by far the largest federal grant, and any change in its funding exerts an enormous impact on federal grant expenditure totals. More than nearly of federal grant spending flows through that one grant program.

As a supplement to this Budget analysis, the California Institute has prepared a set of five tables that breaks out California's and the nation's spending totals under these 29 programs, as reported by the Administration. In addition, the tables calculate the state's percentage shares of total spending, as well as of spending that is distributed among the states and territories. These tables are attached to this document or are available at http://www.calinst.org .

As shown in the tables, California is expected to receive $20.6 billion, or 10.3 percent of the nation's $201 billion, from the Medicaid program in 2007. Compared to 2006, the state's total receipts (federal payments that reimburse outlays by state and local governments for providing health care services for low-income Californians)

EXHIBIT 13

WORK PLAN FOR
U.S. CEMENT INDUSTRY'S CLIMATE CHANGE PROGRAM
PORTLAND CEMENT ASSOCIATION

The U.S. cement industry began a concerted effort to address the issue of climate change in the mid-90s. A key step was the decision to work with EPA through the Climate Wise Program to develop a CO_2 emissions protocol and a means by which to record emissions reductions through the DOE 1605 (b) program. The U.S. industry was then able to accurately quantify cement industry CO_2 emissions and to begin a process of examining ways to reduce them. The product of this assessment culminated in the adoption of a voluntary CO_2 emission reduction goal in July 2001. Similar efforts have since been initiated around the world, resulting in the development of a global cement industry greenhouse gas emissions protocol, prepared under the auspices of the World Business Council on Sustainable Development.

Cement Industry Voluntary Goal: A 10 percent reduction in CO_2 emissions per ton of cementitious product produced or sold from a 1990 baseline by 2020.

The industry is now implementing a three part program to achieve the goal—and to foster additional reductions by users of the product—as described below. The reduction goal will be achieved by changes in the cement manufacturing process and in product formulation. In addition, applications of cement and concrete can result in energy savings that will further reduce overall global greenhouse gas emissions.

1. <u>Process</u>: reduce emissions through increased energy efficiency and decreased fuel use. PCA anticipates that approximately half of the projected reductions will come from these activities.

- Efficiency technologies: continue to take advantage of new technologies such as conversion to modern preheater/precalciner kilns, highly energy efficient fan systems, and other means of reducing energy use per unit of output.
- Alternative fuels and raw materials: utilize alternatives to conventional fuels and raw materials to reduce greenhouse gas and other pollutant emissions all the while attending to the goal of reducing the amount of energy required to produce a ton of cement.
- Demand-side energy management: reduce the amount of electricity used to produce a ton of cement through the application of improved energy management practices and more efficient technologies such as fans, motors, and other items utilized in making cement. While member companies and PCA will track these emission reductions, they will not be counted toward the goal.

Actions:

- Prepare Cement Industry Emissions Protocol: Develop a comprehensive and consistent means of measuring greenhouse gas emissions that result from the production of cement. The GHG Protocol—developed under the auspices of the World Resources Institute and the World Business Council for Sustainable

Development—includes a comprehensive measurement protocol for cement manufacturing emissions. PCA and some of its member companies were involved in the development of this protocol, and the Association endorses the protocol as a measurement and reporting tool. PCA is planning to conduct a workshop to instruct our members in utilizing this tool. PCA is also currently assessing whether this protocol can be further enhanced with some minor adjustments or should be utilized for Climate VISION purposes as it stands.

- Prepare Cement Industry Emissions Profile: To the extent possible, the protocol would be back applied to develop a profile of emissions from the U.S. cement industry for the 1990 baseline.

- Prepare Emission Trend Diagrams: Develop projections for industry emissions through the PCA goal endpoint of 2020, with an interim projection for the Climate VISION endpoint of 2012.

- Identify Near-Term Cost Effective Options: This could include achievable means of reducing or benchmarking emissions or factors contributing to emissions, such as:
    - Plant modernizations
    - Use of alternative fuels and raw materials
    - Strengthening energy management through the ENERGY STAR focus on energy efficiency in U.S. cement manufacturing including supporting meetings, aiding the development of the cement plant energy performance indicator, and applying energy management guidance and other ENERGY STAR opportunities
    - Introducing and implementing DOE energy efficiency tools, training, software and assessment opportunities to cement companies
    - Creating links to websites for ENERGY STAR and DOE's Energy Savers on the PCA website
    - Participating in the Resource Conservation Challenge.

- Research Long-term Cement Technology Alternatives: Contribute to research that could identify or develop emission-reductions technologies or options that are not currently envisioned.

2. <u>Product Formulation</u>: develop cement-production techniques that require a lower proportion of calcined materials, thereby reducing CO_2 emissions per unit of product. PCA anticipates that approximately half of the projected reductions will come from these activities.

Actions:

- Finalize Changes to Portland Cement Standard through ASTM: The U.S. cement industry supports changes to the standard recipe for portland cement developed by the American Society for Testing and Materials (ASTM) to allow intergrinding some uncalcined limestone into the finished product to reduce the proportion of clinker in the finished product. Acceptance of such a change would result in a significant reduction of CO_2 emissions per unit of cement.

- Harmonize ASTM and AASHTO Cement Standards: Some states use a portland cement standard developed by the American Association of State Highway Transportation Organizations, rather than the ASTM standard. After the ASTM standard is improved, the AASHTO standard should be changed to conform.

- Measure Extent of Clinker Factor Reduction in Cementitious Materials Produced: Further reductions in clinker content might be achieved by utilization of non-clinker cementitious materials. PCA will annually quantify the impact of this practice as part of the effort to measure progress toward implementation of the 2020 CO_2-reduction goal.

3. Product Application: promote the use of concrete as a climate change solution based upon the following considerations. This is the area that provides the greatest promise for reductions, yet it is largely beyond the industry's control and therefore will not contribute toward implementation of the 2020 CO_2-reduction goal.

- Energy-Efficient Structures: commercial and residential structures built with concrete exterior walls to enhance their energy efficiency.
- Urban Heat Island Mitigation: light-colored concrete absorbs less and radiates more light energy than dark materials—whether on pavement, roofs, or other surfaces—thereby reducing radiated heat energy and thus ambient temperatures.
- Vehicle Fuel Efficiency: studies indicate that because of its rigidity, concrete pavement enhances fuel efficiency of vehicles when compared to flexible pavements.
- Lifecycle Analysis: because of the three applications above, and other benefits, cement-based concrete compares favorably to competing products; these results should be taken into account in product-selection guidance.

Actions:

- Promote the life-cycle benefits of concrete use to architects, builders, state and federal procurement officials.

- Encourage tax benefits and other incentives for applications of concrete products for paving and building that demonstrate positive life-cycle attributes.

- Participate in ongoing programs such as the U.S. Green Building Council, DOE's Industrial Technologies Program, and ENERGY STAR.

Develop Cross-Sector Projects for Reducing Greenhouse Gas Emission Intensity:

The obvious cross-sector partner for the cement industry is the ready-mix concrete industry. Together, these industries can achieve the product application reductions described above. Other opportunities for cross-sector participation are the steel industry, utilities, and other manufacturing fields that can provide waste products that can be utilized as fuels and raw materials at cement kilns. The use of alternative fuels and raw materials can result in emission reductions in the process and product formulation elements of the workplan by reducing the use of traditional fuels or the clinker content of cement.

On the product application side, the cement industry could team with architects, builders, city planners, paving contractors, procurement officers and others responsible for selecting building and paving materials to demonstrate the environmental benefits of cement and concrete and promote its enhanced market penetration.

Accelerate Investment in R&D and Commercialization of Advanced Technology:

Once again, the opportunities in the technology-development arena can be divided into process, product formulation and product application. Process technologies could include means of enhancing the efficiency of cement operations or of reducing or capturing the CO_2 produced in cement kilns. Further product formulation reductions could result from experimentation with other materials—including by-products and virgin materials—that could be utilized in cement manufacturing in a way that reduces overall GHG emissions. Product application technologies to expand the use of cement and concrete might include new tools or processes for mixing, pouring, and drying concrete.

PCA participated in the development of *Roadmap 2030:The U.S. Concrete Industry Technology Roadmap* in December, 2002. This document defines enabling research opportunities for cement and concrete, and proposes areas where governmental-industrial-academic partnerships can accelerate the pace of development.

Climate VISION

Portland Cement Industry Activity Timeline

Program Area: Manufacturing Process

Activity	Timeline	Outcome
Participate in EPA's Resource Conservation Challenge: Work with government agencies to identify potential alternative fuels and any barriers that affect their use	Ongoing	Alternative fuel use is maximized
Create links to Energy Savers and ENERGY STAR web sites from the PCA web site	Summer 2004	Industry and others are presented with greater information
Utilize World Business Council for Sustainable Development (WBCSD) Greenhouse Gas (GHG) Protocol to track industry emissions	Ongoing	WBCSD Protocol will be used for all reporting and will standardize responses for the industry
Update industry emissions profile	Ongoing	Baseline will be established for measurement of progress
Update emission trend diagrams	Ongoing	Projection of Climate VISION reduction outcome will be made
Identify near-term, cost-effective options such as plant modernizations, alternative fuels and raw materials, and methods for improving the energy efficiency of plants	Ongoing	Opportunities for companies will be made clear
EPA ENERGY STAR Focus: PCA co-hosts with EPA an annual ENERGY STAR Focus for the cement industry	May 2004	Energy efficiency opportunities are identified for the industry; companies are familiarized firsthand with next steps for action
EPA ENERGY STAR Focus: Support the development, use and maintenance of the ENERGY STAR cement plant energy performance indicator (EPI)	Initial - May 2004 and Ongoing	EPI is developed to enable companies to gauge efficiency of cement plants
EPA ENERGY STAR Focus: EPA works with DOE to organize a meeting with the industry to review the efficiency tools available from the DOE Best Practices Program including software, training, plant audit services, etc.	July 2004	DOE tools and resources are made available to companies to support the industry in making improvements
EPA ENERGY STAR Focus: Coordinate the use of and demonstration of energy performance achievements by PCA member companies through use of the EPI	Annual	Annual improvement in energy intensity is demonstrated across member companies
EPA ENERGY STAR Focus: Aid in the finalizing and distributing the ENERGY STAR Energy Guides for cement plant energy efficiency	Completed January 2004	Industry corporate energy managers and plant managers are familiarized with efficiency opportunities identified in the report
Research long-term cement technology alternatives	Ongoing	Emission reduction technologies could be identified

Program Area: Product Formulation

Activity	Timeline	Outcome

Finalize changes to the ASTM portland cement standard	Summer 2004	2% of the total Climate VISION goal is expected from this activity
Harmonize ASTM and AASHTO standards	Ongoing	Allow limestone additions in all states
Measure extent of clinker factor reduction in cementitious materials produced	Spring 2005	Information will be made available to PCA member companies

Climate VISION

Portland Cement Industry Activity Timeline - *continued*

Program Area: Product Application

Activity	Timeline	Outcome
Support research into environmental benefits of concrete structures and paving	Ongoing	Users better informed of benefits
Promote environmental lifecycle benefits to architects, builders, and local/state/federal procurement officials	Ongoing	Greater use of efficient materials will occur

Program Area: Cross-Sector Projects

Activity	Timeline	Outcome
Coordinate with Aluminum Industry: Study pot liners	Ongoing	Explore potential use of waste materials
Coordinate with Carpet Industry: Study carpet use	Ongoing	Explore potential use of waste materials
Coordinate with Automobile Industry: Study used gas tanks	Ongoing	Explore potential use of waste materials
Coordinate with other industries	Ongoing	Explore potential uses of waste materials
Coordinate with the Concrete Industry: Support efficiency efforts where possible; example activity supported development of the Concrete Roadmap with DOE	Ongoing	Concrete industry receives support in controlling its greenhouse gas emissions

Program Area: R&D and Advanced Technology

Activity	Timeline	Outcome
Explore R&D opportunities into further emission reduction areas	Ongoing	Further understanding of emission reduction opportunities

EXHIBIT 14

AMERICAN CONCRETE PAVEMENT ASSOCIATION

Why is concrete such a great pavement choice?

Safety

Best Visibility - Concrete reflects light, which increases visibility and can save on street lighting costs.
Reduced wet spray - Concrete never ruts. There's NO risk of water accumulating in ruts and causing hydroplaning.
Best traction grip - Concrete pavements are easily "roughed up" during construction to create a surface that provides superior traction.

Durability

Rigid for life - Concrete actually hardens over time. After its first month in place, concrete continues to slowly gain 10 percent in strength during its life.
Outlasts flexible materials - With an average life span of 30 years, concrete makes the best long-term pavement solutions.
Exceeds its own life expectancy - Concrete pavements frequently outlast their designed life expectancy and traffic loads.

Smoothness

Concrete stays smoother longer - The rigidity of concrete pavements allows it to keep its smooth riding surface long after construction.
Smoothness most important issue for users - Smoother pavements create safer, more comfortable transportation surfaces.
Roads last longer - Concrete can withstand even the heaviest traffic loads. There's no need to worry about ruts, shoving or washboard effects common with asphalt pavements.
Roads save fuel - Concrete's hard surface makes it easier for rolling wheels. Studies have even shown that this can increase truck fuel efficiency.

Versatility

Variable life expectancy - Concrete pavements can be designed to last from 10 to 50 years, depending upon the system needs.
Ideal for distressed asphalt - Whitetopping, a process of placing a thin layer of fiber-reinforced concrete over prepared asphalt, is a cost-effective, expedient method of rehabbing old pavements.
Best choice for worn concrete - Concrete pavement restoration techniques can extend the life of pavements up to nine times their original design life.

Value

Long-term value - Concrete pavements are by far the best long-term value because of their longer life expectancies and minimal maintenance requirements.
Easy to repair - The durability of concrete minimizes the need for annual repairs or maintenance. When repairs are necessary, they are typically smaller in scope than asphalt pavements.
Rapid paving - Concrete pavement can be built and open to traffic in as little as 12 hours

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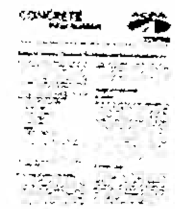
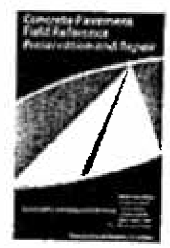




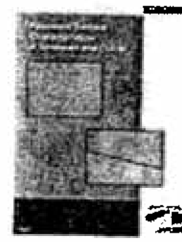


EXHIBIT 15

Frequent Questions

What is a heat island?

Heat islands are characterized by urban air and surface temperatures that are higher than nearby rural areas. Many U.S. cities and suburbs have air temperatures up to 10° F (5.6° C) warmer than surrounding natural land cover.

[See About Heat Islands for more information.]

How do heat islands form?

Heat islands form as cities replace natural land cover with pavement, buildings, and other structures. Built areas absorb more of the sun's heat than do natural surfaces, causing surface and air temperatures to rise. The loss of trees and shrubs also eliminates the natural cooling effects of shading and evapotranspiration, a process that draws heat from the air to convert water contained in vegetation to water vapor.

[See About Heat Islands for more information.]

When do heat islands form?

Heat islands can occur at any time, regardless of season or time of day. They are often largest in the evening when urban areas release stored heat energy into the air from roads and other structures. This urban-rural cooling difference produces maximum heat island intensities three to five hours after sunset. Information presented in this web site pertains mainly to summertime heat islands.

[See About Heat Islands for more information.]

What are the effects of heat islands?

Heat islands can increase air conditioning demand, the incidence of heat-related illness and mortality, and power plant emissions of air pollution and greenhouse gases. In addition to this direct increase in power plant emissions, elevated ambient temperatures can speed up the heat-dependent reaction that forms ground-level ozone.

[See Human Health and the Environment for more information.]

What is ozone?

Ozone is an odorless, colorless gas that can be "good" or "bad" depending on where it is in the atmosphere. "Good" ozone occurs in the stratosphere, approximately 10 to 50 kilometers above the Earth's surface, where it forms a protective layer that shields us from harmful ultraviolet radiation. Stratospheric ozone forms what is known as the ozone layer.

"Bad" ozone, or ground-level ozone, exists closer to the Earth's surface. Ground-level ozone is formed by a chemical reaction between nitrogen oxides and volatile organic compounds in the presence of heat and sunlight. Ground-level ozone is a harmful pollutant and the main constituent of smog.

[See Human Health and the Environment for more information.]

How can cities mitigate heat islands?

Cities can mitigate heat islands by installing cool roofs or green roofs; using cool pavements; and planting shade trees and vegetation throughout an urban area.

The extent to which communities can capture the benefits of these heat island reduction strategies depends on factors such as the types and effectiveness of mitigation measures used, prevailing weather patterns, climate, geography, current urban canopy cover, and pollution transported from up-wind regions.

[See Mitigation Strategies for more information.]

What is albedo?

Albedo is the ability of a surface material to reflect incident solar (short wave) radiation. It is expressed on a scale of 0 to 1 where a value of 0.0 indicates that a surface absorbs all solar radiation, and an albedo value of 1.0 represents total reflectivity. Alternatively, albedo can be expressed as a percentage between 0% and 100%. Light-colored surfaces generally have higher albedos than dark-colored surfaces.

[See Mitigation Strategies for more information.]

What is emittance?

Emittance is the amount of thermal radiation – also known as infrared or long wave radiation – that a material releases or radiates away from its surface. Emittance is expressed as a number between 0.0 and 1.0, or 0% and 100%. With the exception of metals, most building materials have emittances above 85%.

[See Cool Roofs for more information.]

What is a cool roof?

Cool roofs have a high solar reflectance, or albedo, and may also have a high emittance. EPA's ENERGY STAR ® Roof Product Program has cool roofing specifications for both low-slope (primarily commercial) and sloped (primarily residential) roofs. ENERGY STAR low-slope roofs should have an average initial albedo of at least 0.65 while sloped roofs have an average initial albedo of at least 0.25. Although emittance is not a qualifying criterion for ENERGY STAR ®, a value of at least 0.85 further reduces roof temperatures and can decrease the amount of heat transferred to building interiors.

[See Cool Roofs for more information.]

What are the benefits of cool roofs?

On a hot, sunny summer day, traditional roofing materials can reach peak temperatures of 190°F (88°C). By comparison, cool roofs reach maximum temperatures of 120°F (49°C). In buildings with air conditioning (AC), cool roofs can save money on energy bills, lower peak energy demand, and reduce power plant emissions of air pollution and greenhouse gases. In buildings without AC, cool roofs can increase indoor occupant comfort by lowering top-floor temperatures. In both cases, cool roofs can contribute to urban heat island mitigation.

[See Cool Roofs for more information.]

What are some examples of cool roofing applications?

Low-slope cool roofing applications, which are typically used in the commercial building sector, include single-ply and cool coatings. Single-ply roofing is often constructed of white rubber or plastic material that is glued or fastened over the entire roof surface. Cool coatings have the consistency of thick paint, and contain cement particles or elastomeric polymers. They can be applied to a wide range of existing and new roof surfaces.

Sloped cool roofing applications include concrete or clay tile with a white pigment added to the surface or mixed in during manufacturing. These products are typically used in the residential sector.

[See Cool Roofs for more information.]

What is a green roof?

Green roofs, or rooftop gardens, are planted over existing roof structures, including industrial facilities, residences, offices, and other commercial property. These "living" roofs consist of a waterproof, root-safe membrane that is covered by a drainage system, lightweight growing medium, and plants.

[See Green Roofs for more information.]

What are the benefits of green roofs?

Green roof benefits include:

- Reducing rooftop temperatures and heat transfer to the surrounding air;
- Decreasing summertime indoor temperatures, which reduces air conditioning demand and peak energy consumption for cooling;
- Lessening pressure on sewer systems through the absorption of rainwater;
- Filtering pollution – including heavy metals and excess nutrients – through the processes of bio- and phytoremediation; and
- Protecting underlying roof material, reducing noise, providing a habitat for birds and other small animals, and improving the quality of life for building inhabitants.
  Reducing the urban heat island effect by decreasing rooftop temperatures through evapotranspiration, which cools the surrounding air.

[See Green Roofs for more information.]

What are some examples of green roof applications?

Green roofs are generally classified either as intensive or extensive. Intensive green roofs require a minimum of one foot of soil. Trees and shrubs are usually planted, adding 80 to 150 pounds per square foot of load to the building. These roofs require complex irrigation and drainage systems, and significant maintenance. Intensive roofs are often accessible to the public.

Extensive green roofs require only 1 to 5 inches of soil. Low lying plants and grasses are usually planted, and 12 to 50 pounds per square foot of load may be added. These roofs use simple irrigation and drainage systems, and require little maintenance. Extensive green roofs usually are not accessible to the public.

[See Green Roofs for more information.]

What is a cool pavement?

Although there is no official standard or labeling program to designate cool paving materials, the term "cool pavement" is often used to describe light-colored or permeable pavements. Pavements with high solar reflectance may absorb less heat than traditional products and contribute to heat island mitigation.

[See Cool Pavements for more information.]

What are some examples of cool pavement applications?

Asphalt concrete and portland cement concrete – commonly called "concrete" and "asphalt," respectively – are the most common paving materials for sidewalks and streets. Most new concrete has a solar reflectance, or albedo, of 35% to 40%; the solar reflectance of fresh asphalt is typically 5% to 10%.

Over time, the albedos of these pavements change. Asphalt lightens as the binder wears away to expose the underlying rock aggregate, while concrete darkens from the build-up of tire residue, dirt, and oil. To maximize the albedo of both types of pavement, lighter-colored aggregate can be used in the pavement mix.

Permeable, or porous, pavements allow water to percolate and evaporate, cooling the pavement surface and surrounding air. Permeable pavements can be constructed from a number of materials including concrete, asphalt, and plastic lattice structures filled with soil, gravel, and grass.

[See Cool Pavements for more information.]

What is urban forestry?

Urban forestry is the process of increasing and maintaining the vegetative land cover in an urban area. Many cities plant and maintain trees and other vegetation outside of commercial buildings, along highways, and on residential streets. Planting shade trees in urban parking lots is another common application.

In addition, trees and vegetation can be planted strategically – next to homes and buildings – to save energy. This blocks the sun's rays and reduces heat transfer to interiors along with the need for air conditioning.

[See Trees and Vegetation for more information.]

How does urban forestry mitigate the heat island effect?

Increasing the amount of urban vegetation decreases local ambient air temperatures through shading and evapotranspiration. The U.S. Department of Agriculture Forest Service estimates that maximum mid-day air temperature reductions are in the range of 0.07°F (0.04°C) to 0.36°F (0.2°C) for every one percent increase in the canopy cover.

Shading can play an important role in building-level cooling by preventing solar radiation from coming in contact with, and being absorbed by, building materials.

In addition, urban forestry provides cooling through evapotranspiration. A mature 40 foot tree with a crown of 30 feet can decrease air temperature by transpiring as much as 40 gallons of water per day.

[See Trees and Vegetation for more information.]

What are the benefits of urban vegetation?

Benefits of urban vegetation include:

- Decreasing air conditioning demand and peak energy consumption for cooling by shading buildings from solar radiation;
- Ambient cooling from evapotranspiration;
- Increasing property values through aesthetic enhancement; and
- Enhancing air quality by removing particulate pollutants from the air and by decreasing the emissions associated with air conditioning energy demand.

[See Trees and Vegetation for more information.]

What are some examples of shade tree and vegetation applications?

Shade trees and vegetation can be used in parking lots to prevent storm water runoff, and around buildings to decrease interior temperatures. In most U.S. cities, trees should shade the east and especially west walls to maximize cooling savings. Planting trees directly to the south may provide little shade in the summertime and block desired sun in the wintertime. Effective tree planting efforts require detailed information on species selection, site selection and preparation, and ongoing maintenance.

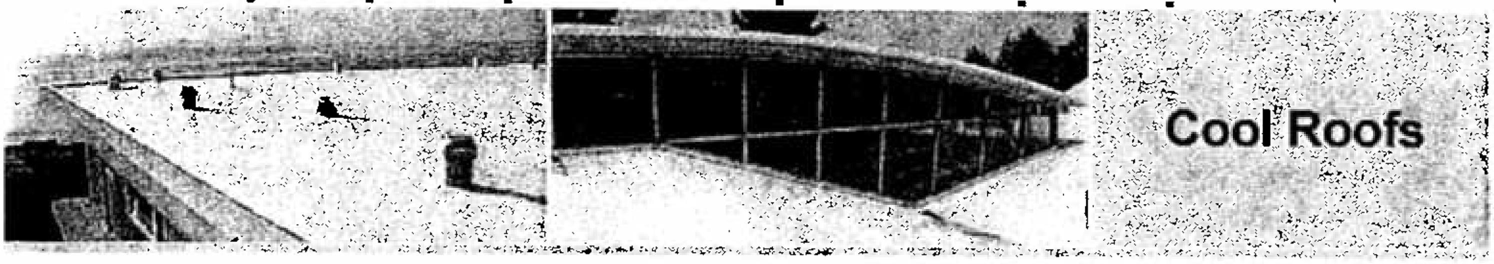
[See Trees and Vegetation for more information.]

How are heat islands, global warming, and climate change related?

Heat islands describe local-scale temperature differences between urban and rural areas. In contrast, global warming refers to the gradual rise of worldwide average surface temperatures.

[See About Heat Islands for more information.]

EXHIBIT 16



FREQUENTLY ASKED QUESTIONS ABOUT COOL ROOFS

What is a cool roof?

Cool roofs are highly reflective and emissive materials that stay 50 to 60 degrees F cooler in the summer sun, thereby reducing energy costs, improving occupant comfort, cutting maintenance costs, increasing the life cycle of the roof, and contributing to the reduction of urban heat islands and associated smog.

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What kind of roofing products are available for

Cool Roofs Main Page

Find Out More...

FAQs About Cool Roofs

Cool Roof Links

Other Places to Visit

Title 24 *Blueprint Newsletter* Issue # 83 on Cool Roofs
(PDF file, 1.4 megabytes)

Energy Videos on Cool Roof
California Energy Commission

Cool Roof Rating Council

Cool Roofing Materials Database
Lawrence Berkeley Laboratory

ENERGY STAR® Reflective Roof Products
Product and manufacturers lists.

FLEX YOUR POWER
Product Guide on Cool Roofs and California Rebates

Heat Island Group
Lawrence Berkeley Laboratory

commercial and residential applications?

Products for low-slope roofs, found on commercial and industrial buildings, fall into two categories - single-ply materials and coatings. Single-ply materials are large sheets of pre-made roofing that are mechanically fastened over the existing roof and sealed at the Seams. Coatings are applied using rollers, sprays, or brushes, over an existing clean, leak-free roof surface.

Products for sloped roofs, usually found on residences, are currently available in clay, or concrete tiles. These products stay cooler by the use of special pigments that reflect the sun's infrared heat. Lower priced shingles or coated metal roofing products are not yet available in "cool" versions.

Visit the ENERGY STAR® Website for a list of cool roof products and manufacturers. www.energystar.gov

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How cool is a cool roof?

During the summer, a typical dark roof is 150 to 190 degrees Fahrenheit at peak, while cool roofs peak at 100 to 120 degrees Fahrenheit.

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Do cool roofs cost more than conventional roofs?

Initial material costs are comparable with traditional roofing materials - some cool products cost less than traditional materials, some cost up to 20% more. Cool protective coatings can be reapplied repeatedly every 10 to 15 years and reduce, if not eliminate the need for expensive roof tear-offs. Combining these maintenance savings with an average 20 percent savings on air conditioning costs make cool roofing a better bargain over the long term.

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Are rebates available for cool roofs?

In addition to energy and life cycle savings, rebates are available from some local utility companies for cool roofing in California. For more information on cool roof rebates, visit the Flex Your Power website at: www.fypower.org

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Where do I find cool roofs in California's Title 24 Building Energy Efficiency Standards?

Cool roofs are included as a performance option in Title 24. Refer to Section 10-113 for information on certification and labeling requirements for reflectance and emittance of cool roof products. For the prescriptive compliance approach in the energy efficiency standards, view section 118 of Title 24. Sections 141, 142, and 151(b) outline the performance approach. For the latest applicable Standard see: www.energy.ca.gov/title24/

For updates and general information on Title 24 and to download the new Residential Manual (available August 2001), visit www.energy.ca.gov/title24/

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Are cool roofs required in California's residential or nonresidential energy efficiency standards?

No, they are not required, but there are energy credits available to those who use the compliance options in the performance approach.

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What specifications does a roof need to meet to be considered for credit under the Title 24 Standards?

Commercial and residential products must meet the following specifications according to the ASTM standards outlined below:

	ASTM	Tiles	Multiply or Liquid
Solar Reflectivity	E903 or E1918	0.40+	0.70+
Emittance Factor	E408	0.75+	0.75+

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When did the Cool Roof Rating Council become the supervisory entity for cool roofs in California?

The Cool Roof Rating Council (CRRC) became the supervisory entity responsible for administering California's certification program for roofing products beginning January 1, 2003. At this time, every roofing product that is installed to comply with Title 24 will need to carry a packaging label that lists the product's reflectance and emittance as tested in accordance with ASTM standards.

For more information, see "Section 10-113 - Certification and Labeling of Roofing Product Reflectance and Emittance" of the Building Energy Standards. Until this time, all products must be ENERGY STAR® qualified. For a list of qualified products, visit www.energystar.gov

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EXHIBIT 17

information

ENVIRONMENTAL
COUNCIL of CONCRETE
ORGANIZATIONS

5420 Old Orchard Road
Skokie, Illinois
600 77-1083
800 994-ECCO (3226)
FAX (84 7) 966 8389

Shining a Light on "Cool Communities"

"Cool Communities" are having their day in the sun.

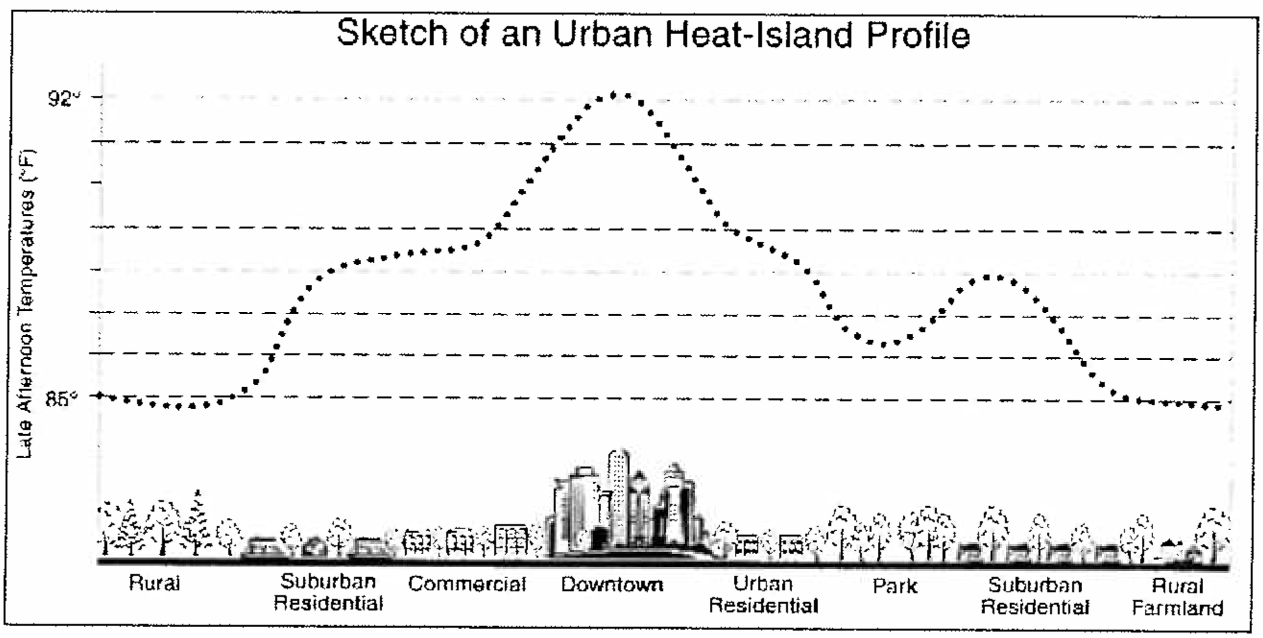
Modern-day planners and architects are learning what Mediterranean and Native American builders have known for millennia: Major scale residential and commercial structures can be planned and built to beat the heat and moderate the "heat island" urban effect which raises the average temperatures of America's cities and suburbs.

Consistent use of portland cement-based building materials for structures and pavements—along with strategic landscaping—is a prime element of the "Cool Communities" concept.

The *Cool Communities Partnership* is a program of the U.S. Department of Energy, other federal agencies, American Forests, and private industry, under DOE's *Energy Partnerships for a Strong Economy* effort.

The Partnership applies the research products of the *Urban Heat Island Research* project of Lawrence B. Livermore National Laboratory (LBL) at Berkeley, Calif. A project goal is to develop practical use of reflective surfaces and vegetation in cities as a means of improving energy use in buildings, reducing atmospheric concentrations of greenhouse gases, lowering air and water pollution, and enhancing sustainable development.

Much of the scientific research and development of materials for cooling our nation's cities is being done by the Heat Islands project. In early 1998 there were 13 designated



Summer daytime temperature profiles rise significantly in urban areas.
Source: Lawrence B. Livermore National Laboratory, Berkeley, Calif.

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"Cool Communities" in which demonstration projects were taking place.

This research is showing that use of light- and heat-reflective concrete-based materials, along with careful planting of trees, could lower the average summer afternoon temperature in some cities by as much as 5°F, cutting the need for air conditioning by 18 percent and even reducing air pollution. And high-reflectivity pavements and structural materials enhance night illumination with concurrent energy savings, observes the National Ready Mixed Concrete Association.

Master-planned communities in the Sunbelt are being constructed with "Cool Communities" concepts in mind. But structures with "Cool Communities" design elements are lowering energy costs in the Northern tier of states as well, because energy consumption in concrete buildings is lower due to concrete's thermal mass.

Thermal mass may be used in the exterior building envelope to delay and reduce heat losses and gains, reports the National Concrete Masonry Association. Interior thermal mass may be used to increase thermal comfort and shift heating and cooling loads to off-peak hours. (See also ECCO's *Thermal Mass—The Energy Saver in Concrete and Masonry Buildings*, EV12.) Interior thermal mass is a crucial factor for achieving the desired performance of passive solar buildings, NCMA states.

Energy efficiency the main event

Urban heat islands are not inevitable, but are the product of dark roofs, black pavement, and loss of vegetation. "Cool Communities" planning lowers air-conditioning and electricity use and can reduce urban haze or smog.

But why bother in an era of cheap energy? Through a combination of abundant supplies, more efficient consumption and deregulation of prices, the United States has enjoyed low energy prices in recent years. And restructuring of the nation's electricity generation, transmission and distribution industry—now in various stages of implementation—is anticipated to lower prices even more for most customers well beyond the turn of the century.

But in an era of low energy prices, energy efficiency still makes sense. More efficient energy consumption keeps supplies abundant. Furthermore, low energy prices may not stay low indefinitely if carbon taxes are instituted by the U.S. government to meet greenhouse gas emission reductions required by the United Nations Kyoto climate change treaty (December 1997).

And since all energy, from air-conditioning to lights, uses fuel, Cool Communities can help forestall global climate change by reducing energy consumption and related greenhouse gas emissions.

The public is becoming aware of the impact of their decisions on this issue. More than 25 percent of buyers say that it's important to buy a home constructed with green methods, such as less wood, reports *Professional Builder* Magazine. Better energy efficiency is important to 22 percent of home buyers, the magazine said.

Summers in the city

Global warming aside, there's no doubt that summers in the city are hot, and getting hotter. Historical data show an increase in inner cities' temperatures since buildings and pavement began replacing agriculture near urban areas. One report indicates average U.S. urban temperatures have risen an average of 2° to 4°F in the last 40 years.

Of the methods for reducing cooling loads, use of trees and high-albedo (high-reflectivity) surfaces are paramount. High-albedo surfaces (usually light-colored) contain building materials that are more reflective of the sun's energy and can greatly reduce a building's cooling load. And this high reflectivity provides even another benefit in the form of energy saved on lighting streets at night.

Albedo is measured on a scale of 0 to 1.0. A surface with a relatively high albedo of 0.75

Landscaping to reduce energy use

While light-colored, high-thermal mass concrete construction is essential to "Cool Communities" design, careful landscape architecture design and tree planting programs are just as necessary.

Within 10 to 15 years—the time it takes a tree to grow to a useful size—properly placed trees can reduce heating and cooling costs by an average of 10 to 20 percent. Over their lives, trees can be much less expensive than air conditioners and the energy needed to run them.

Maximum benefits will be derived from deciduous trees shading the south and west sides of a building, to block the summer sun. For a home monitored in Sacramento, Lawrence B. Livermore National Laboratory *Mitigation of Heat Islands* project researchers found that this reduced cooling energy use by as much as 30 percent.

"Trees, bushes or vines should also shade your air conditioner, which works more efficiently when kept cool. Also, evergreen trees and bushes to the northwest can protect buildings from cold winter winds," they said.

reflects most of the incoming energy while one with a low albedo will absorb most of it. Geometry and surface texture can impact albedo. Structures and pavements utilizing concrete provide high albedo ratings.

Under the direction of researcher Hashem Akbari, LBL's *Heat Islands* project monitored buildings in Sacramento with lightly colored, higher-reflectivity roofs. They found that these buildings used up to 40 percent less energy for cooling than those with darker roofs. A similar study by the Florida Solar Energy Center also showed up to 40 percent cooling energy savings.

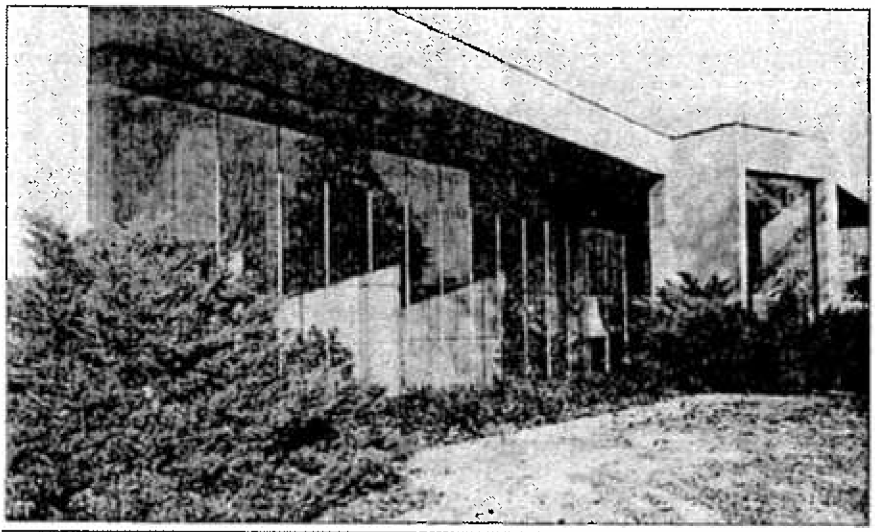
Switch to concrete pavements

Blacktopping of faded asphalt pavements in urban heat islands should be discontinued, write Arthur H. Rosenfeld and Joseph J. Romm, U.S. Department of Energy; Alan C. Lloyd, Energy and Environmental Engineering Center at the Desert Research Institute, Reno; and Akbari in the February/March 1997 issue of MIT's *Technology Review*

"Better yet would be to switch the binder from asphalt to lighter-colored portland cement," they write. "Although its first cost is higher than asphalt, cement is stronger and lasts longer, so its life-cycle cost is lower. Iowa already requires [concrete] roads as a long-term cost-savings policy."

And longer life-cycles translate to fewer wasted resources and energy. These considerations are borne out in quantitative research by T. Asaeda, et. al., Saitama University, Japan (1996). And the American Concrete Pavement Association is actively promoting concrete roadways and "whitetopping" of asphalt pavements on that basis.

Also, tests have shown "cool" terra-cotta roof tiles can run 6°F cooler than "white" asphalt-fiberglass shingles. And an analysis of Frederick, Md., has estimated potential savings of $3.4 million annually from strategic tree planting around existing buildings.



Headquarters of precast concrete producer Trenwa, Inc., Fort Mitchell, Ky., features "Cool Community" concepts such as southwestern-exposed massive concrete wall near glass exterior wall and white aggregate reflecting yard. Photo courtesy of *Concrete Products* magazine.

Encouraging 'Cool Communities'

The U.S. Department of Energy's *Cool Communities* Program is an ongoing part of a national effort to enhance energy efficiency. Besides the Cool Communities demonstration projects, efforts to encourage cool communi-

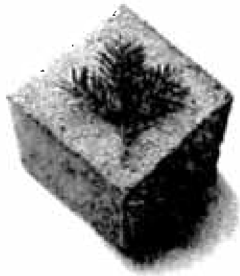
Pumice concrete in Santa Fe replaces adobe

Ironstone Gardens is an innovative commercial redevelopment in the heart of Santa Fe, N.M.'s warehouse district. Features include passive solar design, low energy consumption, heavy insulation (R40 in roofs; R24 in walls), and low timber use.

One building (5,200 square feet) is constructed with a material dubbed "pumice-crete", its first commercial use in Santa Fe. Because timber is an expensive commodity in the Southwest and is reducing old-growth forest reserves elsewhere, pumice-crete not only produces cost savings while minimizing the impact on the environment, but also provides a stronger, more durable product for construction than other alternative materials.

At Ironstone Gardens, the pumice/cement mix replaces adobe. The mix is a lightweight, cast-concrete material that uses pumice nodules bound by a light coating of cement and water. Only 2-1/2 sacks of cement per cubic yard are mixed with the pumice to produce a material superior to adobe in compressive strength and durability, with a natural insulating R value of 1-1/2 per inch, (versus an R value of 0.3 for adobe or 1 for wood).

This indicates—in the case of this building—an insulating value of R 24 for the pumice concrete, without additional insulation. In addition to its insulating value, pumice-crete has a compressive strength of 600-700 psi compared to adobe, which is around 200 psi. In terms of overall cost comparison, pumice-crete is approximately 25 percent less expensive than adobe.



Computer simulation indicates cooler L.A.

Computer models indicate that a "Cool Communities" strategy can have a lucrative benefit/cost ratio for major cities, researchers say.

Los Angeles could enjoy cooler summers if cooler-colored building materials and pavements were used, and shade trees planted, write Arthur H. Rosenfeld and Joseph J. Romm, U.S. Department of Energy; Alan C. Lloyd, Energy and Environmental Engineering Center at the Desert Research Institute, Reno; and Hashem Akbari, of the Heat Island project at DOE's Lawrence B. Livermore National Laboratory, in the February/March 1997 issue of MIT's *Technology Review*.

"In our own simulation, we raise the city albedo—the reflected fraction of incident solar heat—by a modest 7.5 percent and cover 5 percent of its area with 10 million trees," they write. "The use of white roofs and shade trees in Los Angeles would lower the need for air conditioning by 18 percent, or 1.04 billion kilowatt-hours, for the buildings directly affected by the roofs and shaded by the trees." They estimate peak period electricity savings at about $100 million per year. Reduction in air conditioner noise pollution is an added benefit.

If an entire community drops a degree or so in temperature due to "Cool Communities" concepts, everyone else's air conditioning load will go down as well, even for structures not incorporating "Cool Communities" design, they write. This indirect annual savings would total an additional 12 percent, or $70 million.

"Implementing these cool community measures would lower the need for peak electrical generating capacity by about 1,500 megawatts, equivalent to two or three large power plants," they write. Because heat causes smog to form and ozone concentrations to rise, the overall-cooler temperature would moderate those conditions as well.

ties are continuing on other fronts.

In the late 1990s, in its next revision, the National Energy Performance Standards for Buildings (of the American Society of Heating, Refrigeration and Air-Conditioning Engineers) may give energy-conservation credits for cool roofs and shade trees.

Similar credits were to be offered in the California Title 24 building standard. The South Coast Air Quality Management District in California has accepted "Cool Communities" strategies as the most cost-effective single measure in the reduction of smog.

And American Society for Testing and Materials Subcommittee E06.21.16 continues to work to standardize procedures for rating roofs and pavements for reflectivity. In 1998 a new Cool Roof Rating Council—with representatives from roofing manufacturers, electric utilities and code bodies—was being formed to tackle these issues.

Also, new federal regulations revised Jan. 1, 1997, require energy efficient design that favor "Cool Communities" concepts (Code of Federal Regulations, Title 10, Volume 3, Parts 200 to 499, Part 435: *Energy Conservation Voluntary Performance Standards for New Buildings; Mandatory for Federal Buildings*). These regulations would favor concrete's high albedo and high thermal mass in structural applications.

Without doubt, and for many reasons — its low embodied energy, high-reflectivity and thermal mass, and ease of recyclability — concrete is the building material of choice for structures and pavements in environmentally friendly "Cool Communities."

The Environmental Council of Concrete Organizations is a coalition dedicated to promoting the environmental benefits of concrete and its role in safe and sustainable construction.

ECCO members are companies, organizations, and individuals affiliated with the concrete industry. Together, they are committed to developing and disseminating information on the environmental benefits of concrete and concrete products.

EXHIBIT 18

information

ENVIRONMENTAL
COUNCIL *of* CONCRETE
ORGANIZATIONS

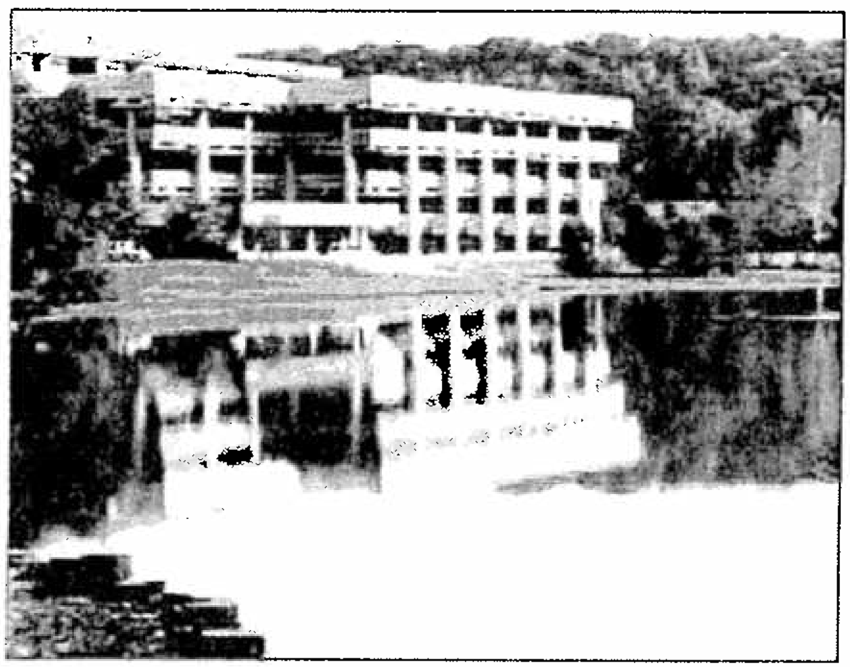
5420 Old Orchard Road
Skokie, Illinois
60077-1083
800 994 ECCO (3226)
FAX 847 966 8389
www.ecco.org

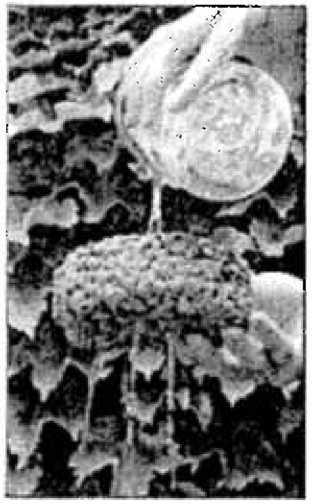
LEED Green Building Rating System and Concrete

Using concrete can facilitate the process of obtaining LEED™ Green Building certification. Leadership in Energy and Environmental Design (LEED) is a point rating system devised by the United States Green Building Council (USGBC) to evaluate the environmental performance of a building. The system is credit-based, allowing projects to earn points for environmentally friendly actions taken during the building process.

LEED was launched in an effort by the USGBC to develop a "consensus-based, market-driven rating system to accelerate the development and implementation of green building practices." The program is not rigidly structured, i.e., not every project must meet identical requirements to qualify.

The LEED rating system has five main credit categories: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. Each category is divided into credits. Detailed information on the LEED program and project certification process is available on the USGBC website, www.usgbc.org. The program outlines the intent, requirements, technologies, and strategies for meeting each credit. Credits are broken down into individual points. Additional points can be earned for innovation and use of a LEED-accredited professional on the project team.





Sustainable Sites Credit 6.1. Water flows freely through a section of pervious pavement.

Points for Certification

A building requires at least 26 points for certification. Silver, gold, and platinum levels are also available.

Credit Category	*Points Available*
Sustainable Sites	14
Water Efficiency	5
Energy and Atmosphere	17
Materials and Resources	13
Indoor Environmental Quality	15
Total Core Points	64
Innovation and Design Process	5

LEED Certification Levels	
Certified	26 - 32 Points
Silver	33 - 38 Points
Gold	39 - 51 Points
Platinum	52+ Points

Concrete and LEED

The following are suggestions for earning LEED points through the use of cement and concrete products. The paragraph headings below correspond to the credit categories and the credit numbers in the LEED rating system.

Brownfield Redevelopment (Sustainable Sites Credit 3). Cement can be used to solidify and stabilize contaminated soils and reduce leaching concentrations to below regulatory levels. Documentation is required indicating the site was contaminated and the remediation performed. This credit is worth 1 point.

Stormwater Management: Rate and Quantity (Sustainable Sites Credit 6.1). The intent of this credit is to limit disruption and pollution of natural water flows by managing storm water runoff. Using pervious concrete pavements will reduce the rate and quantity of storm water runoff because they increase infiltration of stormwater. Pervious concrete contains coarse aggregate, little or no fine aggregate, and insufficient cement paste to fill the voids between the coarse aggregate. It results in concrete with a high volume of voids (20% to 35%) and a high permeability that allows water to flow through easily. Similar results can be achieved by using concrete pavers that have large voids where vegetation can grow. This credit is worth 1 point.

Landscape and Exterior Design to Reduce Heat Islands (Sustainable Sites Credit 7.1). "...[U]se light-colored/high-albedo materials (reflectance of at least 0.3) for 30% of the site's non-roof impervious surfaces." This requirement can be met by using portland cement concrete rather than asphalt concrete for 30% of all sidewalks, parking lots, drives and other impervious surfaces.

Albedo, which in this context is synonymous with solar reflectance, is the ratio of the amount of solar radiation reflected from a material to the amount that shines on the material. Solar radiation includes the ultraviolet as well as the visible spectrum. Generally, light-colored surfaces have a high albedo, but this is not always the case. Surfaces with lower albedos absorb more solar radiation. The absorbed radiation is converted into heat and the surface gets hotter. Where paved surfaces are required, using materials with higher albedos will reduce the heat island effect—consequently saving energy by reducing the demand for air conditioning—and improve air quality.

Portland cement concrete generally has a reflectance of approximately 0.35, although it can vary. Measured values are reported in the range of 0.4 to 0.5. For "white" portland cement, values are reported in the range of 0.7 to 0.8. New asphalt concrete generally has a reflectance of approximately 0.05, and asphalt concrete five or more years old has a reflectance of approximately 0.10 to 0.15. This credit is worth 1 point.

Minimum Energy Performance (Energy and Atmosphere Prerequisite 2). All buildings must "meet building energy efficiency and performance as required by the ANSI/ASHRAE/IESNA 90.1-1999 or the local energy code, whichever is the more stringent." The ASHRAE standard is usually more stringent and applies for most states. The requirements of the ASHRAE standard are cost-effective and not particularly stringent for concrete. Insulating to meet or exceed the requirements of the standard is generally a wise business choice. Determining compliance for the envelope components is relatively straightforward using the tables in Appendix B of the ASHRAE standard. Minimum requirements are provided for mass and nonmass components such as walls and floors.

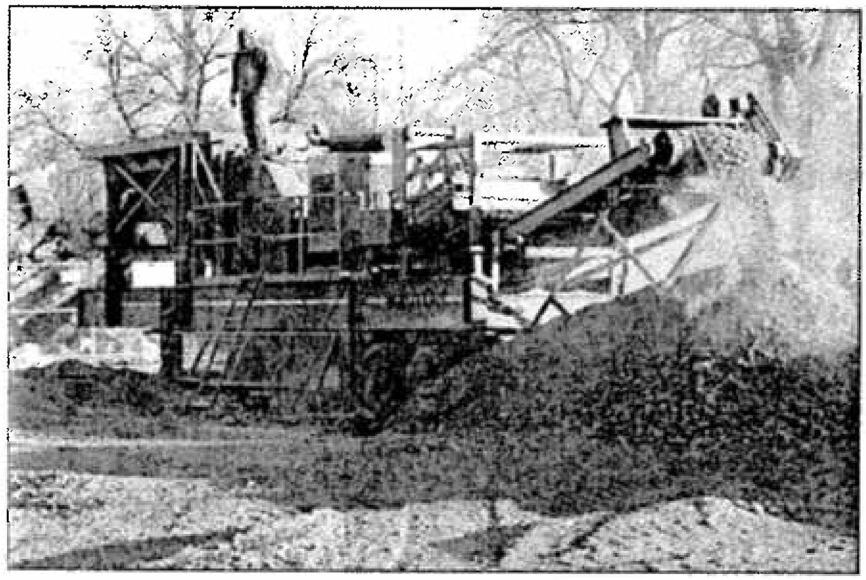
Components constructed of concrete generally are considered "mass." This means the components have enough heat-storage capacity to moderate daily temperature swings. Buildings constructed of cast-in-place, tilt-up, precast concrete, insulating concrete forms (ICF), or masonry possess thermal mass which helps moderate indoor temperature extremes and reduces peak heating and cooling loads. In many climates, these buildings have lower energy consumption than non-massive buildings with walls of similar thermal resistance; and heating, ventilating, and air-conditioning can be met with smaller-capacity equipment. This item is required and is not worth any points.

Optimize Energy Performance (Energy Credit 1). This credit is allowed if energy cost savings can be shown compared to a base building that meets the requirements of ANSI/ASHRAE/IESNA 90.1-1999. The method of determining energy cost savings must meet the requirements of Section 11 of the standard.

Many engineering consulting firms have the capability to model a building to determine energy savings as required using a computer-based program such as DOE2. When concrete is considered, it is important to use a program like DOE2 that calculates yearly energy use on an hourly basis. Such programs are needed to capture the beneficial thermal mass effects of concrete. Insulated concrete systems, used in conjunction with other energy savings measures, will most likely be eligible for points. The number of points awarded will depend on the building, climate, fuel costs, and minimum requirements of the standard. From 1 to 10 points are awarded for energy cost savings of 15% to 60% for new buildings and 5% to 50% for existing buildings.

Building Reuse (Materials Credit 1). The purpose of this credit is to leave the main portion of the building structure and shell in place when renovating. The building shell includes the exterior skin and framing but excludes window assemblies, interior walls, floor coverings, and ceiling systems. This credit should be obtainable when renovating buildings with a concrete skin, since concrete in buildings generally has a long life. This is worth 1 point if 75% of the existing building structure/shell is left in place and 2 points if 100% is left in place.

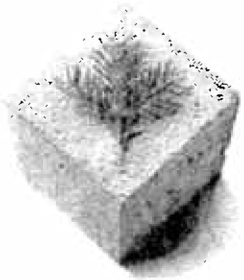
Construction Waste Management (Materials Credit 2). This credit is extended for diverting construction, demolition, and land clearing waste from landfill disposal. It is awarded based on diverting at least 50% by weight of the above listed materials. Since concrete is a relatively heavy construction material and is frequently crushed and recycled into aggregate for road bases or construction fill, this credit should be obtainable when concrete buildings are demolished. This credit is worth 1 point if 50% of the construction, demolition, and land clearing waste is recycled or salvaged and 2 points for 75%.



Material Credit 2. The picture shows machinery taking portions of concrete walls, columns, and floors and crushing them to be used as fill material.

For concrete, either the credit for building reuse or the credit for construction wastemanagement can be applied for, but not both, because the concrete structure is either reused or recycled into another use.

Recycled Content (Materials Credit 4). The requirements of this credit state: "use materials with recycled content such that post-consumer recycled content constitutes at least 5% of the total value of the materials in the project OR combined post-consumer and one-half of the post-industrial recycled content constitutes at least 10%." The percentage is determined by multiplying the cost of an item by the percent of recycled materials—on a mass basis—that make up that item. Supplementary cementitious materials, such as fly ash, silica fume, and slag cement are considered post-industrial. Furthermore, using recycled concrete or slag as aggregate instead of extracted aggregates would qualify as post-consumer. Although most reinforcing bars are manufactured from recycled steel, in LEED, reinforcing is not considered part of concrete. Reinforcing material should be considered as a separate item. This credit is worth 1 point for the quantities quoted above and 2 points for an additional 5% post-consumer recycled content OR an additional 10% combined post-consumer and one-half post-industrial recycled content.



Points must be documented according to LEED procedures in order to be earned. The USGBC website, www.usgbc.org, contains a downloadable "letter template" that greatly simplifies the documentation requirements for LEED version 2.1.

Using concrete can increase the number of points awarded to a building in the LEED system. The potential available points that can be earned through the use of concrete range from 11 to 21.

Local/Regional Materials (Materials Credit 5). The requirements of this credit state: "Use a minimum of 20% of building materials that are manufactured regionally within a radius of 800 km (500 miles)." This means that a ready-mix or precast plant within 800 km (500 miles) of the building would qualify. Concrete will usually qualify since ready-mix plants are generally within 80 km (50 miles) of a job site. The percentage of materials is calculated on a cost basis. This credit is worth 1 point.

An additional point is earned if 50% of the regionally manufactured materials are extracted, harvested, or recovered within 800 km (500 miles). Ready-mix and precast plants generally use aggregates that are extracted within 80 km (50 miles) of the plant. Cement and supplementary cementitious materials used for buildings are also primarily manufactured within 800 km (500 miles) of a job site. Reinforcing steel is also usually manufactured within 800 km (500 miles) of a job site, and is typically made from recycled materials from the same region.

Others Points

Concrete can also be used to get points indirectly. For example, the Pennsylvania Department of Environmental Protection building in Harrisburg, Pennsylvania is LEED Bronze certified and features a concrete floor with low-VOC sealant. This allowed the building to obtain the Low Emitting Materials credit under Indoor Environmental Quality.
One point is also given if a principal participant of the project team is a LEED Accredited Professional. The concrete industry has LEED-experienced professionals available to help maximize points for concrete.

In addition to the points discussed above, 4 points are available under Innovation Credits. These points can be applied for if an innovative green design strategy is used that does not fit into the point structure of the five LEED categories or if it goes significantly beyond a credit requirement. For example, the USGBC has issued a credit interpretation that allows for an innovation credit if 40% of the cement in concrete is replaced with slag cement or fly ash. However, using fly ash in this higher-than-usual dosage is not common, and special testing for compatibility and concrete properties is required for quality concrete.

Benefits of LEED Certification

LEED certification is a voluntary program; however, obtaining a LEED certification projects a positive environmental image to the community. Additionally, meeting many of the green building practices can result in energy and cost savings over the life of the structure. Other advantages include better indoor air quality and plenty of daylight. Studies have shown that workers in these environments have increased labor productivity, job retention, and days worked. These benefits contribute directly to a company's profits because salaries—which are about ten times higher than rent, utilities, and maintenance combined—are the largest expense for most companies occupying office space. Students in these environments have higher test scores and lower absenteeism.

The following cities and states either provide tax credits or grants for green buildings, or require green building certification for public buildings: Massachusetts, New York, Pennsylvania, Chicago, Los Angeles, Portland, San Diego, San Jose, and Seattle. Conditions vary and the list is growing, so please contact local jurisdictions for details.

The U.S. government is adopting green building programs similar to LEED through the General Services Administration, which owns or leases over 8300 buildings, and the U.S. Army, which has adopted LEED into its Sustainable Project Rating Tool (SPiRiT). Support for green buildings is increasing, so the above list should not be considered complete.

The LEED Green Building Rating System, Version 2.1, promotes environmentally conscious buildings for the improvement of outdoor and indoor building quality and the reduction of waste during the building process. Concrete can be used in conjunction with the LEED program to earn a LEED certification.

The Environmental Council of Concrete Organizations is a coalition dedicated to promoting the environmental benefits of concrete and its role in safe and sustainable construction.

ECCO members are companies, organizations, and individuals affiliated with the concrete industry. Together, they are committed to developing and disseminating information on the environmental benefits of concrete and concrete products.

EXHIBIT 19

CAMBRIDGE SYSTEMATICS

Cool Pavement Report

EPA Cool Pavements Study - Task 5

draft

report

prepared for

Heat Island Reduction Initiative, U.S. Environmental Protection Agency

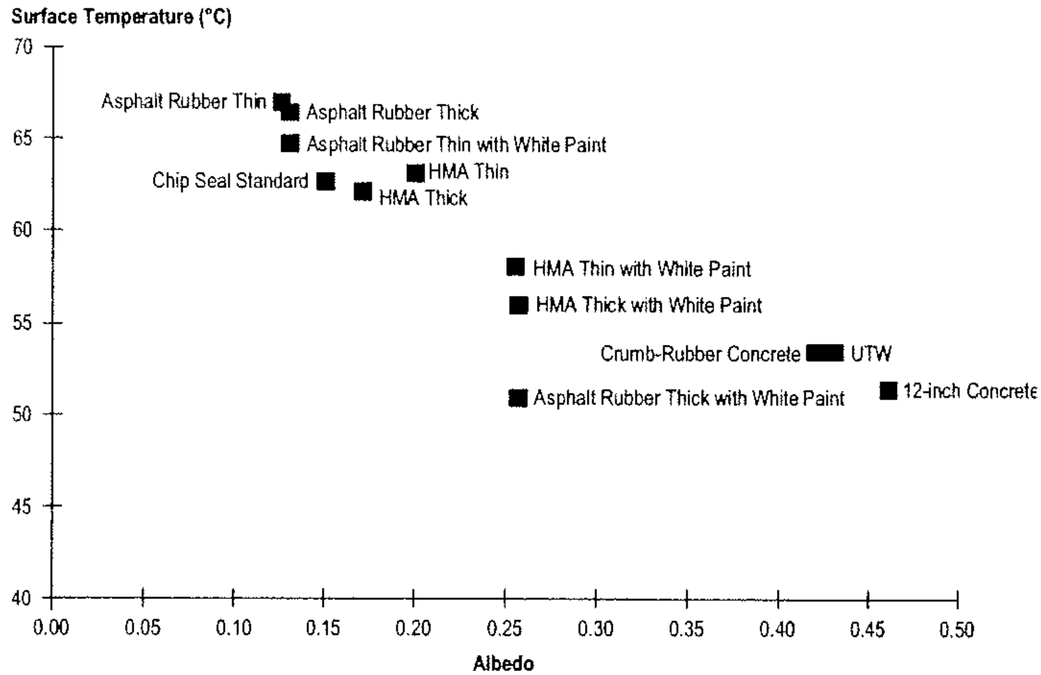
prepared by

Cambridge Systematics, Inc.

June 2005

www.camsys.com

Figure 4.2 Surface Temperature and Albedo for Selected Types of Pavements in Phoenix, Arizona



Source: Redrawn from data by Jay S. Golden and Kamil Kaloush, SMART Program, and Arizona State University, July 24, 2004.

- Pavement materials change over time due to aging and use. For example, asphalt oxidizes, which lightens its color and increases its reflectance over a period of roughly five to 10 years. However, if allowed to continue, the asphalt effectively "dries out," becomes brittle, and loses its ability to bind the aggregate, leading to a distress referred to as raveling. If a concrete surface becomes dirty and stained, its reflectance decreases over time. Thus, while concrete pavements generally have higher reflectance than asphalt pavements when they are new, over time their albedo values become closer.
- The surface characteristics that affect reflectance also affect the appearance of pavements, and appearance is important to facility owners and motorists for many reasons. Certainly, the contrast in color between pavement surface and lane striping or message markings is important to daytime and nighttime visibility in dry and wet conditions, and affects safety. While owners of facilities where nighttime illumination is important may prefer a lighter pavement color, others like the "crispness" of black pavement with white striping in their parking lots. Some perceive color as a measure of "newness." These subjective perceptions, discussed in the literature and revealed as well in interviews during this study, are hard to generalize, and may lead to unforeseen public responses to attempts to adjust pavement color for reflectance.

EXHIBIT 20

National Research Council Canada
Conseil national de recherches Canada

Centre for Surface Transportation Technology
Centre de technologie des transports de surface

NRC·CNRC

Test Report

Effects of Pavement Structure on Vehicle Fuel Consumption – Phase III

G.W. Taylor, P. Eng.
J.D. Patten, P. Eng.

Centre for Surface Transportation Technology (CSTT)
National Research Council of Canada (NRC)
2320 Lester Road
Ottawa, Ontario K1V 1S2
Canada

Phone (613) 998-9639
Fax (613) 957-0831

Prepared for:
Cement Association of Canada; and
Natural Resources Canada Action Plan 2000 on Climate Change

January 27, 2006

Project 54-HV775
Technical Report CSTT-HVC-TR-068

CONTROLLED
UNCLASSIFIED

Canada

EXECUTIVE SUMMARY

The Pavement Fuel Efficiency Study, Phase III was contracted by the Cement Association of Canada (CAC) and Natural Resources Canada (NRCan) under the Government of Canada Action Plan 2000 on Climate Change (Minerals and Metals Programme), in the fall of 2002, to the National Research Council's (NRC) Centre for Surface Transportation Technology (CSTT). CSTT provided an independent third-party evaluation to quantify the potential fuel consumption differences when vehicles are driven over three distinct types of pavements: asphalt, concrete and composite (asphalt top-coat over concrete).

CSTT developed comprehensive performance tests that were conducted between fall 2002 and fall 2003 to quantify these potential fuel consumption differences for a highway tractor pulling a loaded van semi trailer. Additionally, limited data were also collected for a passenger car. The passenger car was tested in one loading condition, winter and summer weather conditions over all three pavement types. The highway tractor and tridem van semi-trailer were tested in three loading conditions, at five distinct seasonal conditions (winter, summer day [hot], summer night [cool], fall and spring) and over all three pavement types.

The results of the study pertain to the test routes that were selected for this programme and not necessarily all grades of concrete, asphalt and composite pavements. Additionally, there was no attempt to quantify the effects of periodic surface irregularities such as potholes, low friction/high friction transient areas, tining and changes in elastomeric properties. The study was focussed on fuel burn characteristics and did not consider such pavement properties as light reflection, sound reflection, resistance to hydroplaning, maintainability or ease/cost of construction.

In addition to the dynamic fuel consumption data, a series of static surveys were conducted to characterize the road surfaces. An IRI survey was used to gather information on International Roughness Index, an index that measures irregularities on the surface of the road (lower values of IRI equate to smoother roads). A precision GPS survey was used to gather information on road curvature and grade. Finally, a Falling Weight Deflectometer survey was conducted to quantify the strength of the road bed at selected locations. The data from these surveys were merged with the fuel consumption data to form 'Meta' files. These 'Meta' files were then used to generate models for all the various conditions, allowing statistical multiple regression formulae to be generated.

CSTT's conclusions, stemming from the tractor and van semi-trailer fuel consumption testing and subsequent statistical models, are summarized below. Unless noted otherwise, all values of absolute fuel consumption differences are mean values and all percentage differences are mean percentage differences:

- At 100 km/h, on smooth roads, fuel consumption reductions were realised on all concrete roads when compared to asphalt. The savings ranged from 0.4 L/100 km to 0.7 L/100 km (0.8% to 1.8%) when compared to asphalt roads. These savings were realised for both empty and fully loaded vehicle conditions for four of the five seasons. All these differences were found to be statistically significant at the 95% level. The savings during the fifth season, Summer Night, were 0.25 L/100 km (0.4%), however, these data were found to be not statistically significant.

- When comparing concrete roads to composite roads at 100 km/h, the results showed that fuel consumption savings ranged from 0.2 L/100 km to 1.5 L/100 km (0.8% to 3.1%) in favour of concrete. However, under Summer day conditions, less fuel was consumed on the composite roads, as compared to concrete. The value of these savings was roughly 0.5 L/100 km (1.5%). All composite to concrete comparisons were found to be statistically significant except the Spring data, which was not statistically significant.

- The fuel savings for the empty trailer at 60 km/h when comparing concrete to asphalt roads ranged from 0.4 L/100km to 0.5 L/100km (1.7% to 3.9%) in favour of concrete and were all statistically significant in four of the five seasons. The fuel savings for the Summer Night data were 0.1 L/100 km (0.5%) but they were not statistically significant.

- The fuel savings for the full trailer at 60 km/h when comparing concrete to asphalt roads ranged from 0.2L/100km to 0.4 L/100km (1.3% to 3.0%) in favour of concrete and were all statistically significant in four of the five seasons. The fuel savings for the Summer Night data were 0.1 L/100 km (0.5%) but they were not statistically significant.

- The fuel savings for the empty trailer at 60 km/h in four of the five seasons when comparing concrete to composite roads ranged from 1.1 L/100km to 1.9 L/100km (2.0% to 6.0%), in favour of concrete. However, the summer day data indicated a savings in favour of composite, when compared to concrete, of 0.2 L/100 km (3.0%). All of these savings were statistically significant.

- The fuel savings for the full trailer at 60 km/h in four of the five seasons when comparing concrete to composite roads ranged from 0.6 L/100km to 1.4 L/100km (1.9% to 4.1%) in favour of concrete. However, the summer day data indicated a savings in favour of composite, when compared to concrete, of 0.2 L/100 km (2.4%). All of these savings were statistically significant except the Spring data.

Coastdown tests were conducted on the fully loaded tractor and van semi-trailer combination to isolate the differences in rolling resistance between the three pavement surfaces. The results of the coastdown testing did not indicate any significant differences between any of the three surfaces with respect to rolling resistance, from 30 km/h to 10 km/h.

CSTT's primary conclusions stemming from the passenger car testing and subsequent statistical models are summarized below:

- Due to the limited number of data points and seasonal conditions, the results from the passenger car testing were less conclusive than the tractor and trailer testing.

- Of the four seasonal car models presented below, three were statistically significant and one was not (asphalt versus concrete in summer).

- In winter testing, the passenger car consumed 0.3 L/100 km more (2.9%) on asphalt than on concrete. These savings were all statistically significant.

- In winter testing, the car consumed 0.2 L/100 km less fuel (2.3%) on composite pavement when compared to concrete. These savings were all statistically significant.

- In summer testing, the passenger car consumed 0.1 L/100 km (1.5%) more fuel on composite roads when compared to concrete. These savings were all statistically significant.

- In summer testing, the passenger car consumed 0.05 L/100 km (0.3%) less fuel on asphalt roads when compared to concrete. However, these savings were not statistically significant.

CSTT performed a comparison between this Phase and the previous Phase II rework project. Since each project generated a data set and a model it stood to reason that each of the data could be plugged into each of the models. The results of this cross-comparison are listed below:

- Different mathematical models were developed for the Phase II and Phase III studies. The data from both studies (Phase II and Phase III) were analyzed and compared using both models for the data collected at 25 deg C. For the Phase II data (tanker semi-trailer), these analyses showed statistically significant fuel savings when operating on concrete pavement compared to asphalt pavement of 1.9 L/100 km, ranging from 4.3% to 9.2%, depending on model used, IRI range, vehicle speed and weight. It is important to note that these higher percentage differences between the two data sets were likely affected by the different types of road surfaces and not the models.

- When similarly comparing concrete pavement and composite pavement, the savings ranged from 0.8 L/100 km to 1.2 L/100 km (1.9% to 5.8%) in favour of concrete on smooth roads and were statistically significant.

- The comparison using the two models for the Phase III (van semi-trailer) data at 25 deg C showed statistically significant fuel savings when operating on concrete pavement compared to asphalt pavement ranging from 0.5 L /100 km to 0.8 L/100 km (1.1% to 5.2%), depending on model used, IRI range, vehicle speed and weight.

- The comparison using the two models for Phase III data (van semi-trailer) showed that the fuel consumption differences between composite and concrete pavements on rougher roads were not statistically different. However, the fuel consumption savings for concrete pavements, when compared to composite, on smoother roads ranged between 0.3 L/100 km and 0.7 L/100 km (0.6% and 4.8%) and were all statistically significant.

- The predicted fuel savings on concrete, when compared to asphalt and composite, are very similar when Phase III data (van semi-trailer) is inserted into each of the models. Similarly, the predicted fuel savings on concrete, when compared to asphalt and composite, are very similar when Phase II data (tanker semi-trailer) is inserted into each of the models. However, the predicted fuel savings when comparing Phase II data to Phase III data are not similar. CSTT therefore concludes that the differences between Phase II and Phase III results stem primarily from the collected data themselves (i.e. the prevailing road conditions) and not the mathematical models.

EXHIBIT 21

information

ENVIRONMENTAL
COUNCIL of CONCRETE
ORGANIZATIONS

5420 Old Orchard Road
Skokie, Illinois
60077-1083
800 994.ECCO (3226)
FAX 847 966 8389
www.ecco.org

A Bright Idea: Specify Concrete

Portland cement concrete pavements, paving blocks ("pavers"), and other precast elements are saving energy and lives due to their high reflectivity of light.

Public facilities like pavements, sidewalks, and parking facilities are brighter at night when they're constructed with portland cement concrete. That's because concrete's high albedo, or ratio of light reflected, means less light is needed to attain a like level of illumination when using other building materials.

Up to 27% of light falling on a portland cement concrete surface will be reflected, according to the University of Florida, compared to as little as 5% of light from blacktopped pavements and dark soil, and 8% from water (see chart). This unique feature can make concrete safer for users, and a real energy saver as well, researchers observe.

Albedo of different surfaces

Surface	Percent reflected
Clouds	50–55
Concrete	17–27
Crops, green	5–25
Forest, green	5–10
Meadows, green	5–25
Ploughed field	14–17
Road, blacktop	5–10
Sand, white	30–60
Snow, fresh fallen	80–90
Snow, old	45–70
Soil, dark	5–15
Soil, light (desert)	25–30
Water	8

Concrete provides high albedo for a construction material, making light go farther. (Source: University of Florida)

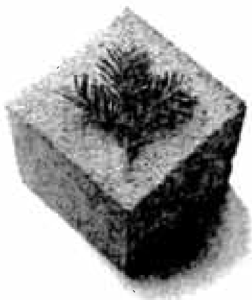
"Reflectivity [of pavement] is a safety factor in visibility at night, and this factor reduces the demand for electric lighting for streets," says the Center for Building Science, Energy & Environment Division, Lawrence Berkeley National Laboratory.

But there are aesthetic benefits to concrete's high reflectivity, too. Because outdoor lighting can be used to emphasize aesthetic features of structural or landscape architectural design, these features will stand out best when they're made of portland cement concrete.

And high-albedo concrete pavements, pavers, and other precast elements have the added quality of reflecting heat as well as light, thus reducing the "heat island" effect and higher temperatures endemic to urban areas (see EV19, *Shining a Light on "Cool Communities"*). The resulting lower overall temperatures can make a difference in the amount of electricity consumed in air conditioning and reduce smog formation, potentially improving air quality in urban areas.

Research shows that light fixtures with suitable directivity and efficiency can illuminate public spaces with minimal energy use, while reducing wasted light. Such stray light is the prime source of light pollution, a rapidly growing theme in environmental design and quality of life.

Lighting accounts for up to 25% of annual electricity usage in the United States, according to the U.S. Department of Energy. When combined with high-albedo concrete surfaces, the efficiency of lighting can be enhanced to the point that fewer fixtures are needed, with accompanying reductions in energy use and light pollution.



Concrete pavement reflects up to 27% of light. Black asphalt pavement reflects only 5% of light.

Brighter public areas

Lighting of streets and highways supplements vehicle headlights to enhance driving safety. Public benefits of lighting include improved traffic flow in congested areas, enhanced pedestrian safety, and improved police services. Lighting can lend an air of activity and confidence that can bolster business such as retail sales and office rentals.

In pedestrian areas—central business district streets and plazas, parking lots, parking garages, and around shopping malls—lighting enhances safety, and can help improve commerce and maintain property values.

For commercial districts and shopping malls, bright lighting can increase patronage and revenues without adding to cost. Because lighting actually does enhance security, the likelihood of incidents is decreased, leading to lower liability exposures, fewer losses and claims, and reduced negative publicity, according to the National Lighting Bureau. It can even lead to reduced insurance premiums and decreased personnel costs via a reduction in security patrols required.

From an architectural viewpoint, lighting can improve the appearance of a facility. For little, if any, additional investment, security/safety lighting can be used much as an artist uses paint, to selectively illuminate those aspects of a facility or its grounds that look more attractive. This can enhance the building's aesthetic appeal and neighborliness.

And in all instances, use of portland cement concrete in those structures will make light perform better. Utilization of white aggregates, such as quartzite, and premium white cement, will make your structure stand out even more.

Light for safer roadways

Increasing the number of light standards or pylons along highways for brighter roadways can make driving more hazardous, due to the increased hazard of collision. But because use of concrete can make the same amount of light go farther, fewer standards may be needed, although they may need to be taller to augment their distribution pattern.

Research for Transport Canada (1977) found an approximately 40% drop in luminance levels under the same illumination conditions for concrete roads overlaid with bituminous asphalt.

The superior reflectance of concrete pavements was carved in stone, so to speak, with the 1983 release of American National Standards Institute (ANSI) publication RP-8, *Practice for Roadway Lighting* (revised 1993). This publication recognized the significant contribution of road surface reflectance to the performance of the roadway lighting system.

"The pavement surface in effect becomes part of the lighting system," says consulting illuminating engineer Richard E. Stark in the journal *Lighting Design + Application*, April 1986. "High-reflectance pavements require less illumination than low-reflectance surfaces."

The new standard embodied use of the newer luminance methodology—based on light

Illuminated pavements are safer pavements

Hard evidence supports the contention that illuminated pavements are safer pavements. The Wisconsin Department of Transportation found out the hard way, when in 1980 it curtailed lighting on 55 miles of Milwaukee expressways and 100 interchanges as a means of saving money.

The DOT cut out the lighting on Oct. 1, but amid immediate public outcry the governor ordered the lights back on only three weeks later. Data gathered by the DOT during the "lights out" period indicated a 6% increase in nighttime accidents, compared to the average of the same period in the three preceding years.

The number of reportable night accidents increased 14%; injury accidents increased 5%; the number of persons injured increased 50 %; and interchange ramp accidents increased 35%. Yet another study showed a startling 77% increase in nighttime accidents over the immediately preceding 20 days, Sept. 10–30.

Earlier research from Canada during the Energy Crisis from December 1973 through March 1974 reflects these trends. As a result of the acute oil shortage, a large portion of street and highway lighting was switched off. Transport Canada's data show a dramatic increase in the accident rate for that period, of nearly 30% for motorways, 2% for rural roads, and nearly 11% for urban roads.

reflected from the pavement surface and toward the driver's eye—as opposed to the preceding luminance method, which only considered light falling on the pavement surface. The luminance method—while more complicated mathematically—is thought to better reflect real-world conditions. It originated in Europe and was adopted as a European standard in the early 1980s.

ANSI's standard classifies pavements into four categories, with portland cement concrete and asphalt with artificial brighteners added as the most reflective (R1), and asphalt with a very smooth surface as least reflective (R4).

This means that concrete pavements and structures allow the same lighting standard to be met with a smaller investment in equipment and wattage, resulting in a lower initial investment and lower energy and maintenance costs.

And new lighting technologies will make portland cement concrete even more attractive as a construction material. For example, a cost-effective application for prism light guides is tunnel and roadway lighting.

In Boston's Callahan Tunnel, 11,880 feet of "light pipe" is replacing linear fluorescent luminaires. The prism light guide provides drivers with uniform, linear light along the length of a tunnel while reducing lighting maintenance costs. High-reflectivity in the tunnel's interior makes light go farther, so to speak.

With the proprietary Lighted Guidance Tube (LGT), the leakage light from a prism light guide aids drivers traveling through hazardous roadways, such as construction work zones or sharp curves. The LGT can be mounted on concrete barriers to provide a continuous line of light, according to the Rensselaer Polytechnic Institute in its May 1998 quarterly publication, *Lighting Futures*.

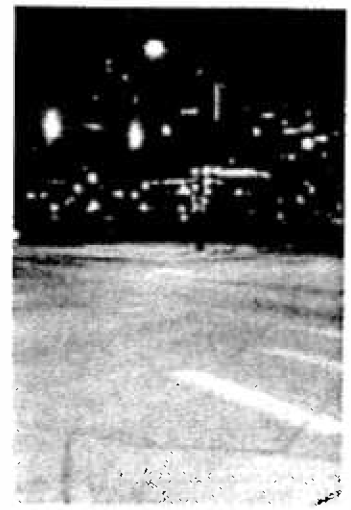
Reduce crime in parking facilities

Good lighting, coupled with a high-reflective surface, will do much to increase parking facility security, says Mary S. Smith, vice president of Walker Parking Consultants, writing under a grant of the American Institute of Architects.

Because parking facilities comprise a large volume of space with relatively low levels of activity, violent crime is more likely to occur in a parking facility than in other commercial areas, she says. But Crime Prevention Through Environmental Design (CPTED) concepts can be applied to parking facilities to enhance their safety.

An individual can be isolated in a parking area and targeted for an attack, which, in turn, attracts people with criminal intent. In particular, Smith notes, parking garages, which are either partially or fully enclosed and elevated above grade, offer much less natural surveillance—a primary focus of CPTED—than does an open single-level parking lot of the same capacity.

Thus it makes sense for parking facility owners and designers to specify adequate lighting and remote monitoring systems, and specify concrete as a building material to make that light go farther on dark nights, saving money and energy while making patrons safer.



Concrete parking lots are brighter—and safer—at night.

A Lexicon of Lighting

(Adapted from Shaflik and the International Dark-Sky Association)

Candela measures the luminous intensity of a lighting source. It's the basic unit of photometric quantity.

Full Cutoff Type Fixture is a luminaire or light fixture the housing of which doesn't allow any light dispersion or direct glare to shine above a 90-degree, horizontal plane from the base of the fixture.

Illuminance (or illumination level) is defined as the amount of light being transmitted upon a certain area. The SI unit for luminance is the lux, which is equal to one lumen per square meter.

Light Trespass is light from an artificial source that is intruding into an area where it is not wanted or does not belong.

Lumen is the unit of luminous flux produced by the source and is directly related to the candela. The lumen can be loosely interpreted as the amount of light emitted from a source with a certain intensity.

Luminance is the brightness of an object that has been illuminated by a source. The luminance of an object depends on its material characteristics and reflectance. For example, under the same luminance conditions a dark object will look less bright that a light object. Since luminance refers to the amount of light reflected back by an object, this object in effect acts as a new source. The unit of luminance is the candela per square meter.

Uplighting describes any light source that distributes illumination above a 90-degree horizontal plane.

Governments influence design

Municipal governments can have a major influence on parking garage design, and local officials can play a much stronger role in fostering security planning, Smith said, as reported by the International Dark-Sky Association (IDA).

"The single most important CPTED security feature is lighting," she writes. "Lighting fixtures selected for a parking facility must do more than just provide ample, glare-free lighting. As a key component of the security system, they must also be reliable, easy to maintain, able to withstand the elements, and protected from vandalism.

If local officials wish to encourage or mandate security in parking facilities, the single most effective thing they can do is to require good lighting, " Smith says.

"Staining [coloring] concrete is a cost-effective method of increasing general brightness and creating a sense of well-being," Smith says, adding, "White stain on ceilings and beam soffits reflects light, thereby increasing uniformity."

Staining ceilings and beam soffits white may improve the lighting level of a particular design by as much as one level of service, she observes, adding, that a good quality concrete stain will last at least 10 years in these locations, but that paint creates the same brightness and requires increased maintenance.

White stain on walls seems to encourage graffiti, however, which tends to hurt the perception of security, she notes. Instead of white stain, anti-graffiti coatings may be used on walls to ease cleaning.

Choose luminaires wisely

Light pollution is a growing problem in urban areas, and one getting more attention from architects and planners. Common design sense—such as using the right kind of fixtures at the right location—is a primary means of limiting light pollution. Also important is appropriate local legislation, like that requiring billboard illumination to be aimed downward instead of upward.

"In many areas light pollution has become an important aspect of both planning and design," writes Carl Shaflik, P.E., in *Environmental Effects of Roadway Lighting*, August 1997. Shaflik is affiliated with the University of British Columbia, Department of Civil Engineering.

"Light trespass can be correctly equated to wasted energy, " Shaflik writes, citing research undertaken by the International Dark-Sky Association, which estimates that up to 30% of all roadway lighting is lost or misdirected from the intended source. This translates to over $1 billion per year in lost energy in the United States alone, in addition to concomitant increases in air pollution from the wasted energy.

Luminaires are classified by their vertical light distribution, lateral light distribution, and the control of distribution above maximum candlepower, known as cutoff. Vertical and lateral light distributions apply primarily to the shape of the roadway area to be illuminated. Both of these distributions can be important when determining the amount of light trespass from a source.

Solutions to problems of light trespass are simple and inexpensive, Shaflik says. "Designers must take care to use luminaires with distributions suitable to the roadway. It is not necessary to apply an arbitrary 'safety factor' and overlight an area. And finally, the use of full-cutoff luminaires greatly increases the control of the stray light."

New, much improved light sources are now available that provide considerably more light per unit of energy, IDA says. "Most newer fixtures offer better light control, putting light where it is needed rather than wasting a great deal of the light produced by the lamp. Replacement of older fixtures and lamps with newer, improved ones can greatly improve efficiency."

Night and day, concrete's the one

By day, portland cement concrete pavement and products' high albedo means more solar heat can be reflected into the atmosphere, contributing to "cooler communities" and resulting in lower energy consumption and air pollution.

At night, that same high reflectivity makes for improved lighting, with safer roadways, parking garages and public places, and additional energy savings. And concrete can make for more attractive exterior displays, highlighting aesthetic architectural features.

Without a doubt, use of concrete for public spaces is a truly bright idea.

The Environmental Council of Concrete Organizations is a coalition dedicated to promoting the environmental benefits of concrete and its role in safe and sustainable construction.

ECCO members are companies, organizations, and individuals affiliated with the concrete industry. Together, they are committed to developing and disseminating information on the environmental benefits of concrete and concrete products.

EXHIBIT 2

Kevin Kennedy

RECEIVED
MAY 15 2008

May 14, 2008

Ms. Mary Nichols
Chair, California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: Comments on the Economic Modeling of AB 32

Dear Ms. Nichols,

As representatives of the California cement industry, the Coalition for Sustainable Cement Manufacturing and Environment ("the Coalition")* welcomes the opportunity to provide comments on the California Air Resources Board's (CARB) economic modeling efforts related to AB 32. While the Coalition supports the broad goal of ensuring a sustainable future for California, it has concerns that the modeling work to date is likely to systematically underestimate the economic costs of AB 32 to the cement industry and to the California economy. It also is concerned that the problem of leakage in the cement industry — that is, an offsetting increase in global greenhouse gases outside of California as a result of AB 32 — is not being adequately addressed by the modeling efforts.

In preparing its comments, the Coalition has benefited from technical advice from Keybridge Research LLC, a Washington, DC-based economic research firm. Both the Coalition and Keybridge Research look forward to working with CARB on regulatory issues related to the impact of AB 32 on the cement industry and would be happy to meet with CARB staff to discuss the issues raised in this letter in greater detail.

Sincerely yours,

John T. Bloom, Jr.

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

Robert F. Wescott

Robert F. Wescott, Ph.D.
President, Keybridge Research LLC and Technical Advisor to the Coalition
Washington, DC

CC:
Linda Adams, California Environmental Protection Agency
Darren Bouton, California Governor's Office
David Crane, California Governor's Office
Dan Dunmoyer, California Governor's Office
James Goldstene, California Air Resources Board
John Moffatt, California Governor's Office
Dan Pellisier, California Environmental Protection Agency
Chuck Shulock, California Air Resources Board
Cindy Tuck, California Environmental Protection Agency

* *The Coalition includes Cemex, Inc., National Cement Company of California Inc., California Portland Cement Company, Mitsubishi Cement Corporation, Texas Industries, Inc. and Lehigh Southwest Cement Company.*

EXECUTIVE SUMMARY

In its efforts to achieve the emissions reduction targets specified by AB 32, the California Air Resources Board (CARB) is working with economic models to develop an economic impact analysis of alternative policy options. Through the stakeholder workshop process, cement industry representatives have both raised questions and expressed direct concerns about the overall modeling approach. The concerns are directed to both the general limitations of the models and their ability to provide insights on issues related to non-electric power sectors, such as the cement industry. Our key concerns are as follows:

- CARB's exclusive reliance upon a computable general equilibrium (CGE) model to estimate the economic effects of AB 32, as opposed to a traditional time-series forecasting model, is likely to significantly underestimate the economic costs of compliance. The economics literature shows that CGE models, which assume rapid and perfectly maximizing behavior, tend to understate the economic costs of adjusting to climate change policies by roughly half compared with other types of models.[1]

- CARB is using an unrealistically low estimate of future personal income growth in California and hence, overall economic growth, for the next 25 years. By applying the actual 2.4% annual average real per capita growth that California has experienced during the past 10 years, rather than the 1.5% assumed by CARB, the California economy would be 25% larger in 2030. This key assumption leads to an under-estimate of the economic costs of compliance with AB 32.

- CARB's modeling approach is heavily focused on the electric power sector and does not provide the necessary detail to explain likely impacts on the industrial sector. It does not, for example, provide sector-by-sector cost abatement curves or investment functions for various manufacturing sectors. Without sector by sector cost abatement curves, the model can not be used to quantify the impact of policy options across industries and is therefore incapable of providing any guidance as to the equity of alternative policy options across industries. The modeling approach also does not appear capable of quantifying leakage – that is, an offsetting increase in global GHG emissions outside of California due to a shift in production to less regulated jurisdictions as a result of the new policy.

In light of these concerns, the Coalition for Sustainable Cement Manufacturing and Environment[2] recommends that CARB pursue the following actions:

- Develop a new baseline forecast for economic growth that is consistent with historical experience and accepted forecasting standards.

- Explicitly acknowledge and disclose the inherent limitations and tendencies of the modeling approach currently being employed or make necessary adjustments, which would include:

[1] Economic costs in this context refer to reduced real personal income by California residents.

[2] The Coalition for Sustainable Cement Manufacturing and Environment includes Cemex, Inc., National Cement Company of California Inc., California Portland Cement Company, Mitsubishi Cement Corporation, Texas Industries, Inc. and Lehigh Southwest Cement Company.

- Simulate macroeconomic impacts using both a CGE model and a traditional econometric forecasting model with cost abatement curves and investment functions for all industries at the same level of detail as the utility sector, and establish a transparent process for reviewing third-party modeling studies and incorporating those results into the policy decision making process.

- For the cement industry in particular, also include the demand response to price changes and the extent of leakage and its impact on the cement Industry and global GHG emissions.

- For all sectors, provide greater transparency on assumptions used relating to technologically feasible GHG reductions and projected abatement costs.

I. Introduction

In its efforts to achieve the emissions reduction targets specified by AB 32, the California Air Resources Board (CARB) is using economic models to develop an economic impact analysis of alternative policy options. Through the stakeholder workshop process, cement industry representatives have raised both questions and expressed direct concerns about the overall modeling approach. The concerns revolve around both the general limitations of the models and their ability to provide insights on issues related to non-electric power sectors, such as the cement industry.

On a general level, the models being employed, though well-respected, suffer from well-known limitations and tendencies. Furthermore, the overall approach suffers from challenges that are common in efforts to link together disparate models that were originally constructed for significantly different applications with significantly different variable structures and different geographical coverage. In the interest of full transparency and pursuant to its statutory obligation to prepare the Scoping Plan, and ultimately regulations, CARB should explicitly acknowledge the imperfections and limitations of the model and explain how it will be used in developing the Scoping Plan and the regulatory rulemaking process.

Specifically, the modeling approach appears to have limited applicability to non-electric power sectors, such as the cement industry. It is possible that CARB has chosen to focus its modeling efforts more on the electric power sector than on other sectors for a variety of reasons.[3] However, it is unrealistic to expect that such a focus will provide valuable industry-specific insights into anything other than the electric power sector. Thus, given the current approach, we believe that any results specific to the cement industry should be considered indeterminate and any efforts to extend those results to development of the Scoping Plan and regulations of the cement industry would be improper. Rather, the Scoping Plan and regulations for the cement industry should be based on abatement measures that are technologically feasible and cost effective and minimize leakage as required by AB 32.

The following sections present the Coalition on Sustainable Cement Manufacturing and Environment's ("the Coalition") concerns in more detail. In an Appendix we also provide a list of specific questions. We respectfully request that CARB provide the Coalition written comments on these issues.

[3] For example, the electric power sector constitutes a plurality of GHG emissions. Furthermore, the electric power sector has a narrow and well-defined geography – making it easier to model than industries that produce internationally traded goods. Finally, the electricity sector has historically been the most measured and modeled sector within the economy, due to the fact that it has been a heavily regulated sector overseen by state public utility commissions. As a result, we understand that it is more expedient to adapt existing electricity models to a particular modeling approach than building customized models of other state sectors from scratch which is fine as long as all parties recognize and acknowledge that the results are indeterminate for industries outside the utility sector.

II. The Modeling Process Should Recognize and Address the Limitations & Tendencies of CGE Models

There are two main types of economic models that are used for estimating the economic impact of climate change policies – traditional time-series forecasting models and computable general equilibrium (CGE) models. It is our understanding that the macroeconomic impact of various scenarios will be estimated by the EDRAM model – a CGE model that seeks a set of prices that put all markets in equilibrium simultaneously. Although CGE models are widely employed and well respected, they suffer from a set of well-documented limitations and tendencies in modeling climate change policies. Most notably:

- CGE models are unable to offer guidance on the nature or duration of disequilibrium states – that is, the critical dynamic adjustment process leading to the ultimate result.
- CGE models tend to produce more optimistic results than those produced by other equally respectable methods – namely, traditional time-series forecasting models.[4]
    - Specifically, in one of the most cited recent academic meta-studies of the properties of economic models used to estimate the effects of climate change policies, Barker, *et. al.*, (Cambridge University, 2006), found that stabilizing GHG by 2030 would lead to a cumulative average 3.4% reduction in real GDP by that year. This meta-study concluded that this estimated loss in GDP would be reduced by a cumulative 1.5% simply by relying upon CGE class models. In other words, CGE models, when used for climate change studies, tend to find only about half as much "economic pain" as other economic models find on average.
    - A key reason for this result is that CGE models implicitly assume perfect information and rational maximizing behavior on the part of businesses and consumers, who rapidly and completely respond to higher carbon prices. Traditional time-series forecasting models rely more upon historical behavioral patterns and typically find that in the real world information is imperfect and takes time to accumulate for decisions. They also find that there is substantial sub-optimal behavior—that is, that consumers do not necessarily make optimal decisions 100% of the time.

The Coalition believes that CARB should take additional steps to mitigate these concerns and provide for a more robust modeling exercise, including:

- Perform macroeconomic analysis using *both a CGE model and a time-series forecasting model* with all industries specified at the same level of detail as the utility sector and allow for full demand responses to prices – an approach that will both enhance stakeholder understanding of the dynamic adjustment process and provide a range of results that would be robust.

[4] See, for example, Terry Barker, Mahvash Saeed Qureshi, and Jonathan Kohler (2006) "The Costs of Greenhouse Gas Mitigation with Induced Technological Change: A Meta-Analysis of Estimates in the Literature," Cambridge University Tyndall Centre for Climate Change Research, Working Paper 89.

- *Ensure a transparent process* for reviewing third-party modeling exercises (especially those that employ a time-series forecasting modeling technique) and incorporate those results into its policy evaluation process.

III. CARB's Baseline Assumptions Likely Understate Future Economic Growth in California

Based upon a review of model documentation, it appears that Energy 2020 assumes an unreasonably low rate of personal income growth (and therefore economic growth) in its baseline scenario. This tends to artificially make the achievement of a GHG reduction target appear easier and less costly for industry and the California economy than is likely to be the case in reality. Specifically, according to the "Energy 2020 Model Input & Assumptions" manual provided by ICF, the model assumes that *nominal* income per capita will grow at an average annual rate of 1.5% between 2005 and 2030. This number would represent an unrealistically low assumption and the Coalition assumes that this should read "*real* income per capita will grow at an average annual rate of 1.5% between 2005 and 2030."

Even with this correction, however, the per capita income estimate is unjustifiably low. During the past decade (1997-2007) California's per capita income has increased from $26,490 to $41,571.[5] Adjusting these nominal per capita income values to real (inflation adjusted) terms using widely accepted economic formulas shows that real per capita income in California increased at an average annual compound growth rate of 2.4% a year between 1997 and 2007.[6]

By applying the actual 2.4% annual average real per capita growth that California has experienced during the past 10 years, rather than the 1.5% assumed by CARB, the California economy would be 25% larger in 2030.[7] To the extent that economic growth is a primary driver of GHG emissions within the model, CARB's assumption of sharply slower growth in the future is likely to dramatically understate a business-as-usual emissions trajectory in coming years and gives a grossly distorted picture of the GHG reduction challenge. As a result, the model will require fewer GHG reductions to hit AB 32 targets, and, consequently, it would greatly understate the real economic costs.

The Coalition believes that the baseline growth assumption is a fundamental flaw and advises that CARB develop a new underlying growth assumption that is consistent with recent historical experience and accepted economic forecasting standards.

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[5] Source is U.S. Department of Commerce, Bureau of Economic Analysis, State Personal Income 2007, online at www.bea.gov.

[6] Calculations performed by Keybridge Research LLC. Nominal to real adjustment was calculated using the U.S. national personal consumption deflator from the U.S. Bureau of Economic Analysis NIPA table 2.4.4.

[7] Calculations performed by Keybridge Research LLC.

IV. The Modeling Effort Offers Little Policy Relevance, Insight, or Guidance for Non-Electric Power Sectors and Does Not Shed Light on Leakage

The CARB modeling effort has primarily focused on the electric power sector and provides little of the needed detail on other industrial sectors that will be critical to meeting AB 32 targets. Energy 2020 is fundamentally an energy and electric-power-sector model that is poorly suited to capture the true impacts within the industrial sector. Even the combination of the Energy 2020 model and the EDRAM macroeconomic model provide only a very limited ability to capture the dynamics of key industries, including the cement industry. Although some share-down demand estimates may be available for different industries, the modeling system fails to acknowledge a number of key aspects of the manufacturing sector that would need to be addressed to provide meaningful results, including the following:

- Detailed GHG cost abatement curves for each industry based on an assessment of the current state of technologically feasible options.
- A fully articulated supply-side for manufacturing industries, including a detailed industry-specific investment function for the California cement industry.
- The likely effects that AB 32 might have on capital costs in each California manufacturing industry.
- Industry-by-industry product demand elasticities that can capture demand responses to price changes, including impacts beyond first-order effects.

This lack of model detail for non-electric power sectors has been repeatedly evident in CARB responses to workshop questions:

- CARB representatives have stated that Energy 2020 will not be simulating the demand response to price increases in energy-intensive goods – a fundamental element of any complete economic impact assessment.
- Based on CARB comments, it is our understanding that investment decisions and costs in non-electric power sectors will not be based upon customized industry abatement cost curves, but rather upon generic functions relating investment costs to efficiency gains. Our concern is that the generic investment-efficiency curves specified in Energy 2020 may greatly understate the true investment costs for industries such as cement. Indeed, California cement is among the most efficiently produced cement in the world and employs a variety of energy and process practices that are among the most technologically advanced. As a result, California cement producers are likely to be currently operating on the high end of a generic industry cost curve, and marginal efficiency gains per dollar of capital spending are very likely to be significantly lower in California compared to national industry averages or averages in cement industries in other countries.
- It is our understanding that EDRAM only provides one aggregate investment function. As a result, we are left with the assumption that EDRAM will not actually simulate investment decisions by sector, but will "share down" investment spending from this aggregate account based on fixed weights

calculated from historical data. Without a fully articulated industry-by-industry investment breakdown (ideally at the 100 industry level), however, any modeling effort is likely to understate the negative investment effects in the most affected industries. This is particularly troublesome for an industry like cement, which faces very high capital investment costs (both initial and on a going forward basis) and high energy costs (particularly in California).

In addition, leakage — an offsetting increase in global GHG emissions outside of California that occurs through a shift in production to less regulated jurisdictions as a result of the policy — is not satisfactorily addressed in the current modeling structure. In addition to the estimating the leakage that would occur within the cement industry (as cement manufacturing might be shifted out of California to other jurisdictions), a comprehensive modeling system would also estimate the leakage that might occur from a shift away from cement to, say, non-California produced steel or asphalt, used in construction and paving applications in California. Minimization of leakage is both a fundamental concern of California companies and a legal requirement of AB 32. Any failure to address leakage will undermine the climate change objectives of AB 32 and have significant and irreversible effects on California's manufacturing industry. CARB representatives have suggested that the modeling efforts will not be able to provide insights about leakage in the industrial sector, though it is unclear if such statements refer to the entire modeling process or only the initial simulations.

Given the combination of these modeling weaknesses concerning the industrial sector, the Coalition believes that any quantitative indications about the likely affects of AB 32 on the cement industry are indeterminate at best.

V. Concluding Comments

CARB has made a number of choices in its economic modeling work — from selection of model type to choice of key forecasting assumptions — that heavily bias the results in the direction of minimizing the likely true economic and industry costs of compliance with AB 32. The Coalition believes that these choices could easily understate the true costs by half or perhaps even more. Although the modeling effort may capture the dynamics in the electric power sector, it is poorly equipped to provide detailed analysis of the effects of AB 32 on other industries, and especially the cement industry. A key limitation is a likely inability to accurately assess the risks and costs of manufacturing and industrial-sector leakage. Although the modeling effort relies upon credible and well respected models, the aggregate effect of cobbling together multiple models with different regional coverage, different industrial detail, and different variable structure suggests that any estimated impacts on a specific industry, like cement, are indeterminate and ill-suited for guiding the development of the Scoping Plan and related GHG regulations.

APPENDIX I: SPECIFIC QUESTIONS ON THE MODELING PROCESS

1) Please explain or refer us to a document that describes the goals of the modeling and how the model results will be used. For example, to what extent will the draft Scoping Plan rely on the results from the preliminary modeling effort in choosing an initial regulatory approach? Is it the intent of the preliminary modeling effort to address individual industrial sectors, or is this intended for some future modeling effort? How will the absence of detail in the preliminary modeling effort affect the validity of these choices?

2) Please explain the relationship of the CARB economic modeling effort to the existing CAT modeling effort and the parallel modeling effort at CPUC.

3) Please provide an overall schedule for the modeling efforts, including the second phase of the modeling in which detailed cap & trade options, including offsets, will be addressed.

4) Please indicate how investment in individual industries is modeled in Energy 2020. How is it modeled in EDRAM? Given that they seem to rely upon different sector breakdowns, how is this information linked between the two models?

5) Will the limitations of the modeling effort be documented in any reports generated?

APPENDIX II: BACKGROUND ON TECHNICAL ADVISORS

Keybridge Research LLC is a Washington-DC based economic, financial, and public policy research firm. The firm serves G-7 governments, major financial institutions and companies, and leading industry associations. Among the firm's clients are Fortune 500 companies and well-known international financial-sector firms in the U.S., Europe, and Asia. Keybridge is particularly well known for its economic research, quantitative analysis, statistical and modeling capabilities, and ability to assist clients with the development of strategic plans. Keybridge Research maintains a network of high-profile experts, including Nobel-prize winning economists, leading academics, and former senior G-7, Federal Reserve, White House, Treasury, and International Monetary Fund officials, who assist with projects and participate in strategic planning and research activities.

Dr. Robert F. Wescott is President and Founder of Keybridge Research LLC, the Washington, DC-based economic research firm. He has nearly 30 years of professional experience working on macroeconomics, energy economics, and public policy issues. He concentrates on energy issues, energy modeling and analysis, financial risk assessment, and strategic planning. Before founding Keybridge, Dr. Wescott served as Special Assistant to the President for Economic Policy at the White House and as Chief Economist at the President's Council of Economic Advisers. From 1982-93 he was Senior Vice President and Chief Economist at Wharton Econometrics (WEFA Group—today known as Global Insight, Inc.), the private economic modeling and analysis firm, where he oversaw all economic modeling, forecasting, and consulting operations. Dr. Wescott also was a senior official in the Research Department of the International Monetary Fund where he did research on global economic risks and policy challenges. In 1990 he was research director at the International Center for the Study of East Asian Development in Kitakyushu, Japan. He holds a Ph.D. in economics from the University of Pennsylvania, 1983. He graduated magna cum laude with a B.A. in economics from Bucknell University in 1977, where he was elected to Phi Beta Kappa.

EXHIBIT 3

BUILDING A SUSTAINABLE FUTURE:

ECONOMIC GROWTH, CLIMATE CHANGE, & THE CALIFORNIA CEMENT INDUSTRY

A BRIEFING PREPARED BY:

THE COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT

JUNE 18, 2008

TABLE OF CONTENTS

EXECUTIVE SUMMARY

As a carbon-intensive industry, an engine of economic growth, and an enabler of climate change strategies, the cement industry has the potential to play a multifaceted and constructive role in building a sustainable future for California. Unfortunately, traditional approaches to sustainable growth tend to primarily view cement as a carbon-intensive industry that offers opportunities for greenhouse gas (GHG) emissions reductions – a simplistic view that narrowly defines the industry as part of the problem. More innovative and holistic approaches to sustainable growth, however, also recognize the cement industry's vital importance to the larger economy and the more robust role that it can play in addressing the challenge of global climate change. For instance,

- Cement is the primary component of concrete – an indispensable building block of modern economies that is, quite literally, the foundation of cities, suburbs, factories, and the transportation systems that support growing populations and thriving societies.
- The cement industry, as an enabler of the state construction industry, is a direct and indirect source of jobs and income for millions of California families, as well as a significant contributor to state budget revenues.
- Cement has a variety of "green qualities" that can be leveraged through innovative product applications to reduce California's carbon footprint.
- Cement is critical to a variety of strategies to mitigate and adapt to the impact of global climate change, including the construction of energy efficient buildings and roads, wind turbines, flood control systems, and irrigation projects.

Ultimately, building a sustainable future for California will require climate change policies that recognize, address, and leverage these multifaceted qualities – moving beyond the view of the cement industry as simply part of the problem and enabling it to be an active part of the solution.

Furthermore, the design of effective policy for the cement industry will require a firm understanding of the industry's complexities and a deep appreciation for its challenges. The California cement industry is distinguished from other carbon-intensive industries within the state in a variety of respects. Most notably, cement manufacturing entails a significant amount of process emissions – that is, GHG emissions that are a direct and unalterable consequence of the chemical reaction that is fundamental to the production process. More generally, the industry is defined by a unique set of economic characteristics that limit its capacity to adapt to a carbon-constrained world, including:

- As producers of a homogenous commodity, California cement manufacturers compete exclusively on the basis of price – generally limiting the extent to which they can pass through costs.
- As suppliers of a product that is inexpensively shipped by sea, California cement manufacturers are subject to significant international competition – limiting the extent to which they can pass through the costs associated with a state climate change policy.

- As participants in a capital-intensive industry, California cement manufacturers invest heavily in expensive and long-lived capital assets – restricting their ability to cost effectively retire existing assets and replace them with less carbon-intensive equipment.

- As a technologically advanced group in a technologically mature industry, California cement manufacturers are on the leading edge of energy efficiency – suggesting that incremental improvements in energy efficiency will be relatively small and expensive.

- As companies operating in a heavily regulated industry, California cement manufacturers are subject to an array of constraints, including stringent environmental controls and strict product specifications – impeding their capacity to pursue certain abatement opportunities.

Collectively, these unique characteristics suggest that the California cement industry faces two key challenges. First, the industry is unlikely to have a robust set of low-cost abatement opportunities. As a result, its capacity to cost effectively contribute to California's GHG emissions targets will heavily depend on its ability to finance emissions reductions that take place outside of the industry. This suggests that alternative compliance mechanisms – such as the ability to purchase credits from an offsets market and permits from a cap-and-trade system – will be critical elements of a cost-effective regulatory approach.

Second, the industry will be unable to pass through a vast majority of costs associated with a unilateral climate change policy. As a result, it is likely to suffer from a high rate of carbon leakage – that is, a shifting of market share to less regulated jurisdictions that generates an offsetting increase in global GHG emissions. This suggests that anti-leakage measures – such as the free allocation of permits in a cap-and-trade system and a carbon intensity standard for imported cement – will be critical elements of an environmentally effective and equitable regulatory approach.

Although the dual challenges of relatively few low-cost abatement opportunities and a high potential for leakage are formidable, they are not intractable or insurmountable. While an ill-designed climate change policy will simultaneously threaten the viability of the state cement industry, damage the state economy, and diminish the efficacy of the state's environmental efforts, a well-designed climate change policy can overcome these challenges, enable the cement industry to contribute to meaningful reductions in global GHG emissions, and generate sustainable growth in California.

I. Introduction

The cement industry has been an engine of economic growth in California for more than a century. As a result of its exceptional properties as a binding agent, cement is the primary component of concrete – an indispensable building block of modern economies that is, quite literally, the foundation of cities, suburbs, factories, and the transportation systems that connect them. As the Golden State's economy continues to thrive and its population continues to expand, access to affordable and stable cement supplies will remain a critical component of prosperity for current and future generations.

At the same time, the welfare of current and future generations will also heavily depend on the international community's response to the challenge of global climate change. Mitigating the potential impact of global climate change will be a daunting task that will require an unprecedented, coordinated, and well-conceived policy response from the entire international community. The cement industry recognizes California's leadership on the issue of global climate change and strongly believes that it is in *everyone's* best interest that the state is successful in achieving meaningful greenhouse gas (GHG) emissions reductions in an environmentally effective, economically efficient, and equitable manner.

Although the California cement industry is prepared to do its fair share in bringing about sustainable growth, it faces significant challenges in adapting to a carbon-constrained world. While hopeful a well-designed climate change policy can overcome these challenges and enable the cement industry to meaningfully contribute to reducing global GHGs, the industry is confident that an ill-designed climate change policy will simultaneously threaten the viability of the industry and the efficacy of the state's environmental efforts.

Ultimately, the realization of a well-designed climate change policy will depend on both California's ultimate choice of instruments and their judicial application. The policymaker's toolbox overflows with instruments for addressing climate change, including carbon taxes, cap-and-trade programs, baseline-and-credit programs, financial incentives, technology mandates, and performance mandates, among others. The appropriate application of these policy tools requires a thorough understanding of the unique complexities of individual industries and a deep appreciation for the different challenges that each industry faces in adapting to a carbon-constrained world.

With this in mind, the Coalition for Sustainable Cement Manufacturing & Environment, a coalition of all six cement companies with plant facilities in California[1], will submit a series of briefings that seek to provide policymakers with a better understanding of the cement industry and a better appreciation for its challenges. The current policy briefing, the first in the series, provides a general introduction to the cement industry and a survey of issues relevant to California's efforts to design an effective, efficient, and equitable climate change policy. Subsequent briefings will explore critical issues in more depth, including the availability of cost-effective abatement opportunities, the potential for carbon leakage as a result of a unilateral climate change policy, and the ability to avoid or mitigate carbon leakage through the use of complementary policies.

[1] The coalition includes California Portland Cement Co., Cemex, Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California and Texas Industries, Inc.

The ultimate goal of these reports is to engage policymakers in a constructive and thoughtful dialogue about incorporating the cement industry into a climate change policy while satisfying basic notions of environmental effectiveness, economic efficiency, and equity. To that end, we encourage comments from interested stakeholders and welcome inquiries from those who would like to learn more about the cement industry and its efforts to build a sustainable future for California.

The current policy briefing is organized as follows:

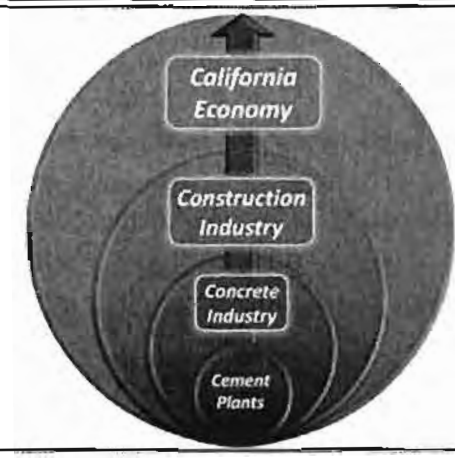
- Section II examines the cement industry's impact on the California economy.
- Section III discusses the cement manufacturing process.
- Section IV explores the scale and nature of GHG emissions in the cement industry.
- Section V evaluates specific abatement opportunities within the industry, with a focus on the economic, market, technical, and regulatory barriers inherent to each strategy.
- Section VI identifies several fundamental characteristics of the California cement industry and discusses their primary implications.
- Section VII illustrates how the industry's unique set of characteristics gives rise to two fundamental challenges in adapting to a carbon-constrained world and how well-designed policy can overcome those challenges.
- Section VIII offers concluding remarks.

A thorough examination of the interface between the cement industry, global climate change, abatement opportunities, international competitiveness, and the implications for policy design requires significantly more space than afforded by this policy briefing or, indeed, the series of briefings to follow. Readers who would like more detail are encouraged to examine the references listed at the conclusion of the paper.

II. The Cement Industry's Impact on the California Economy

The California cement industry is an important source of jobs and income for California families, as well as significant contributors to state government revenues. In addition, as the supplier of the key ingredient in concrete, the California cement industry supports economic activity in a variety of other industries, including residential, commercial and public building construction, manufacturing facilities, and a vast array of public infrastructure projects. In this sense, like a rock cast into a pond, the cement industry sends ripples throughout the economy that can impact every corner of the state.

FIGURE 1: THE ROCK & THE RIPPLE
CEMENT AS A SOURCE OF ECONOMIC GROWTH



The following section provides an overview of the cement industry's impact on the California economy. Exploring both "the rock" and "the ripples", it begins with an overview of the cement industry's role as a significant source of jobs and income for California families, and it concludes with an examination of the cement industry's importance as a vital supplier of the construction industry and, by extension, an enabler of economic growth throughout the California economy.

2.1 *The Rock: The California Cement Industry*

The California cement industry, including cement manufacturers and closely related industries such as ready-mix concrete suppliers, concrete contractors, and masonry contractors, is a major source of jobs and income for California families. As shown in Table 1, the Portland Cement Association (PCA) estimates that cement manufacturing, the cornerstone of the industry, currently employs about 2,500 workers.[2] Closely related and more labor-intensive industries, including concrete contractors, masonry contractors, ready-mix concrete suppliers, and manufacturers of other concrete products, employ more

Table 1: Employment in Cement & Related Industries
(Estimated Number of Employees, 2008)

Direct Employment	Employees
Cement	2,453
Ready Mix	10,041
Other Cement Products	11,238
Concrete Contracting	48,202
Masonry & Stone Contracting	35,799
Total Direct Employment	107,733
Estimated Indirect Employment	281,183
Direct & Indirect Employment	**388,916**

Source Portland Cement Association

[2] Portland Cement Association (2008). Unless noted otherwise, all economic data related to the cement industry in California is derived from this source.

than 100,000 workers. Together, cement and these closely related industries *directly* employ 108,000 Californians with an annual payroll of approximately $4.3 billion.

Furthermore, PCA estimates that the industry *indirectly* supports another 281,183 jobs throughout the state – that is, jobs that are highly dependent on a healthy and vibrant cement industry. Collectively, the approximately 389,000 California workers who are directly and indirectly supported by the cement industry represent more than 2% of total state employment.

The domestic cement industry is also a major source of revenue for the state government. In 2007, it provided more than $1.6 billion in direct revenues and an estimated $4.3 billion in indirect revenues to the California government. Combined, these revenues represented roughly 2.2% of all government receipts – more than three times the Governor's proposed spending on environmental protection in the 2008-09 fiscal year.[3]

2.2 The Ripple: The Cement Industry's Impact on the Larger Economy

Very little construction can take place without the use of concrete and, by extension, cement. As a result, locally produced cement benefits virtually every sector of the California economy – contributing to the construction of schools, homes, hospitals, offices, warehouses, industrial sites, shopping centers, roads, public parks, water/sewer systems, and much more. This ubiquitous use makes cement an ever present cost driver for residential home builders, commercial office builders, and public works projects that rely on readily available and affordable supplies. Regional supply shortages can lead to price spikes and costly construction bottlenecks – easily translating into hundreds of millions of dollars in additional construction costs for a state economy on an annual basis.

California is a particularly large consumer of cement. In 2006, California consumed 14.3 million metric tons – roughly equivalent to the cement consumption of Illinois, Ohio, Pennsylvania, and New York combined.[4] The state's appetite for cement is not simply a function of size, but also of growth. From 1977-2006, California's consumption of Portland cement increased at an annual growth rate of 2.5%, representing the eleventh highest growth rate among all U.S. states.[5]

In 2007, the California construction industry represented approximately 5% of the California economy.[6] Specifically, California spent roughly $140 billion on construction, with roughly $80 billion spent on private residential construction and another $30 billion spent on private non-residential construction.[7] Cement and concrete products represent a major cost component of construction in these areas. For example, cement and concrete represent 8% of the material costs for non-residential buildings, 14% for single-unit residential buildings, and more than 30% for multi-unit residential buildings.[8]

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[3] California Department of Finance (2008).

[4] Portland Cement Association (2007).

[5] Ibid.

[6] U.S. Bureau of the Census (2008).

[7] Calculations by Keybridge Research LLC based on U.S. Bureau of the Census (2008) and U.S. Bureau of Labor Statistics (2008). National estimates were scaled to state estimates based on construction industry employment estimates.

[8] U.S. Bureau of Labor Statistics (2008).

In 2007, total public spending on infrastructure and building projects in California amounted to roughly $30 billion, with approximately $950 million spent on cement.[9] Cement and concrete are particularly important for such public works projects, making up nearly 19% of the material costs of highway and street construction and almost 15% for other heavy construction projects, such as airport and mass transit projects.[10] Thus, a significant increase in the price of cement and concrete can easily translate into millions of dollars in additional construction costs for the state budget.

Furthermore, public spending on infrastructure projects in California is likely to increase in the future as the state and federal government replace and repair aging highways, bridges, levees, and other infrastructure. In addition to the spending needed to maintain existing infrastructure, California will need to invest heavily in the coming years to meet the needs of a growing population. For example, Governor Schwarzenegger's $37 billion infrastructure program, passed in November 2006, includes approximately $20 billion for transportation projects, $10 billion for school construction projects, $4 billion for levee and flood control projects, and $3 billion for housing projects.[11] Furthermore, the governor and others estimate that California needs $500 billion in infrastructure spending over the next 20 years to build new schools, prisons, water management facilities, bridges, highways and other critical infrastructure needs.[12] Undoubtedly, available and affordable cement supplies will be critical to meeting the state's infrastructure needs in a timely and cost-effective manner.

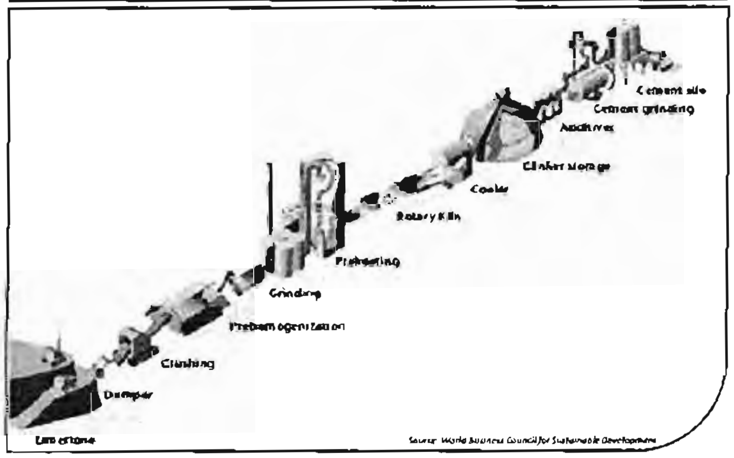
Such estimates of future infrastructure needs largely ignore the substantial investments in new construction that will be critical to mitigating and adapting to the negative consequences of climate change. Many GHG mitigation strategies (e.g., wind turbines, net-zero energy buildings, and nuclear energy facilities) will require significant new construction, as will adaptation strategies that attempt to manage the worst effects of climate change (e.g., flood control facilities and irrigation projects). To the extent that the construction of these new climate-friendly structures depend on concrete, the availability of affordable and stable cement supplies will be fundamental to a robust and cost-effective response to the challenge of global climate change.

[9] Calculations by Keybridge Research LLC based on public cement demand (7.494 metric tons) and cement prices as reported by the Portland Cement Association (2008).
[10] U.S. Bureau of Labor Statistics (2008). Weights are based on 2002 input-output relationships for producer price indices.
[11] California Department of Finance (2007).
[12] Ibid.

III. THE CEMENT MANUFACTURING PROCESS

Despite cement's ubiquitous use, few individuals realize the complexity of the process and the technology required to produce a ton of cement. Indeed, the large scale of cement manufacturing often obscures the exacting nature of the process. Some 80 separate and continuous operations are required to generate complex chemical reactions and produce a closely controlled combination of multiple ingredients, including calcium, silicon, aluminum, iron, and gypsum. Such precision requires that each stage in the cement manufacturing process be closely monitored and frequently inspected, and that the finished product be routinely tested to insure that it meets technical specifications.

FIGURE 2: FROM QUARRY TO SILO
THE CEMENT MANUFACTURING PROCESS



In the most elementary sense, the cement manufacturing process consists of four steps:

(1) Quarrying & Crushing: Extracting limestone (calcium carbonate) and other raw materials from a quarry, crushing to more manageable sizes, and stockpiling for eventual use.

(2) Raw Material Preparation: Recovering crushed limestone and other raw materials from stockpiles, grinding into a fine powder, proportioning to achieve the correct chemical composition, and blending in a homogenization process to form a consistent raw meal for the pyroprocessing system.

(3) Pyroprocessing: Heating the raw meal at extreme temperatures to separate the limestone into lime (calcium oxide) and carbon dioxide, with the lime reacting with other components to form cement clinker and carbon dioxide being emitted.

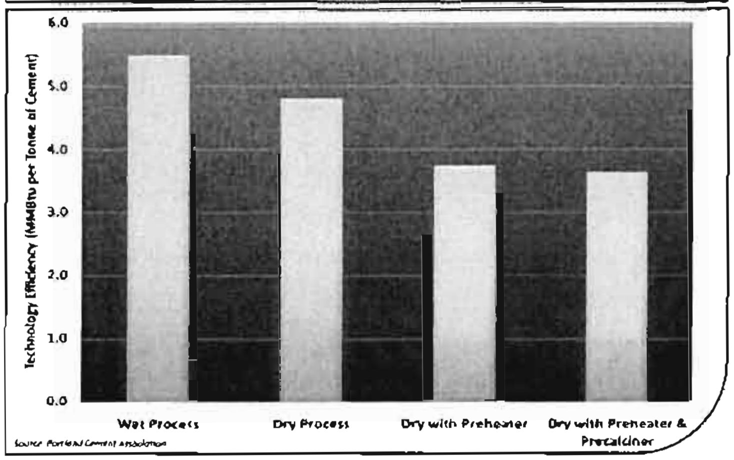
(4) Finish Grinding: Subjecting the raw cement clinker to mechanical processes to grind the material with a small proportion of limestone and gypsum, which controls the rate of hydration, to produce an ultra-fine powder that is commonly referred to as Portland Cement.

The heart of the cement manufacturing process is the kiln – a slightly inclined, slowly rotating brick lined steel tube where the pyroprocessing stage takes place. Raw materials are fed into the upper end of the kiln and heated to temperatures of 2,700-2,800 degrees Fahrenheit. Fuel is supplied at the lower end of the kiln and the heated raw materials are transported "downhill" as the kiln rotates. Many fuels can be used in the pyroprocessing stage, but coal has been the predominant fuel due to economics and availability. The intermediate product of the kiln is known as clinker, which is mixed with additional limestone, gypsum, or other materials before being ground into a fine cement powder.

Although the basic configuration discussed thus far is common to all cement production, there are critical differences in cement manufacturing technology. Specifically, there are two fundamental types of process technologies, which primarily differ in their treatment of the raw materials to be fed into the kiln. The so-called "wet process" consists of suspending raw materials in water to form a slurry, which is then fed into the kiln to be heated. In contrast, the "dry process" consists of grinding dry raw materials into a manageable powder before being fed into the kiln.

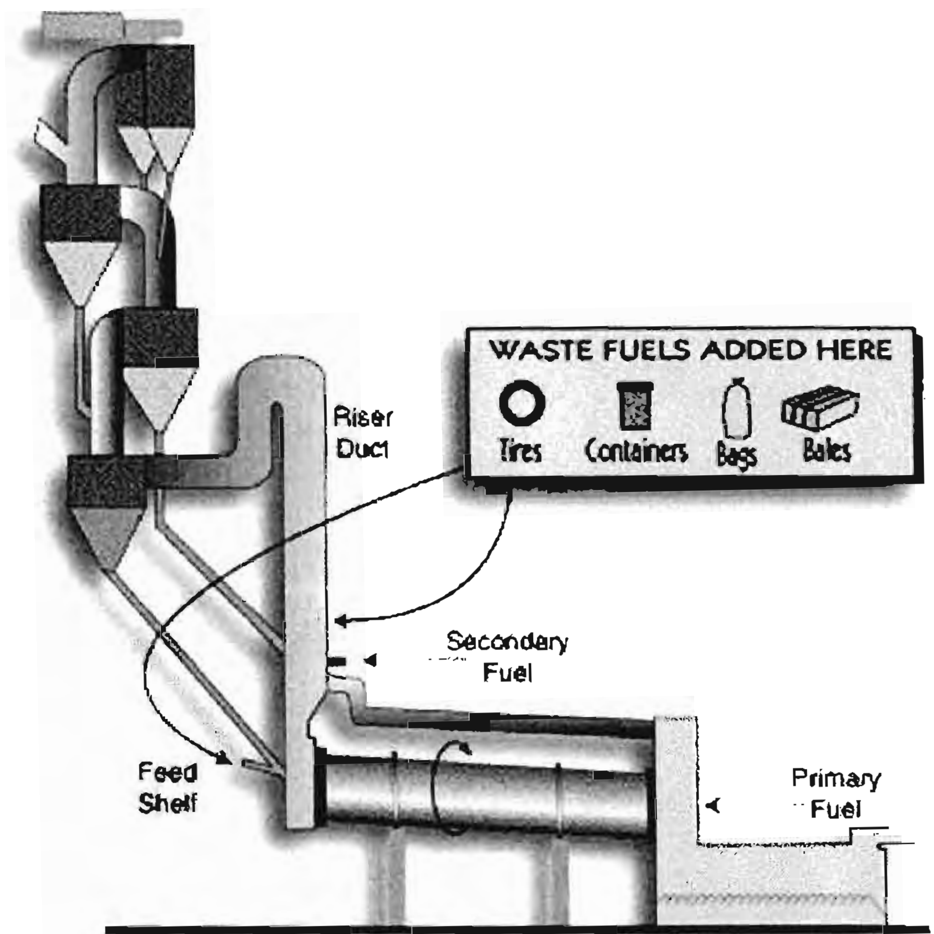
FIGURE 3: ENERGY EFFICIENCY

STANDARD EFFICIENCY FOR VARIOUS TECHNOLOGIES



As shown in Figure 3, the basic dry process technology, known as "long dry", is significantly more energy efficient than wet process technology. Moreover, a dry process plant can further improve efficiency by installing a series of preheaters, which utilize thermal waste gases to heat the raw materials before entering the kiln, or diverting fuel to a calciner vessel at the base of the preheater tower. Although both the wet and dry processes are still used extensively throughout the U.S. and the world, virtually all new cement plants use the dry process because of the significantly lower energy requirements.

Figure 4: Manufacturing Technology
Dry Process Kiln with Preheater Tower



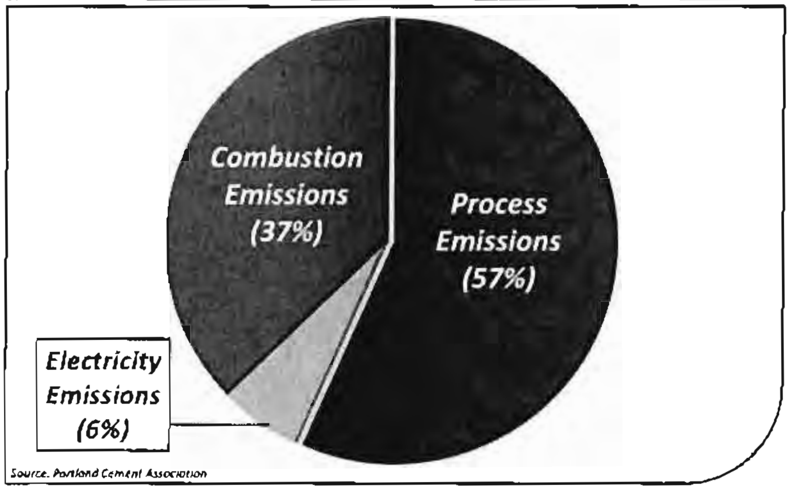
Source: www.temarry.com

IV. GHG Emissions in the California Cement Industry

The production of cement results in GHG emissions through a variety of activities. Common to all cement production is the chemical reaction that occurs when the calcium carbonate ($CaCO_3$) in limestone is heated and breaks down into lime (CaO) and carbon dioxide (CO_2) – a process that accounts for 57% of emissions in the California cement industry, as shown in Figure 5.[13] Lime is the key ingredient in cement, and CO_2 is released in a fixed ratio with the production of lime.[14] In short, the majority of CO_2 emissions are a direct and unalterable consequence of the chemical reaction that is fundamental to the cement manufacturing process. These immutable "process emissions" distinguish the cement industry from other carbon-intensive sectors, such as electric power or transportation.

Emissions from non-calcination activities primarily result from the combustion of coal and other fuels in the pyroprocessing stage, which accounts for 37% of GHG emissions in the California cement industry. Indirect emissions from the consumption of electricity account for the balance (6%).

Figure 5: Cement Manufacturing Emissions
Share of Emissions, California Average



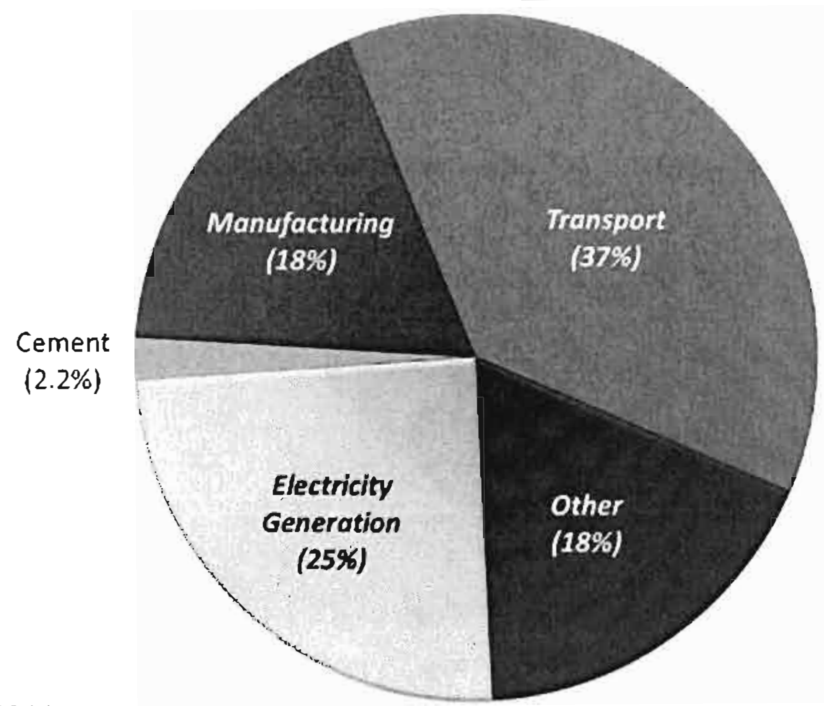
Importantly, the transport of cement produces additional CO_2 emissions – especially when importing from distant locations, such as Asia. Climate change policies that result in a shift in market share to imports will reduce the emissions associated with California cement *production*, but will increase the emissions associated with California's cement *consumption*. The additional CO_2 released through transportation of cement virtually insures that this shift in market share will result in a net increase in global GHG emissions. The following section explores this delicate interplay between emissions from California cement production and consumption in more detail.

4.1 Trends in Emissions from California Cement Production

In 2006, the California cement industry emitted 10.9 million metric tons of CO_2 – representing approximately 2.2% of total state GHG emissions.[15] Compared to other carbon-intensive industries within the state, cement is a relatively minor but nevertheless notable source of emissions. Cement industry emissions are roughly one-third of those from the petroleum refining industry, one-tenth of those from the electric power industry, and one-twentieth of those from the transportation sector.

[13] Estimate from PCA based on confidential plant data.
[14] Specifically, one gram of CO_2 is released for every 1.27 grams of lime produced.
[15] Cement emissions from PCA. State emissions from Air Resources Board (2008). Continuation of 1990-2004 emissions growth rates assumed to calculate 2006 statewide emissions. Unless otherwise noted, all state emissions data are from this source.

FIGURE 6: CALIFORNIA GHG EMISSIONS
SHARE OF STATE EMISSIONS IN 2004, BY SECTOR



Source: ARB GHG Emissions Inventory

Trends in California cement emissions during the past two decades can be characterized by two underlying forces: (1) strong demand for cement fueled by a growing need for housing and infrastructure, and (2) consistent improvements in energy efficiency in cement manufacturing. Over the last 15 years, cement production in California increased 44%, while industry emissions increased just 34%.[16] This marked difference between output growth and emissions growth reflects the industry's significant improvements in energy efficiency and, by extension, carbon intensity.

4.2 THE CARBON FOOTPRINT ASSOCIATED WITH CALIFORNIA CEMENT CONSUMPTION

The discussion thus far has focused on emissions from California cement *production*, but an equally important consideration is the emissions associated with the state's cement *consumption*. As is well known, GHGs are global pollutants in which the impact of the emissions is independent of the location of the emitter – simply put, geography is irrelevant in the context of GHG emissions. A state that imports 100% of its cement consumption is no less complicit in contributing to global climate change than if it produced 100% of its cement consumption. All else being equal, it is a state's consumption of cement that is pertinent to addressing the challenge of global climate change, not its production.

[16] California Climate Action Team, Cement Subgroup (2008).

In reality, of course, all else is rarely equal – especially in the case of the California cement market. In fact, the emissions associated with cement imported to California are *significantly greater* than those associated with cement produced within the state. For example, imports from China, California's largest foreign supplier, are estimated to result in 34% higher emissions, due to both differences in production efficiencies and additional emissions from transportation.[17]

Specifically, California cement manufacturers are more energy efficient and, by extension, less carbon intensive than most manufacturers of cement imported into California. While California cement is produced at facilities utilizing the most advanced technology, the vast majority of cement imports originate from locations where manufacturers generally rely on significantly less efficient production methods, such as wet process technology or vertical kilns. For example, all California cement manufacturers utilize some variation of the dry process – and more than 95% of California cement is produced with preheater-precalciner technology, the most efficient technology.[18] In contrast, more than half of all facilities in China, the largest producer and exporter of cement in the world, utilize vertical kilns – one of the least efficient production methods.[19]

In the instance of imported cement, California's carbon footprint is also expanded because of increased transportation emissions. Importation requires transport via truck, train, or ship – activities that result in additional emissions per ton delivered to the end user. This effect is exacerbated by California's west coast location, which makes it economically efficient (but not environmentally sensible) to import cement via ship from distant locations, such as Asia. It has been estimated that imports from China, which represented more than half of all California cement imports in 2006, results in an additional 25% increase in global GHG emissions due to transportation by sea.[20]

[17] Calculations by Keybridge Research LLC, assuming a carbon intensity for California cement of 0.92 ton of CO_2 per ton of clinker (from PCA based on confidential plant data), a carbon intensity for Chinese cement of 1.0 ton of CO_2 per ton of clinker (Yuan-sheng, 2006), and a 25% emissions increase for imports due to transportation (ENVIRON, 2007).

[18] Estimate from PCA based on confidential plant data.

[19] Taylor, M., Tam, C., & Gielen, D. (2006).

[20] ENVIRON International Corporation (2007).

V. ABATEMENT OPPORTUNITIES WITHIN THE CALIFORNIA CEMENT INDUSTRY

Although the benefits of reducing a ton of CO_2 are the same regardless of the source, the cost of achieving that reduction can vary significantly across economies, sectors, industries, facilities, and even within the same process. Understanding the nature of emission sources is a critical first step in eventually selecting a set of policy instruments that both recognizes this cost diversity and leverages it to achieve reductions at the least cost. With this goal in mind, the following sections explore the nature of carbon emissions in cement manufacturing and, by extension, the opportunities to reduce emissions within the industry in a cost-effective manner.[21]

5.1 PROCESS EMISSIONS

As previously discussed, process emissions – which account for 57% of emissions in California cement manufacturing – are an unalterable consequence of the chemical reaction that is fundamental to the production of cement clinker. Consequently, the only pathway for reducing process emissions is to decrease the amount of clinker produced. Such reductions can occur through any of the following three strategies:[22]

(1) *Reducing the amount of clinker used in a given quantity of cement*

(2) *Reducing the amount of cement used in a given quantity of concrete*

(3) *Reducing the amount of concrete used in construction*

With respect to the first option, limestone can be used as a partial substitute for Portland cement. Although many other countries use higher proportions of limestone to make blended Portland Cements, these blended products lack general market acceptance in the U.S. Caltrans regulations currently allow for up to 2.5% use of limestone additive.

With respect to the second option, supplementary cementitious materials (SCMs) such as fly ash and slag can – within certain limits – be added to concrete mixes in lieu of cement. The use of different proportions of SCMs, cement, sand, gravel and water can alter the properties of concrete, including drying time, which is generally longer when more SCMs are included. Also, concrete mixes containing large quantities of SCMs may not yield the necessary physical properties for the vast array of finished concrete products, such as precast, extrusions, or high early-strength concretes. With latitude to request concrete to meet project specifications, civil engineers and ready mixers can minimize the carbon footprint of concrete while maximizing its performance. Despite its potential as a GHG reduction strategy, the use of SCMs in the California concrete industry faces several significant barriers and uncertainties:

[21] Another report in this series will provide a more comprehensive and detailed examination of abatement opportunities within the California cement industry, including general ranges of estimates for abatement costs and total abatement potential.

[22] Note that a fourth strategy for reducing the production of clinker exists – namely, reducing construction. However, given that construction is both a function and driver of economic growth, purposefully reducing the demand for construction seems to be a needlessly blunt instrument and a clearly inferior strategy for cost-effectively reducing GHG emissions.

- The use of SCMs is limited under current regulations.
- Neither the cement industry nor the concrete industry controls the utilization of SCMs. Rather, product specifications are determined by the customer, owner, or builder based on the specific requirements of each project in terms of engineering designs, building codes, groundwater conditions, and other factors.
- The availability of affordable and stable supplies of SCMs in California is currently limited and remains highly uncertain in the long-term. Furthermore, SCMs in short supply, such as ground granulated blast furnace slag (GGBFS), are optimally consumed near their source of production, which avoids an increase in global GHG emissions due to excess transportation.
- Even if regulatory barriers and complexities are resolved, it remains unclear if the use of SCMs will gain widespread acceptance among construction contractors and other end-users.

With respect to the third option, reducing the amount of concrete used in construction would be an enormous burden on the economy because adequate substitutes are not available. For some concrete applications, alternatives exist (e.g., asphalt, steel, and lumber), but they generally present more challenging environmental issues than concrete. For other concrete applications, there simply are no alternatives that could meet technical criteria necessary for use in construction.

5.2 Fuel Emissions

After accounting for process emissions, the majority of the balance of GHG emissions from cement production result from fuel emissions – specifically, emissions resulting from the burning of fossil fuels in the kiln. For various economic reasons, coal has historically been the most common fuel used in cement kilns, though petroleum coke, natural gas, used tires, and other fuels are used to a lesser extent.

There are two general strategies for reducing fuel emissions:

(1) Reduce the fuel required to produce a given quantity of clinker – that is, improve energy efficiency.

(2) Substitute toward lower-carbon fuels, such as natural gas, biogenic materials, or waste tires.

With respect to improvements in energy efficiencies, almost all of the cost-effective opportunities for efficiency improvements have already been made. The basic economic incentives of the state's cement industry have driven it to maximize energy efficiency in an environmentally responsible manner in view of high energy costs and what are already some of the strictest environmental regulations in the world. Generally speaking, the energy efficiency opportunities that remain within the California cement industry either are small marginal improvements, involve very significant capital costs, or are prevented by regulations.

Small improvements in kiln efficiencies are possible without large-scale equipment replacements. Although cement manufacturers have already made significant investments to undertake such improvements, increase energy efficiency, and thereby lower production costs, it is possible that some previously unattractive improvements will become attractive under a climate change policy that establishes a price for carbon. Nevertheless, the corresponding efficiency gains are likely to be small and will not generate significant levels of GHG abatement.

With respect to fuel switching, substituting primary fuel sources away from coal and petroleum coke and toward natural gas or other low-carbon fuels will require capital intensive retrofits for some facilities and the early retirement of productive capital equipment for others. Fuel switching toward natural gas also includes significantly higher fuel costs, with natural gas costing about 5 times more than coal per btu.[23] As a result, fuel switching strategies are likely to cost over $200 per ton of CO2 reduced and are not cost-effective.[24] Switching to natural gas is also likely to present environmental challenges, as it would conflict with existing NO_X and particulate matter regulations.

On the other hand, substituting toward alternative fuels, including biogenic fuels and waste products, is a less capital intensive and potentially more viable approach. In testament to the cost effectiveness of this strategy, many California cement manufacturers and cement manufacturers in other markets currently use a wide range of alternative waste fuels. Further adoption of this strategy will depend on the ability to overcome various barriers. For instance, public perception about health risks has inhibited permitting processes and limited manufacturers' ability to more fully utilize alternative waste fuels. In order to maintain proper thermal conditions on a consistent and sustainable basis, there are also limitations on the extent of alternative fuel substitution. The availability of waste products is a potential constraint that also deserves careful consideration. Finally, significant uncertainty remains as to the extent to which the use of waste products such as tires will be credited in a California GHG accounting system – a regulatory complexity that will need to be resolved if additional use of waste products will be a key component of any GHG policy framework.

All of the carbon emissions abatement options listed above can be achieved using available technology. There are other strategies, however, that hold some promise in the long term. Although no major breakthroughs in the pyroprocessing stage appear to be on the horizon, a more extended strategic timeline will allow for marginally more efficient kilns to be introduced in an orderly fashion and without the premature retirement of productive equipment. Further research on the use of biogenic materials as fuels could significantly reduce the cement industry's dependence on fossil fuels, though the competition for potentially scarce biofuels could be a natural limitation. Promising research continues on SCMs and other materials that could be substituted for clinker.

5.3 Electricity Emissions

Approximately 6% of GHG emissions from cement production are indirect emissions from electricity consumption. These emissions can be reduced by:

(1) Reducing the amount of electricity used in cement production.

(2) Decarbonizing the electricity supply.

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[23] Preliminary estimates by Geomatrix Consultants for forthcoming CSCME study.
[24] Ibid.

The first option would likely be very costly, as California cement manufacturers are already efficient consumers of electricity. Indeed, electricity constitutes a significant portion of a cement plant's variable costs. Combining the importance of this cost driver with the above-average electricity prices in the California market (prices that are likely to increase substantially with the implementation of AB 32), cement manufacturers already have a strong natural incentive to minimize kilowatt-hours used per ton of cement. Furthermore, several cement plants in California currently participate in the interruptible power program under which they voluntarily shut down their plants during peak-load periods to receive discounted electricity prices – further demonstrating the critical importance of electricity prices as a driver of variable costs and the existing incentive to reduce electricity consumption.

The other option to reduce indirect emissions from electricity is to reduce the carbon intensity of electricity generation. For electricity coming from the grid, this option is largely outside of the control of the cement sector. However, cement companies could reduce the amount of electricity needed from the grid by producing much of their own electricity through "bottom-cycle" cogeneration. By using the thermal waste heat from kilns and clinker coolers, bottom-cycle cogeneration leverages the energy that would have otherwise been expended in the manufacturing process and displaces electric power consumption from the grid – thereby providing a true, additional offset in GHG emissions. Cement companies already have strong incentives to implement cogeneration and two California plants already include cogeneration systems. Nevertheless, current policies, such as exiting fees, limit or discourage the expansion of cogeneration, and the design of an effective regulatory system for combined heat and power (CHP) under a California climate change regime is plagued with significant complexities.

5.4 Transportation Emissions

As previously mentioned, transportation can represent a substantial source of additional GHG emissions in the cement industry – especially in the case of imports from distant locations. The amount of emissions associated with transportation depends on the distances traveled from "quarry to contractor" and the modes of transportation used. Given that cement production facilities tend to be located close to raw material sources, transportation emissions within the manufacturing process itself are relatively minor. Transporting cement within the state, either from a cement plant or from an import terminal to the contractor results in additional emissions which are small in comparison to emissions from cement production. However, the importation of cement from distant locations can result in substantial additional emissions. Absent a breakthrough in shipping, the only viable strategy for limiting emissions from transportation is insuring the long-term health of local cement manufacturers and avoiding a policy-induced shift in market share to imports.

5.5 "Green Cement" Applications

Presumably because of the carbon-intensive nature of the manufacturing process, cement is typically viewed as part of the problem, not part of the solution. However, as stated in the Portland Cement Association's Work Plan for the U.S. Cement Industry Climate Change Program, "green" product applications hold enormous promise for achieving significant CO_2 reductions. Specifically, proven green cement applications include:

- ***Energy-Efficient Structures:*** Commercial and residential structures built with concrete exterior walls can have enhanced energy efficiency. Concrete has a high thermal mass which allows it to store heat better than other materials. This is one of the fundamental energy saving properties of the new San Francisco Federal Building, one of the greenest buildings in the country.[25] Additionally, homes using insulated concrete forms (ICFs) combine concrete and foam insulation to provide energy savings versus wood or steel frame homes.[26] ICF walls can earn credits under the LEED homes program.[27]

- ***Urban Heat Island Mitigation & Improved Reflective Properties:*** Light-colored concrete absorbs less and radiates more light than dark materials – thereby reducing radiated heat energy and thus ambient temperatures. According to the Cool Pavement Report prepared for the U.S. EPA, concrete exhibits much more favorable "cooling" characteristic than any other material examined, including asphalt.[28] ARB itself identified both "cool roofs" and "light-colored paving" as options for GHG reductions.[29] Improved reflective properties also mean that concrete sidewalks, parking lots, and streets need 36% less lighting at night than asphalt equivalents.[30]

- ***Concrete Pavement that Boosts Vehicle Fuel Efficiency:*** Studies indicate that because of its rigidity, concrete pavement enhances fuel efficiency of vehicles when compared to flexible pavements. Recent studies show that concrete roads increase truck fuel efficiency by 1%-6% as compared to asphalt, with faster moving and heavier trucks benefiting the most.[31]

In addition to considering how concrete applications reduce greenhouse gases, concrete's durability and lifespan are also important considerations for policy makers. Specifically, cement-based concrete compares favorably with competing products on a lifecycle basis. Concrete roads have an average life span of about 25-30 years before needing resurfacing, 2-3 times longer than asphalt roads, which require resurfacing after just 10-17 years. Concrete roads also require less repair and maintenance, lowering GHG emissions from construction equipment and materials and lowering GHG emissions from vehicle idling due to construction bottlenecks. Lifecycle emissions of concrete buildings also compare very well versus wood and steel frame buildings. Lawrence Berkeley National Lab is currently developing a tool that will be able to show the lifecycle emissions savings of concrete buildings. Given these climate-friendly applications and benefits, policymakers should explore abatement strategies in the construction industry that leverage the green properties of cement-based concrete.

[25] Public Broadcasting System (2007).
[26] Portland Cement Association (2002).
[27] U.S. Green Building Council (2007).
[28] Cambridge Systematics, Inc. (2005).
[29] Air Resources Board (2007).
[30] Portland Cement Association (2005).
[31] National Research Council of Canada, Centre for Surface Transportation Technology (2005).

5.6 *Summary of Industry Abatement Opportunities*

A preliminary review of abatement opportunities within the California cement industry reveals that virtually all strategies suffer from some combination of technical, regulatory, economic, or market barriers. A handful of strategies emerge as having the *potential* to generate cost-effective emission reductions: (1) production of limestone blended Portland Cement, (2) increased use of SCMs in concrete and cement, (3) marginal improvements in energy efficiencies, (4) use of waste as alternative fuel, and (5) cogeneration. Nevertheless, non-economic barriers persist, and they will need to be resolved before the industry will be able to pursue these strategies and achieve reductions within the sector.

The use of limestone and SCMs appears to have the greatest potential for large-scale and cost-effective emissions reductions and to represent the only viable strategies for reducing process emissions, which represent a majority of emissions within the industry. Regulatory barriers and market complexities, however, must be resolved before widespread adoption of these strategies can begin to generate significant reductions in GHG emissions.

Marginal improvements in energy efficiencies could, within limits, prove to be cost-effective, though costs are likely to vary significantly across the range of specific efficiency enhancing measures. Cement manufacturers already have strong natural incentives to take advantage of any improvements that yield cost savings, though it is conceivable that some marginally unattractive improvement today will become attractive if a price of carbon is established. Regardless, considering that California cement manufacturers are already among the most efficient in the world, the quantity of abatement from energy efficiency strategies is likely to be small.

With respect to fuel switching, utilizing waste tires and other waste products as secondary fuel sources appears to be a potentially attractive strategy. Many manufacturers currently use such waste fuels in the U.S. and other countries and further adoption will depend on the removal of various non-economic barriers and constraints, including public perceptions about health risks, permitting complexity, supply constraints, and regulatory clarity on the treatment of such fuels in California's GHG accounting system.

The best way to reduce emissions due to the transport of cement is simply to produce cement close to the end user. General speaking, increasing California cement production should decrease imports and the transport emissions associated with them. Simply put, insuring the health of the California cement industry is critical to minimizing leakage and containing transportation emissions beyond current levels.

Other potential strategies are likely to fall well short of any reasonable standard of cost-effectiveness. Strategies that force the premature retirement of capital equipment, such as kilns, are likely to be prohibitively expensive, as are strategies that require substitution away from coal as a primary fuel source in favor of low-carbon fuels such as natural gas.

VI. Fundamental Characteristics of the California Cement Industry

The California cement industry is unique in comparison to both other manufacturing industries and other states' cement industries. This uniqueness is derived from a constellation of characteristics, such as the nature of the product, the conditions of competition, and the prospects for innovation. Understanding such characteristics is a critical step toward developing a deeper appreciation for the key challenges that the California cement industry faces in adapting to a carbon-constrained world. With this goal in mind, the following sections explore the fundamental characteristics of the California cement industry across five basic dimensions: product, costs, market, technology, and regulation.

6.1 Product: Cement is a Homogeneous Commodity

A "homogenous commodity" is one in which the product of all suppliers is virtually identical and indistinguishable. Economists have three general criteria for identifying such a good: (1) the product of all manufacturers is identical in use, (2) it is sold in bulk, and (3) it cannot be differentiated through labeling or advertising. As a product manufactured to satisfy technical specifications and sold in large quantities without labeling, cement is a classic example of a homogenous commodity.

As a homogenous commodity, cement is a perfectly substitutable good from the standpoint of the customer – the identity of the manufacturer makes little, if any, difference to the customer. For perfect substitutes to have sales in the same market, their prices must be virtually identical. Otherwise, sales would gravitate almost entirely to the lower priced good. Simply put, homogenous goods, like cement, compete almost exclusively on the basis of price.

This vigorous competition on the basis of price generates strong natural incentives for cement manufacturers to persistently drive down production costs. Given that energy costs are a primary component of a manufacturer's overall cost structure, this translates into an exceptionally powerful incentive to persistently root out inefficiencies and improve energy utilization. As a result, cement manufacturers tend to be extremely energy efficient.

Furthermore, in markets for homogenous products, such as cement, a cost increase for a subset of manufacturers can significantly alter the conditions of competition within the industry. If some cement manufacturers are faced with a new cost pressure, such as the cost of carbon emissions, that is not faced by all competitors in the market, decision makers are forced to choose some mix of two unattractive strategies: (1) pass through the cost increase to consumers by raising prices, thereby losing market share or (2) absorb the cost increase by maintaining prices, thereby reducing profit margins.

Primary Implications:

- ***Cement manufacturers compete almost exclusively on the basis of price.***
- ***Cement manufacturers have an exceptionally strong natural incentive to root out inefficiency.***
- ***Small cost increases for a subset of manufacturers can result in large impacts on market share and profitability.***

6.2 *Costs: Cement is a Capital-Intensive Industry*

Cement manufacturing requires large upfront investments in capital equipment that is employed for decades. As with energy costs, capital investment costs are a primary component of a cement manufacturer's cost structure. Unlike energy costs, capital investment costs are "fixed costs" – that is, they do not vary with output. These costs exist whether one unit or one million units are produced.

The presence of high fixed costs has important implications for the optimal production behavior of a manufacturer. For instance, the higher the fixed cost ratio, the higher the sales volume needed to reach the "break-even point", the threshold at which the manufacturer covers both its fixed and variable costs and begins making incremental contributions toward profits. As a result, the profitability of cement manufacturers is highly sensitive to sales volume – even small reductions in volume can substantially reduce profits.

Furthermore, in a capital intensive industry, small increases in regulatory compliance costs, market uncertainty, or policy uncertainty for a subset of manufacturers can result in large impacts on overall competitive conditions and investment decisions. To finance the purchase of an expensive and long-lived productive asset, an investor must be confident that he or she will receive a fair return over the life of the asset. If only a subset of manufacturers are faced with greater regulatory compliance costs, market uncertainty, or policy uncertainty than competitors, their costs of financing will be higher and they will be placed at a competitive disadvantage – resulting in large impacts on market share, profitability, and investment decisions.

Primary Implications:

- ***Cement manufacturers have a high fixed cost ratio.***
- ***Small reductions in sales volume can substantially reduce profits.***
- ***Small increases in uncertainty for only a subset of cement manufacturers can result in large impacts on market share, profitability, and investment decisions.***

6.3 *Market: California is an Internationally Competitive Cement Market*

Generally speaking, cement markets tend to have high barriers to entry and limited geographic scope, as the low value-to-weight ratio of cement results in prohibitively high transportation costs for distant suppliers. More specifically, overland transportation of cement by truck or rail is expensive – a factor that typically results in local regional markets.

However, maritime transportation of cement is significantly less expensive and substantially expands the geographic scope of imports for coastal markets such as California. Indeed, the cost of transporting cement by sea is a mere fraction of transporting it by any other means. A coastal state such as California has lower barriers to entry for distant suppliers compared to a typical inland cement market. Consequently, the California cement market could be characterized as an international market in which California produced cement competes almost exclusively with foreign imports.

Furthermore, California's location on the Pacific Ocean makes it easily accessible to imports from Asian nations, such as China, Indonesia, Thailand, and Taiwan. Operating in developing countries with low labor costs and few environmental regulations, Asian cement manufacturers enjoy a significant production cost advantage, which allows Asian imports to remain price competitive in coastal markets, such as California. Additional environmental regulation asymmetries are likely to expand this cost advantage and further alter competitive dynamics within the California market.

Primary Implications:

- ***California cement manufacturers operate in an international market.***
- ***California cement manufacturers are particularly exposed to imports from China, which maintains a cost advantage due to low labor costs and few environmental regulations.***
- ***Additional environmental regulation asymmetries are likely to alter competitive conditions.***

6.4 Technology: Cement is a Technologically Mature Industry

Cement is a technologically mature industry. The last great technological shift within the industry occurred decades ago as new manufacturing facilities shifted from the less efficient wet process to the more efficient dry process. However, no major technological shifts in large-scale production technology are expected in the foreseeable future and the potential for significant reductions beyond those derived from persistent marginal improvements in energy efficiency is limited.

In addition, California's history of environmental leadership has resulted in an industrial base that is more efficient and cleaner than those within other U.S. states or the vast majority of nations. Also, as previously mentioned, strong import competition has forced domestic manufacturers to remain on the leading edge of technology to improve energy efficiency, contain production costs, and thereby remain price competitive in the California cement market. In short, California cement manufacturers are a technologically advanced group in a technologically mature industry.

Primary Implications:

- ***Major technological shifts within the cement industry are not expected before 2020.***
- ***Significant emissions reductions beyond those generated through marginal improvements in energy efficiency are unlikely.***
- ***California cement manufacturers are a technologically advanced group in a technologically mature industry.***

6.5 *Regulation: Cement is a Heavily Regulated Industry*

Virtually every aspect of the cement industry is tightly controlled by rules and regulations, from the structure of the market to the operations of plants to the nature of the end product. The manufacturing process, especially in California, is subject to stringent environmental regulations and the detailed permitting process through which they are implemented. Finally, even the properties of cement products are tightly controlled through technical specifications and building codes intended to insure product performance and safety under a variety of conditions.

While the fundamental purpose of such regulation is to protect the public interest, an unfortunate byproduct is a restriction on the industry's capacity to respond to rapidly changing and uncertain market conditions. Regulation is an inherently backward looking phenomenon that is founded on the often dated legacy of earlier times. It typically reacts to the historical experience of an industry and it is slow to anticipate impending challenges. As a result, industries subject to intense regulation, such as the cement industry, typically lack the strategic and operational flexibility needed to rapidly adapt to new challenges that dramatically transform business-as-usual conditions, such as global climate change.

Primary Implications:

- ***The California cement industry is a heavily regulated industry which limits its flexibility to adapt to rapidly changing and uncertain business conditions.***
- ***Regulations for the California cement industry should be based on forward-looking thinking that anticipates new challenges and provides flexibility in responding to global climate change.***

VII. Key Industry Challenges in Adapting to a Carbon-Constrained World

The unique set of characteristics that define the California cement industry suggests that domestic manufacturers will face two key challenges under any climate change policy: (1) relatively few cost-effective abatement opportunities within the industry and (2) a high risk of carbon leakage. The following sections discuss these challenges in more detail, while also highlighting the role that careful policy design can play in resolving these challenges and enabling the California cement industry to contribute to a growing economy and a sustainable future in California.

7.1 Key Challenge: Relatively Few Cost-Effective Abatement Opportunities

An economically efficient climate change policy requires that GHG reductions be achieved at their least costly source. Some industries will have an abundance of low-cost abatement measures, while other industries will have few. Based on the cement industry's unique combination of characteristics, as identified above, all indications are that the cement industry is likely to have relatively few cost-effective abatement opportunities:

- As the supplier of a homogenous commodity that competes almost exclusively on the basis of price, the California cement industry has strong natural incentives to drive down energy costs by rooting out inefficiencies. As a result, it is likely that only small, marginal cost-effective gains in energy efficiency remain available within the industry.

- Cement is a capital-intensive industry and measures involving the replacement of expensive capital equipment will only be cost-effective if they coincide with the natural turnover of capital stock. Conversely, any measure that forces the premature retirement of productive capital equipment is highly unlikely to be cost-effective.

- Given that California cement manufacturers are a technologically advanced group in a technologically mature industry, there are no technological "silver bullets" within the 2020 time horizon. On a longer-term basis, innovative new technologies such as carbon capture and storage could have potential as cost-effective solutions for large-scale abatement, but significant public-private funding is necessary to bring these new technologies into widespread commercial use.

- Regulation of the California cement industry represents a constraint on its capacity to adapt to the kind of dramatic, rapid change generated by climate change policies. Although the increased use of limestone and SCMs could be cost-effective, the ability to expand the use of these materials will be dependent upon significant changes in building codes and technical engineering specifications. The use of alternative waste fuels may also be cost-effective, but permitting barriers are formidable in terms of time and costs due to misconceptions about public health concerns. Even if such regulatory barriers are removed, the availability of SCMs, the market acceptance of SCMs, and the availability of waste fuels such as tires are key uncertainties that must be resolved.

Collectively, these factors suggest that regulators must be realistic in their expectations for GHG reductions within the California cement industry. The majority of abatement opportunities within the industry are unlikely to be economically attractive relative to abatement opportunities in other sectors of the state economy and around the world. A climate change policy that demands an unrealistic level of abatement from cement manufacturers, for no other reason than to locate reductions within the industry, is unlikely to be cost-effective or equitable.

These factors do not, however, preclude the cement industry from contributing to meaningful GHG reductions in general. The scarcity of cost-effective abatement opportunities within the industry simply means that cement manufacturers must have the ability to take advantage of the lower-cost abatement opportunities in other sectors of the California economy and around the world. Ultimately, flexible compliance mechanisms, such as the ability to purchase emission reduction credits and offsets from sources outside the industry, must be a fundamental feature of any cost-effective climate change policy for the California cement industry.

7.2 Key Challenge: A High Risk of Carbon Leakage

Ideally, the cost increases associated with a climate change policy, whether they be associated with an explicit price of carbon or the implied costs of satisfying certain standards, will be transmitted downstream through product prices – simultaneously providing a clear price signal that discourages carbon use and shifts the cost of the policy onto consumers. However, the unique characteristics of certain industries occasionally prevent the pass through of such costs. Under this less than ideal scenario of limited cost pass through, companies bear a portion of the cost burden of the policy – placing them at a competitive disadvantage relative to competitors in unregulated jurisdictions. Emitting companies that are faced with a significant and persistent competitive disadvantage are likely to lose market share and/or relocate to unregulated jurisdictions to avoid the additional cost imposed by the policy – normally resulting in offsetting increases in global GHG emissions (i.e., leakage).

Many of the unique characteristics identified above suggest that a poorly designed climate change policy will increase costs for California cement manufacturers, resulting in a shift in California consumption to out-of-state suppliers and substantial leakage:

- Given that suppliers of a homogenous commodity, such as cement, compete almost exclusively on the basis of price, small cost increases for cement may result in large shifts in market shares – limiting the extent to which cement manufacturers in an internationally competitive market can pass through the costs associated with a climate change policy.
- Due to its unique location and deep water ports, California is an internationally competitive cement market. Thus, unless importers are faced with an equivalent cost burden, a policy that increases costs for California cement manufacturers will place domestically produced cement at a persistent and artificial competitive disadvantage and shift market share toward imported cement. This advantage will also favor cement from other less regulated states.
- Given that California cement manufacturers are on the leading edge of production technology, the average carbon intensity of domestically produced cement is likely to be lower than that of imported cement. Thus, shifts in market share toward imports are likely to increase the GHG

emissions associated with California cement consumption, even if the increased GHG emissions associated with the transportation of imported cement is ignored.

Although these factors suggest that any climate change policy has significant potential for carbon leakage that would fundamentally undermine California's climate change objectives, such an outcome is not inevitable. Indeed, smartly crafted policies that account for the unique complexities of the California cement industry have the potential to either avoid competitive distortions altogether or restore the natural competitive balance with complementary measures.

Conceptually, there are three basic options for addressing the issue of leakage that is generated by climate change policies. The first best option is a global framework that places equal obligations on all competitors in an industry – thereby maintaining competitive dynamics and avoiding the potential for carbon leakage altogether. Although such agreements for exposed sectors, including cement, hold great promise, a global framework on climate change will significantly lag efforts in California. As a result, it is imperative that regulators search for other solutions to address carbon leakage.

The second best option for addressing leakage is to effectively mute the cost increases imposed on an industry. Indeed, there are strong arguments on environmental, economic, and equity grounds for compensating internationally competitive industries that are unable to pass through the costs of the policy to consumers, such as the California cement industry. In such instances, compensatory measures that counterbalance the full costs of the policy – such as the free allocation of emission permits – have the potential to restore natural competitive dynamics without threatening the environmental effectiveness of the policy.

The third best option for addressing competitiveness issues are so-called "anti-leakage measures" that effectively restore competitive dynamics by imposing equal obligations on domestic and imported cement. Such measures could include border adjustments and GHG product standards, among others. A border adjustment would require importers to pay a fee, either directly through a tax or indirectly through the purchase of permits, corresponding to the GHG content of the product. A GHG product standard would stipulate the minimal GHG specifications that a product must satisfy to be imported. Regardless of its form, a complementary policy that imposes an obligation on importers equal to that imposed on domestic manufacturers has the potential to restore the competitive balance within the California cement industry, minimize leakage, and thereby preserve the environmental effectiveness of a climate change policy.

VIII. Concluding Remarks

The California cement industry will undoubtedly play a multi-faceted role in the state's efforts to build a sustainable future. Cement is a critical component of economic growth and the availability of affordable and stable cement supplies will be an important driver of prosperity for current and future generations of Californians. Moreover, as the primary ingredient in concrete, cement will be indispensable in both mitigating and adapting to climate change though the construction of net-zero energy buildings, nuclear and renewable energy facilities, flood control facilities, and irrigation projects.

With that said, cement is a carbon-intensive industry that faces significant challenges in adapting to a carbon-constrained world. Sound policies can resolve these challenges and enable the California cement industry to contribute to a sustainable future for California. The design of sound policies will require a thorough understanding of the California cement industry and a deep appreciation for the unique challenges presented by the prospect of global climate change.

The California cement industry's unique combination of characteristics suggests that it faces two key challenges in adapting to a carbon-constrained world: (1) relatively few cost-effective abatement opportunities and (2) a high potential for carbon leakage. These are by no means the cement industry's only challenges, simply the most important. They are "threshold issues" that must be resolved if the cement industry is to contribute to cost-effective GHG reductions while maintaining competitive dynamics within the industry and preserving the environmental effectiveness of the policy.

Finally, it is important to note that the two challenges are not independent of each other. As the costs of a policy rise, California cement manufacturers will be placed at a greater competitive disadvantage vis-à-vis out-of-state competitors. In the absence of complementary measures that equalize the costs faced by domestic and imported cement, a persistent competitive disadvantage will shift market share toward imports and thereby threaten the fundamental purpose of the policy: reducing global GHG emissions. However, good public policy that is based on a deep appreciation for the complexities of the cement industry has the potential to reconcile the often competing objectives of affordable energy, environmental quality, and economic growth for the benefit of consumers, cement manufacturers, the California economy, and the global environment.

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EXHIBIT 4

Technical Support Document: Fuel Switching from Coal to Natural Gas California Portland Cement Industry

Prepared for:

Coalition for Sustainable Cement Manufacturing and Environment California

Prepared by:

ENVIRON International Corporation
Los Angeles, Irvine, and San Francisco, California

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ENVIRON

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List of Acronyms

AB 32	Assembly Bill 32
ARB	Air Resources Board
Btu	British thermal unit
$CaCO_3$	calcium carbonate
CaO	calcium oxide
CEQA	California Environmental Quality Act
CHSC	California Health and Safety Code
CO	carbon monoxide
CO_2	carbon dioxide
ε	emissivity
ENVIRON	ENVIRON International Corporation
EPA	US Environmental Protection Agency
GHG	greenhouse gas
kg CO_2/MT	kilogram per metric ton
LNG	Liquefied Natural Gas
MMBtu	million British thermal units
MMcf	million cubic feet
NH_3	ammonia
NO	nitric oxide
NOx	nitrogen oxide
N_2O	nitrous oxide
NRDC	Natural Resources Defense Council
NSR	New Source Review
PM_{10}	particulate matter 10 microns or smaller
$PM_{2.5}$	particulate matter 2.5 microns or smaller
SB 1368	California Senate Bill 1368
SCAQMD	South Coast Air Quality Management District
SNCR	selective non-catalytic reduction
US	United States
VOC	volatile organic compound

1.0 Introduction

California Assembly Bill 32 (AB 32 or the California Global Warming Solutions Act of 2006) requires a reduction in statewide greenhouse gas (GHG) emissions by 2020 equivalent to 1990 levels. Further reductions by 2050 are also required under the Governor's Executive Order S-3-05. The California Air Resources Board (ARB) is tasked with developing emission reduction measures by regulation to achieve the 2020 target. These measures must be "technologically feasible" and "cost-effective", as required by AB 32. The ARB has until January 1, 2011 to adopt GHG emission limits and emission reduction measures to be enforceable by January 1, 2012.[1] As the Portland cement industry was identified as a significant contributor to California's GHG inventory (9.84 million metric tonnes of CO_2 emissions annually which accounts for 2 percent of statewide GHG emissions[2]), the ARB is investigating emission reduction measures specific to the cement sector.

To address emission reduction activities before the 2012 deadline, the ARB identified "early action" measures to be initiated in the 2007 -2012 timeframe. One of the "early action" measures, entitled "Cement (A): Energy Efficiency of California Cement Facilities",[3] aims to reduce GHG emissions from cement production by switching to natural gas as a primary fuel. Although natural gas has lower carbon content per British thermal unit (Btu) compared to coal and therefore produces less carbon dioxide (CO_2) per Btu as a combustion by-product, any change from existing fuel sources will come at the expense of significantly higher fuel costs, significant capital costs related to operational modifications, increased NOx emissions and loss of co-benefits of current use of alternative fuels as well as risk of fuel supply disruptions.

CO_2 is the primary GHG that drives global climate change (other than water vapor) and is the only GHG emitted by the cement industry in any significant amount. California's cement industry emits approximately 2 percent of the statewide CO_2 emissions, of which less than 40 percent are cement-related GHG emissions originating from fossil fuel combustion and potentially subject to reduction (57 percent are direct process emissions from calcination[4] is not part of any potential reduction, other than prohibiting or restricting the manufacturing of cement itself)[5]. The release of CO_2 is inherent in calcination, and is an unavoidable result of the process to produce Portland cement. Thus, the fuel switch measure targets only a fraction of the 40 percent that is a result of direct combustion emissions rather than the entire carbon footprint of the production.

The costs associated with fuel switching to natural gas are primarily the increase in fuel cost, which is on the order of 400% higher than coal (based on $2/MMBtu for coal and $10/MMBtu for natural gas in June 2008). Just the higher price of natural gas alone would increase cement industry operating costs on the order of $33 per metric ton of clinker production, a cost to the California cement industry of approximately $439 million per year based on its annual clinker

[1] California Health and Safety Code (CHSC) §38562(a).

[2] California Air Resources Board. November 2007. Draft California Greenhouse Gas Inventory.

[3] California Air Resources Board (b), "Expanded List Of Early Action Measures To Reduce Greenhouse Gas Emissions In California Recommended For Board Consideration", October 2007, http://www.arb.ca.gov/cc/ccea/meetings/ea_final_report.pdf

[4] The conversion of limestone ($CaCO_3$) to calcium oxide (CaO), the primary precursor to cement.

[5] Increased natural gas demand is also anticipated to result in higher electrical costs, which must be considered as an additional expense to industry as part of the cost-benefit analysis, as well as leakage issues for GHG.

capacity of 13.3 million tons.[6] A cost increase of this magnitude would put California cement plants in a highly uncompetitive position which would result in substantial leakage to imported cement. Based on a natural gas GHG reduction of approximately 140 kilograms of CO_2 per metric tonne (kg CO_2/MT) of clinker production, the GHG abatement cost from switching fuel to natural gas would be over $200 per MT CO_2 for fuel cost alone and could exceed $300 per MT CO_2 for certain plants after capital costs are included.

While natural gas has a lower carbon content compared to coal on a per-Btu basis, there are also a number of technical and environmental challenges fuel switching poses that would add further to this high abatement cost. Natural gas, when used for combustion in cement kilns, results in lower heat transfer efficiency and higher nitrogen oxides (NOx) emissions compared to coal. In order to maintain NOx within permitted levels, most of the plants in California would have to invest in selective non-catalytic equipment to control NOx which would increase operating costs further for the consumption of ammonia. Selective non-catalytic reduction (SNCR) would also increase ammonia emissions and probably particulate emissions due to reactions in the stack with other flue gas constituents. Moreover, significant infrastructure costs will be required to switch cement plants to burn natural gas, as natural gas distribution lines will need to be built and kilns and other equipment will have to be modified or replaced (some of which costs could be as high as $40 to $200 million per plant). The additional natural gas demand that would be required for California cement facilities will stress the already-strained supply of natural gas in the US leading to potential operational disruptions (which is unacceptable as it may result in irreparable and/or costly damage to cement manufacturing equipment).

This technical support document presents the unique technological, environmental and economic challenges that fuel switching from coal[7] to natural gas poses on the California cement industry.

[6] Portland Cement Association.

[7] It should be noted that some facilities, such as National Cement (Lebec) uses primarily petroleum coke, rather than coal as a primary fuel source. In 2005, 14% of the total energy demand for California Portland cement facilities came from petroleum coke, while coal contributed 62%. While the focus of this Technical Support Document is on fuel switching from coal to natural gas, many of the economic and technical issues that apply to coal also apply to petroleum coke (Portland Cement Association. 2007. Summary of California Portland Cement Plant Carbon Dioxide Emissions with Support Data. October 8).

2.0 Technical Issues

There are a number of technical issues that need to be considered in switching from coal to natural gas as a primary fuel source. Coal and natural gas differ significantly in their physical and chemical properties, lending to advantages and disadvantages in their use. Natural gas, as a gaseous fuel, is much easier to handle than coal. Also, natural gas does not need to be stored at the facility and pipeline delivery reduces transportation costs once the pipeline is in place.

However, the readily available domestic supplies, lower price, and better process affinity of coal compared to natural gas, as well as its ability to co-fire with alternative fuels, has made coal the primary fuel for the Portland cement sector for decades.

The use of natural gas will result in several changes to the kiln operating and criteria pollutant emissions characteristics. The impact of these operational changes will require significant equipment changes to allow natural gas firing, which will require New Source Review (NSR) permitting and California Environmental Quality Act (CEQA) review. The combination of the equipment changes and the associated permitting represent a considerable cost impact, regulatory burden, and timing delay. Projects that trigger NSR permitting and CEQA review generally require three to five years from time of project capital allocation to equipment startup due to the many permitting steps. In addition, when there are associated emission increases (as outlined below), emission offsets will be needed, which are not readily available and would add additional costs.

Below we describe the technical issues associated with switching from coal to natural gas as the primary fuel for Portland cement manufacturing.

2.1 Heat Transfer Efficiency

Fuel switching to natural gas will alter the heat transfer efficiency of the kiln system, which will trigger kiln equipment changes to avoid a kiln de-rate. Radiation is the dominant mechanism of heat transfer in cement kilns; 95 percent of heat transfer occurs through this mechanism in the kiln burning zone. Coal burners typically create longer and more luminous flames than those produced by existing natural gas burners. Combustion of the coal particles requires time at temperature to first volatilize combustible gas species from the coal, and then to burn out the remaining char (carbon). The overall time required for combustion is dominated by the char burnout process, which results in long flames as the combustion process is slowly completed. Conversely, natural gas combustion occurs as soon as a flammable mixture of gas and air is achieved. Additionally, pulverized coal flames are highly luminous, in contrast to natural gas diffusion flames, which are typically non-luminous (unless high levels of soot are produced in fuel-rich combustion zones). All hydrocarbon flames emit band radiation, primarily from water and carbon dioxide molecules in the products of combustion. In coal flames, this band radiation is supplemented by radiation from burning char particles and from hot ash particles. This can be expressed in terms of emissivity (ε), a measure of a material's ability to radiate energy. Natural gas flames have considerably lower emissivity values than coal flames, ~0.3 and ~0.85, respectively.[8]

As a result, the heat transfer efficiency of the coal flame is greater than that of the natural gas flame. Consequently, the coal-fired process requires a lower firing rate to achieve the same product yield. In other words, a natural gas-fired kiln will require more energy in order to achieve an equivalent heat transfer. Experts in the cement industry estimate that the use of natural gas will decrease the kiln production by 2 to 3 percent.[9]

2.2 Pre-calciner Retention Time

Fuel switching to natural gas will modify the precalciner retention time, which will trigger equipment changes to avoid a kiln de-rate (*i.e.*, a loss in production capacity). Many of the cement facilities in California would not be able to burn natural gas in their pre-calciners without significant structural modifications. This is because of the increased retention time required for heat transfer into the raw materials using natural gas combustion.

Depending on the specific design, a pre-calciner handles 25 to 65 percent of the total process fuel; the raw materials are 40 to 95 percent calcined before entering the kiln.[10] Complete calcination depends on the heat transfer efficiency and the residence time of the flue gases and solid raw materials in the pre-calciner. As explained in the previous section, natural gas has lower heat transfer efficiency compared to coal and therefore a natural gas-fired pre-calciner will require a longer residence time to achieve the same production rate than a coal-fired pre-calciner.

Facilities with pre-1990 vintage pre-calciner kilns (5 out of 8 in California) may not have sufficient retention time to operate on 100 percent natural gas combustion. These facilities include: CEMEX (Santa Cruz), California Portland Cement (Mojave), Lehigh/Hanson Permanente, Lehigh Cement (Redding), and Mitsubishi Cement (Cushenbury). If they were to switch from coal to natural gas as the primary pre-calciner fuel, they would need to increase the size of the pre-calciners to accommodate the larger retention times required for natural gas.[11] Modification of the pre-calciner would result in not only high capital costs but significant down time for the plant. Moreover, some facilities do not necessarily have the additional space immediately surrounding the current kiln to allow for the expansion. Thus, there might be an additional significant cost to restructure surrounding equipment. We discuss this issue later in this document.

2.3 NOx Emissions

Natural gas combustion will result in an increase in NOx emissions, which will trigger equipment changes for NOx control. Installing NOx control technology has the potential to increase emissions of ammonia and consequently $PM_{2.5}$, and PM_{10} due to the formation of ammonium salts.

[8] Philip A. Alsop. January 2005. "The Cement Plant Operations Handbook". Fourth edition.

[9] Philip A. Alsop. January 2005. "The Cement Plant Operations Handbook". Fourth edition.

[10] Eckert and Hand. Koln/Germany. April 2002. "Modernizing, uprating, and modifying rotary kilns with cyclone preheaters".

[11] Although constructed later, National Cement Company, Inc. (Lebec) may also require a larger pre-calciner, and significant infrastructure investments would be anticipated.

NOx emissions are responsible for a wide variety of health and environmental impacts because of various compounds and derivatives in the family of nitrogen oxides, including nitrogen dioxide, nitric acid, nitrous oxide, nitrates, and nitric oxide. Since the passage of the Clean Air Act in 1970 the US Environmental Protection Agency (EPA) has been tracking emissions of six criteria air pollutants - carbon monoxide, lead, nitrogen oxides, particulate matter, sulfur dioxide, and volatile organic compounds. All of these have decreased significantly except for nitrogen oxides which had increased by ten percent. For this reason, the EPA has identified reduction of NOx as a crucial component of its strategy for cleaner air.[12]

Actual NOx emissions from cement kilns depend on fuel type, specific burner configuration, and combustion efficiency. In general, NOx formation in combustion systems may occur via three mechanisms:

a. **Thermal NOx** – The thermal NOx mechanism involves the conversion of atmospheric nitrogen and free oxygen at elevated temperature. This mode of NOx formation is important regardless of the fuel type involved in the combustion process. As the rate of NO formation by this mechanism is exponential with temperature, low emissions burners are often carefully engineered to minimize peak flame temperatures and the residence times at which conditions favor thermal NOx formation.

b. **Fuel-Bound NOx** – In this mechanism, monatomic nitrogen bound in the fuel is converted into NO under fuel-lean conditions. Under fuel-rich conditions, this mode of NOx formation may be suppressed as the conversion of bound nitrogen to diatomic nitrogen is favored. This mode of NOx formation can be significant for coal because of nitrogen that is naturally present in coal.

c. **Prompt NOx** – This mechanism involves the conversion of atmospheric nitrogen to NOx via pathways that involve hydrocarbon species in fuel rich combustion regions. This formation mechanism does not typically generate significant levels of NOx emissions in comparison to the other two mechanisms.

Cement kiln applications present a challenge with regards to engineering combustion equipment for low-NOx emissions because the calcining and sintering process requires a very high temperature, oxidizing environment, which favors the formation of NOx via the thermal mechanism.

In gas-fired plants, fuel NOx is virtually absent and the majority of the NOx emissions are thermal NOx. However, it should be noted that the absence of fuel NOx in a gas-fired plant does not necessarily lead to a reduction in NOx emissions, since the NO formation rate increases exponentially with flame temperatures (Figure 1) and these are often higher for natural gas (Figure 2).

[12] EPA. Office of Air Quality Planning and Standards. September 1998. How nitrogen oxides affect the way we live and breathe EPA-456/F-98-005

A study conducted in 1977 by Hilovsky[13] of the South Coast Air Quality Management District (SCAQMD) addresses the higher NOx emissions from natural gas burning. At that time, natural gas was becoming less economically competitive relative to coal during the 1970's energy crisis resulting in cement production facilities switching to coal as a primary fuel. Hilovsky documents NOx emission decreases ranging between approximately 50 and 80 percent when switching from natural gas to coal. The study documents emissions measurements from several different dry process kilns taken at two cement production facilities in California. Hilovsky attributes the higher NOx emissions associated with gas firing to the compactness and higher temperatures of the gas flames in comparison to the longer, "lazy" and lower temperature (due to the increased radiation heat loss) flames produced when firing coal.

Comparisons between cement kiln emissions from coal and natural gas firing have also been reported in a more recent study conducted in 2000 by Staudt[14] for the Northeast States for Coordinated Air Use Management. In a case study of four long wet kilns at a facility in Texas, co-firing of coal and natural gas (50/50) produced approximately four times greater NOx emissions than compared to when firing only coal.

There is existing technology that can reduce the amount of NOx emitted from natural gas combustion. However, these technologies generally increase the emissions of other criteria pollutants; this clearly goes against AB 32 requirements that emission reduction measures do not interfere with efforts to maintain and achieve federal and state ambient air quality standards.[15] For example, while low-NOx burners are commercially available for kilns, they generally result in increased carbon monoxide (CO) and volatile organic compound (VOC) emissions. Also, Selective Non-Catalytic Reduction (SCNR) can reduce post-combustion NOx emissions, but its use may increase other undesirable emissions such as CO, N_2O, NH_3, $PM_{2.5}$, and PM_{10} and other pollutants that form from reactions in the atmosphere. Thus, NOx controls will lead to significant permitting hurdles due to additional emissions of other criteria pollutants and will also increase the cost of producing cement.

Therefore, fuel switching to natural gas will result in significant changes to kiln equipment to accommodate its lower heat transfer efficiency and to address NOx emissions increases. These changes will pose additional operational challenges from increased CO, N_2O, $PM_{2.5}$, PM_{10}, and NH_3 emissions as well as kiln de-rating thus resulting in considerable capital costs for new equipment and lengthy project delays due to permitting.

[13] Hilovsky, R.J., "NOx Reductions in the Portland Cement Industry With Conversion to Coal-Firing", Presented at the 1977 Environmental Protection Agency Emission Inventory/Factor Workshop, Raleigh, NC. September 13-15, 1977.

[14] Staudt, J., "Status Report on NOx Controls for Gas Turbines, Cement Kilns, Industrial Boilers, Internal Combustion Engines, Technologies & Cost Effectiveness", Northeast States for Coordinated Air Use Management, December 2000.

[15] CHSC §38562(b)(4)

3.0 Natural Gas Economic Issues

The added costs for firing natural gas will directly depend on a variety of factors. These increases will result from not only the existing significant cost increase of natural gas over current fuel costs, but also as a result of anticipated continued natural gas price increases due to supply limitations. Furthermore, capital costs related to structural/process changes coupled with long-term operation/maintenance costs will result in further significant increased cost. The exact cost of switching from coal to natural gas will vary depending on the existing conditions at each of the eleven facilities in California. This report discusses the issues common to these facilities and a potential range of costs.

3.1 Immediate Fuel Cost Increases Due to Change to Natural Gas

Based upon current natural gas prices, fuel switching will result in a 400% increase in fuel cost (from as low as $2 per MMBtu for coal to as high as $10 per MMBtu for natural gas per fuel prices as of June 2008).

For cement kilns that currently use coal, the base fuel price is in the range of $2 to $3 per MMBtu. However, many kilns use petroleum coke and/or tire derived fuels, for which the price is lower.

Table 1 presents the fuel cost increases due to fuel switching to natural gas, in the following three formats:

- $ per MMBtu (coal, natural gas, and increase)
- $ per MT clinker produced, based on an average fuel usage of 3.85 MMBTU for coal versus 4.04 MMBTU per MT clinker for natural gas. The higher MMBtu requirement for natural gas is due to its lower thermal transfer efficiency.
- Abatement cost in $ per MT CO_2 reduced, based on a reduction in CO_2 emissions from 92.77 to 53.05 kg CO_2 per MMBtu

Table 1 shows that, prior to including the capital costs and additional operating cost for NOx control, the cost increase due to fuel switching to natural gas is approximately $229 per MT CO_2.

3.2 Supply Constraints on Natural Gas Availability[16]

Currently, more than 44 percent of the natural gas consumed in California is used to generate electricity, and it provides more than a third of the state's total energy requirements. In 2006, over 87 percent of California natural gas demand was met through out-of-state imports. In addition, because California is located at the end of the interstate pipeline (see Figure 3) and imports large volumes of natural gas through the pipeline, the natural gas market is vulnerable to weather-related events that can either disrupt production, as in the case of hurricanes, or increase demand with cold temperatures. In either case supply can be constrained, causing prices to spike, or even more problematic, cause supply disruptions. Supply disruptions would have a devastating effect

[16] California Energy Commission. 2007 Integrated Energy Policy Report. Committee Final Report. November 2007. CEC-100-2007-008-CTF.

on cement production as plants are designed to be operated 24 hours/day. A sudden loss of heat can damage kiln refractory resulting in significant down time and costly repairs. Supply disruptions could become more likely as other states/regions of the country seek to convert industry to natural gas, thus further increasing demand, as well as fluctuations due to seasonal peak demand.

US natural gas production has been steady since 1989 (Figure 4). However, the number of natural gas-producing wells has increased by 71 percent in the US since 1989 (Figure 5) while US consumption has increased 13 percent. These observable facts are attributed to a decrease in productivity of US natural gas reserves. At the same time, California natural gas production is slowly declining (Figure 6) while the demand continues to grow slowly but steadily in California and the US (Figures 7 and 8). Therefore, natural gas imports will likely be required to meet future demand (and thus further dependent on supply controls and costs of foreign rather than predictable domestic production of coal or petroleum coke). Moreover, competition for natural gas has intensified with concerns of worldwide GHG emissions and because of a shift towards natural gas as the fuel of choice for electricity generators to reduce criteria air pollutants. For example, California Senate Bill 1368 (SB 1368), approved on September 29, 2006, essentially requires that new power generation in California achieve GHG emissions as low as or lower than GHG emissions from new, combined-cycle natural gas fired power plants.

Therefore, California will not only have to compete with the Mid-West and East Coast for access to less abundant natural gas supplies, but also with Western Europe and Asia Pacific consumers in a world market for natural gas and prices that are likely to continue increasing (Figure 9).

One proposed solution to help stabilize California supplies and prices is the construction of Liquefied Natural Gas (LNG) re-gasification terminals. There is currently only one terminal under construction in Baja California, Mexico. Although there are plans to build terminals in California, to date, not one single project has been approved due to opposition from public and environmental groups. The Sound Energy Solutions proposed terminal that was to be built in the Port of Long Beach has been turned down. While the Mexican terminal is expected to increase natural gas supplies, California will have to compete with other economies for this additional supply leading to a global increase in prices.

Moreover California is continuing to build new natural gas power plants and thus further increasing the in-state natural gas demand. Currently, California generates 106,968 gigawatt-hours of electricity per year from natural gas-fired power plants and 7,500 megawatts of gas-fired power are in review process.

For the reasons mentioned above, it is clear that California demand is already outstripping in-state production by a wide margin and will have to compete with a growing national and international natural gas demand with limited available domestic and imported supplies. These combined pressures pose an ongoing challenge to securing adequate and reliable supplies at reasonable prices. Requiring cement kilns to burn natural gas will exacerbate these problems without addressing whether the use of natural gas would be more beneficial and cost effective for other industrial or energy producing processes which may achieve greater CO_2 reductions at far lower costs.

3.3 Future Natural Gas Demand

All Portland cement plants in California use coal or petroleum coke (coke) as the primary kiln fuel. Many of the cement plants converted to coal- or coke-fired kilns from natural gas-fired kilns in the 1970's during the energy crisis. In fact, a major motivation for shifting to coal-firing was to reduce exposure to volatile and rapidly escalating natural gas prices, and a desire to improve fuel efficiency.[17] As a result of this fuel switch, kiln design is optimized for the use of coal. Naturally, many of these design optimizations have been driven by the high cost of fuel.

There are currently eleven Portland cement plants in California; all these facilities combined currently use 2,700 million cubic feet (MMcf) of natural gas per year. If they were to switch from coal to natural gas as a primary fuel source, an additional 31,000 MMcf of natural gas per year would be required. This represents approximately a 4.3 percent increase in the California industrial natural gas demand (Table 2). If facilities that use petroleum coke as a primary fuel are factored in, the natural gas demand is even higher.

The additional demand for natural gas, from the cement sector only, would reflect an increase of approximately 1.4 percent of California natural gas consumption. This number is significant when compared to the California Energy Commission 2007 Integrated Energy Policy Report annual overall natural gas demand growth projection of *less than one percent*.

California will also be affected if there is an increase in the international natural gas demand. For example, the Alberta oil sands in Canada, a molasses-like viscous oil containing deposits of bitumen that will not flow unless heated, currently consume 6 percent of the all the natural gas produced in Western Canada, and this number is expected to rise up to 15 percent by the year 2017. With 23 percent of our natural gas supplies coming from Canada (Figure 10), the majority of it from the Western Canadian basin, the available gas exports to the United States will likely reduce as the Canadian demand increases. As a result, natural gas prices in the United States most likely will increase and there is uncertainty about the available resources to meet any additional demand from projected growth beyond the additional demand that would be created by a mandate that the California cement industry convert to natural gas.

Future projected natural gas prices could represent substantial additional cost to the industry. For every 1% increase in the relative cost of natural gas versus coal (on a per clinker basis), the GHG abatement cost would increase by approximately $2.30 per MT CO_2.

3.4 Immediate Capital Cost Expenditures Due to Change to Natural Gas

Several facilities in California, including CEMEX (Santa Cruz), Lehigh Hansen Permanente, National Cement, and TXI (Oro Grande) do not have kilns that are configured to burn natural gas fuel. Thus, there will be significant costs associated with the installation of natural gas burning systems.

[17] A return to natural gas is not merely a reversion to prior usage, but would further increase reliance and vulnerability to shortages and cost escalation due to the scarcity of this resource as well as further susceptibility to non-domestically produced energy supplies. Natural Resources Defense Council (NRDC). 2007. *Low Carbon Cement Standard Calculations*. Scoping Plan Proposal. October 1.

First, natural gas lines must be piped all the way to the kiln and raiser burners.

Second, the burners must be converted to accommodate natural gas combustion. An in-depth engineering evaluation must be conducted in order to select the most adequate natural gas burning technology.

Finally, since most existing kiln configurations have already been optimized to burn coal and due to the reduced heat transfer efficiency of natural gas, more energy will be required to produce the same amount of clinker. Thus, switching to natural gas will decrease the kiln production by 2 to 3 percent[18]. This decrease in production could be compensated by elongating the pre-calciner to achieve a longer residence time. However, as discussed previously, space and structural issues must be taken in consideration to assess whether or not a specific facility will have the necessary space requirements to accommodate a longer pre-calciner within the plant as well as expensive capital improvements. In pre-1990 vintage pre-calciner facilities like California Portland (Mojave), this would most likely require a redesigned superstructure for the pre-heater tower to sustain the additional loads and new configuration. Also, it is important to note that these modifications require lengthy shut downs, resulting in significant down-time costs.

Further research is required to address the availability of natural gas for each facility. Some facilities simply do not have natural gas supply lines. For example, one California plant[19] has a natural gas line that used to supply their operations in the 1970s. However, since a new kiln was brought online in years later, they stopped consuming natural gas from this high pressure pipeline and the local gas utility allowed domestic users to draw gas from it. As a result, the currently existing line does not have the necessary capacity to fire the kiln on natural gas. Therefore, the utility would need to run a new pipeline from the closest gas distribution point to the facility (~36 miles) in order to deliver the required natural gas. In general, facilities are strategically located near raw material deposits, and frequently in remote areas that are distant from natural gas distribution lines. Therefore, the effort to create the infrastructure to supply natural gas to the facilities will be considerable. For the plant discussed above, ENVIRON estimated infrastructure costs of 1.7 million dollars to build the new pipeline (Table 3). In order to fully understand the costs and capacity associated with natural gas supplies, ARB must investigate the available distribution facilities to determine the capacity, location and supply necessary just to deliver the necessary natural gas to each plant fence line (which does not include any alterations to manifolds, metering station and delivery within the plant boundary as well as infrastructure for plant use of natural gas).

Additional costs will relate to alteration of equipment to address the potential for NOx emissions increase, such as selective non-catalytic reduction (SNCR) equipment. Some plants may also face permitting costs and emission offsets for associated PM_{10} emission increases. As referenced above, the implementation of any of these large capital expenditures will require extensive and expensive new permit review and inevitable CEQA burdens, not only in terms of direct cost, but in terms of delays and regulatory oversight.

[18] Philip A. Alsop. January 2005. "The Cement Plant Operations Handbook". Fourth edition.

[19] In order to protect the confidentiality of facility-specific information, the facility discussed here is not identified by name.

The capital costs could vary from $40 million to $200 million per plant.[20] Table 1 presents the impact of additional capital requirements on top of the $229 per MT GHG abatement cost for the higher fuel cost of natural gas. The table shows that the GHG abatement cost would increase an additional $18 to $88 per MT for capital requirements ranging from $40 million to $200 million, respectively. Therefore, total GHG abatement costs including capital costs and the direct fuel cost increase, range from $247 to $318 per MT CO_2.

[20] Portland Cement Association.

4.0 Leakage Issues Associated with Fuel Switching

The serious direct implication of substantial fuel/operation/maintenance cost increase is leakage of GHG emissions to other sources. Health & Safety Code § 38562(b)(8) requires that the ARB minimize leakage. The cement industry previously submitted a detailed analysis documenting the vulnerability of the California cement industry to leakage, including economic studies (unrelated to AB 32) that demonstrate that the California cement industry is unable to pass through costs, and that more importantly even small cost increases would result in leakage. Because of the importance of cement to California's economy and the documented vulnerability of the California cement industry to leakage, the ARB needs to avoid cement strategies under AB 32 that will promote leakage in contravention of AB 32. As demonstrated above, the fuel switching measure would place a large and significant cost burden in terms of fuels costs and associated capital costs on domestic industry that is not shared by out-of-state industry. Leakage would occur as imported products would be readily available at lower costs, but higher CO_2 intensity for production related processes, as well as the additional CO_2 associated with the transportation of cement to California. If GHG emission reduction is indeed the goal of this process, then leakage must be avoided. In order to properly evaluate any proposed fuel switch to natural gas, the cost-benefit of such a measure must be performed and specific consideration must be made to ensure that there is no consequential leakage (which will essentially result in the loss of domestic production, income, jobs, etc. at the expense of imported products with no net environmental benefit).

5.0 Conclusions

Switching from coal to natural gas will result in:

- **Substantial fuel cost increase:** There will be a 400% increase in fuel costs in $ per MMBtu, which equates to a CO_2 abatement cost of $229/MT of CO_2 before taking into account capital conversion costs.
- **Plant equipment changes needed:** There is a need for NOx control equipment add-on, other kiln equipment modifications, and natural gas infrastructure changes.
- **Large product cost burden:** The combination of the increase in fuel cost and the capital costs incurred would increase domestic manufacturing cost by $35 to $45 per MT clinker, which would make the industry highly uncompetitive with out-of-state production and expose it to substantial leakage.
- **Production efficiency loss:** The production of cement will ultimately become less efficient, due to lower heat transfer efficiency and a requirement for increase precalciner retention time.
- **Project timing issue:** There will be significant project delays (three to five years from capital allocation to project start-up) due to time needed for NSR permitting and CEQA review for the new equipment, which may have associated PM_{10} emission increases.
- **Additional stress in the already stressed California natural gas market:** due to an increased demand from the Portland cement industry. ENVIRON estimates an additional 4.3 and 1.4 percent increase in the California industrial and state-wide natural gas consumption, respectively. This increase in the demand will directly affect the price of natural gas and the California industrial market that depends on natural gas as feedstock for diverse processes where fuel switching is not an alternative or processes where solid fuels are not an option – e.g. synthesis gas and methanol production. It is also anticipated that this increased demand will put upward pressure on prices for out of state supplies. Increased demand and short supplies are also potentially troubling to the cement industry in terms of supply disruption impacts on production and equipment.

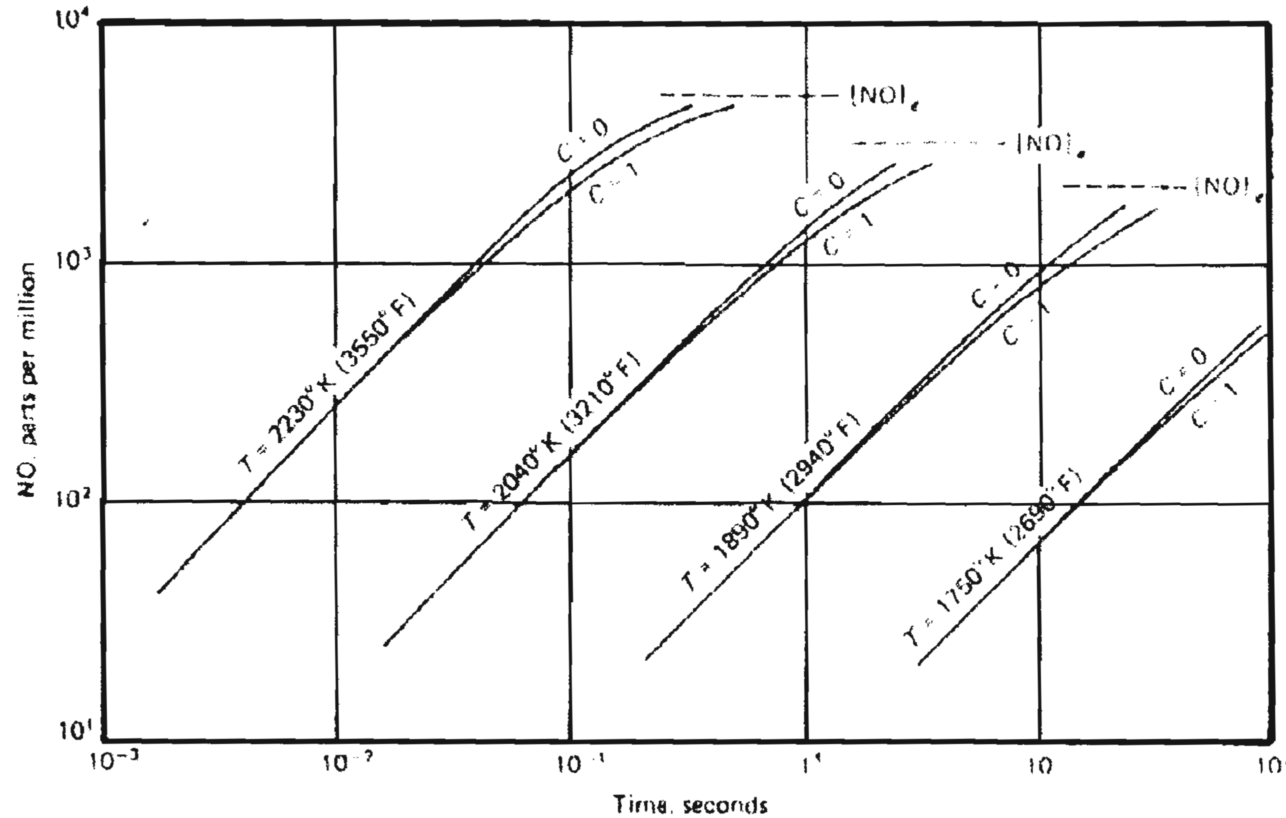
Additionally, the ARB must consider:

- Replacement of existing fuels supplies will be at the expense of alternative fuels that provide direct and identifiable environmental co-benefits.

- Whether the use of natural gas would be more beneficial and cost effective for other industrial or energy producing processes in California which may achieve greater CO_2 reductions at far lower costs than the cement industry. Moreover, as other states develop their own GHG initiatives and consideration of national legislation moves forward, California must balance its needs and goals within a broader national, if not global context to insure that increased use of scarce supplies of natural gas take place in industries and markets that generate the most cost-effective GHG reductions.

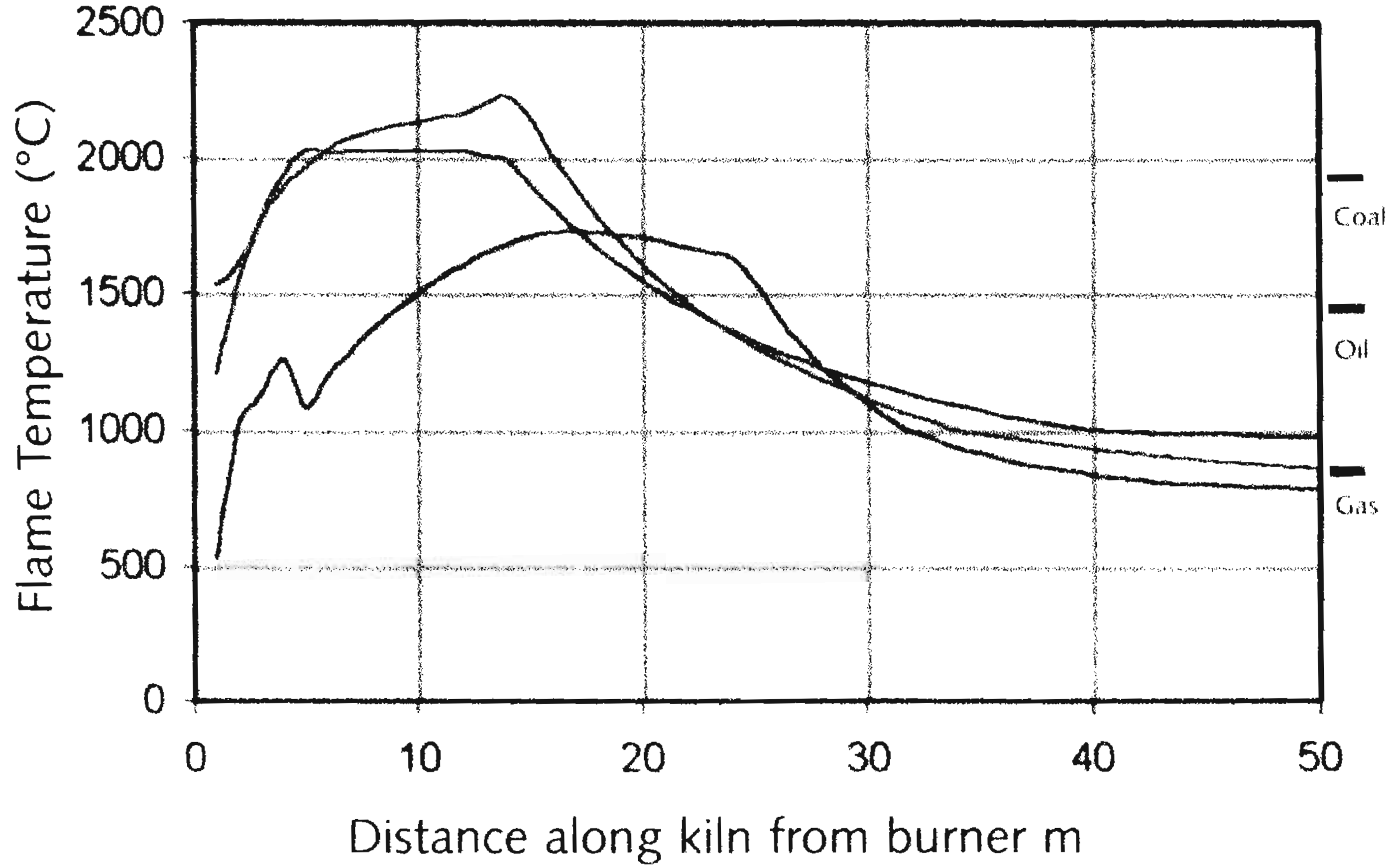
Figures

Figure 1
Concentration of NO Formed from a 40:1 Ratio of N_2/O_2 as a Function of Time at Various Temperatures



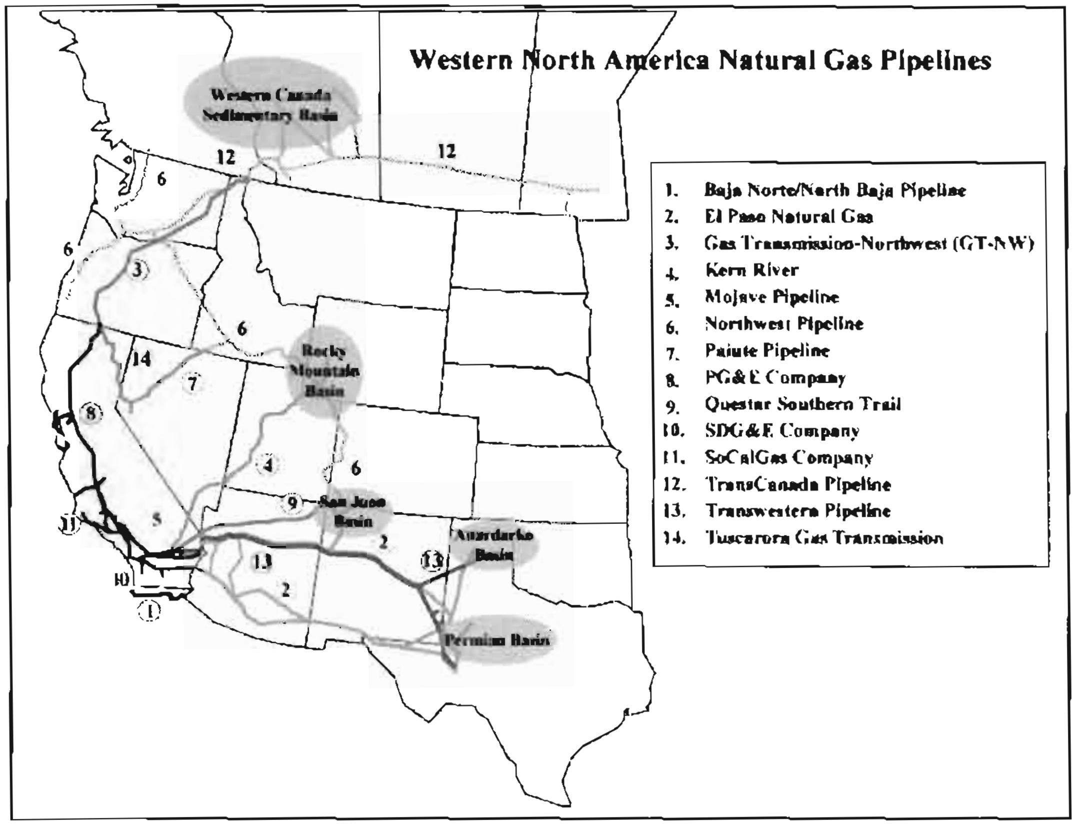
Source: Philip A. Alsop. January 2005. "The Cement Plant Operations Handbook". Fourth edition.

Figure 2
Various Fuels Flame Temperatures



Source: Philip A. Alsop. January 2005. "The Cement Plant Operations Handbook". Fourth edition.

Figure 3
Western States Natural Gas Pipelines



Source: California Energy Commission. November 2007. "2007 Integrated Energy Policy Report".

Figure 4
US Dry Natural Gas Production

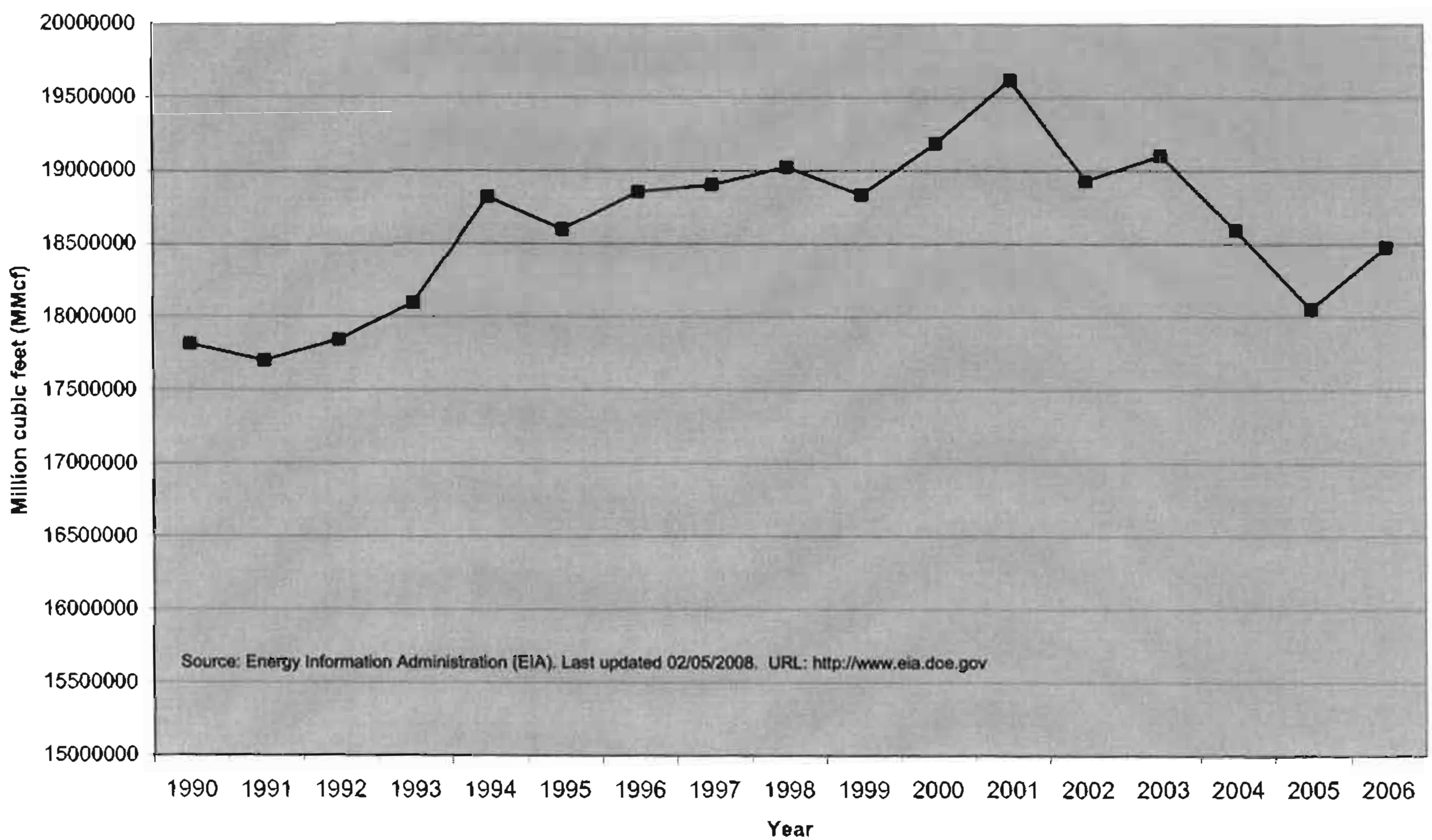


Figure 5
US Natural Gas Production Wells Count

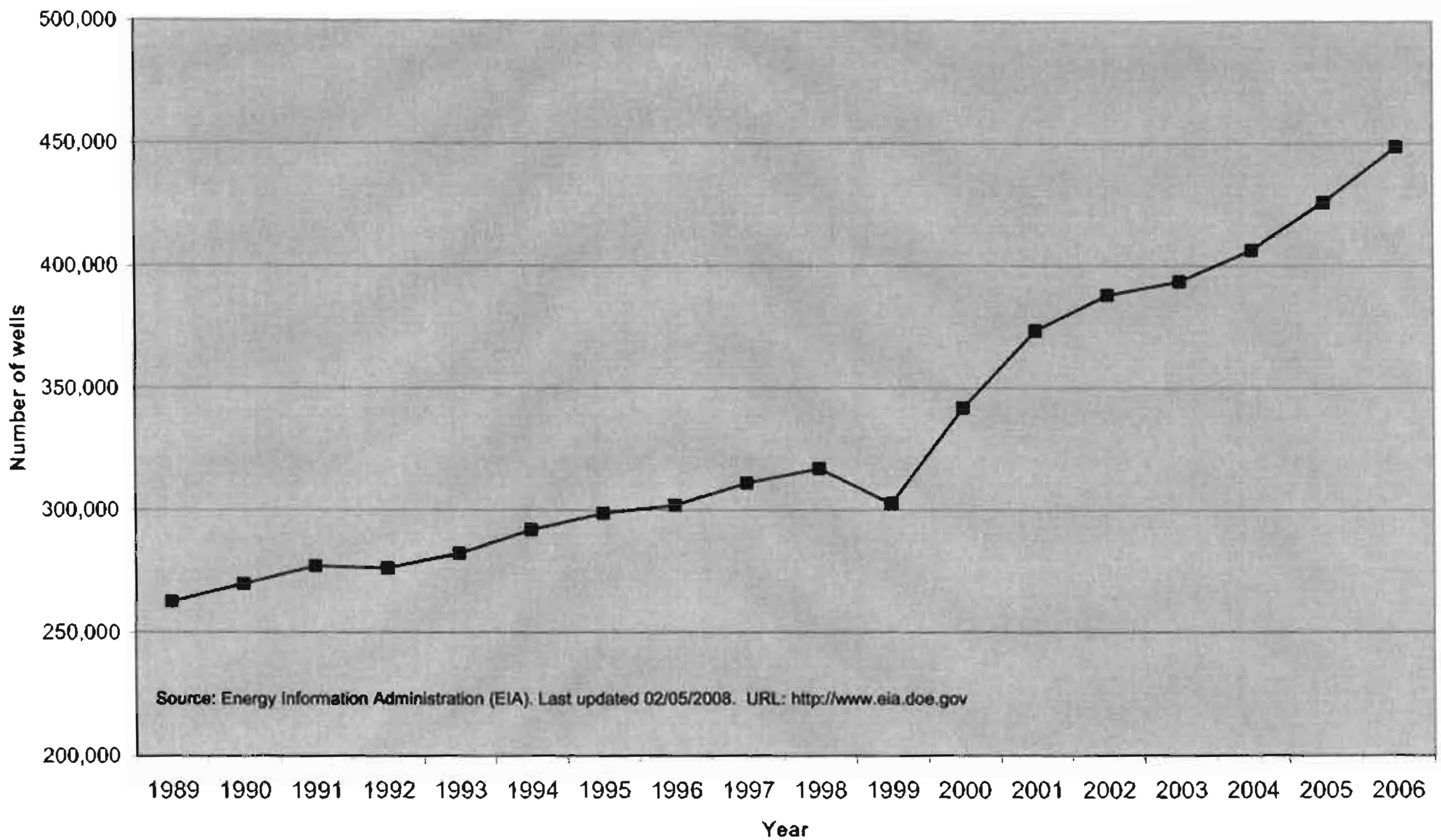


Figure 6
California Dry Natural Gas Production

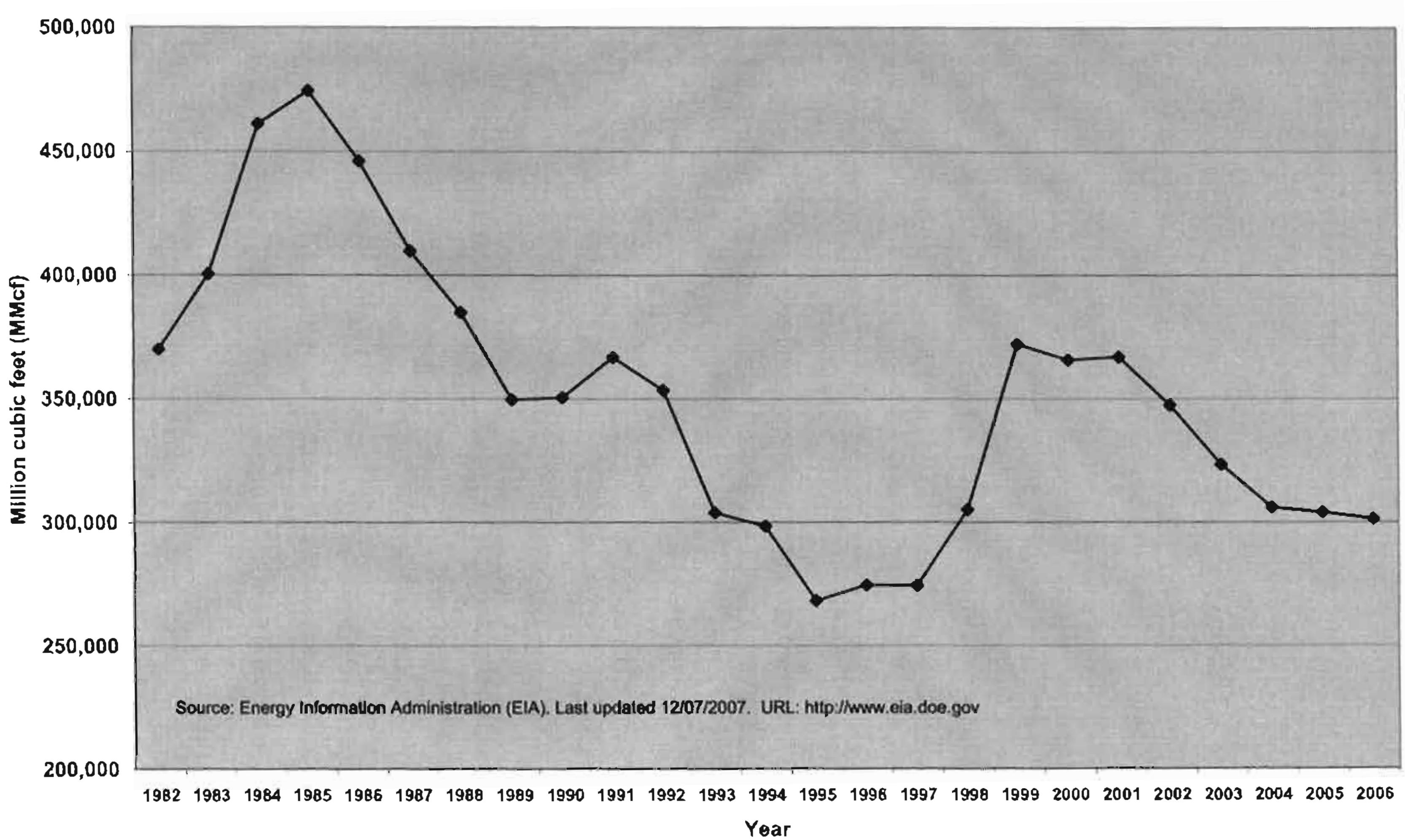
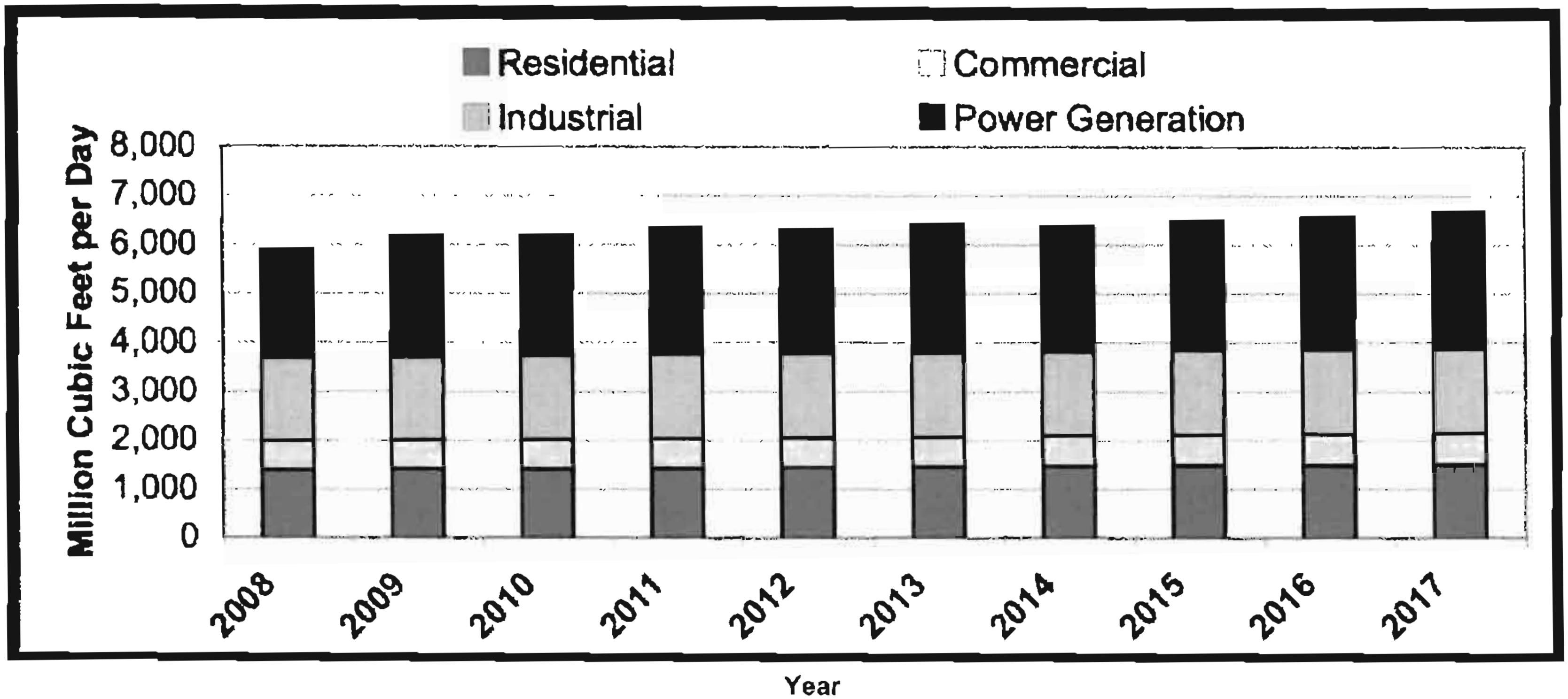


Figure 7
California Projected Natural Gas Consumption



Source: California Energy Commission. November 2007. "2007 Integrated Energy Policy Report".

Figure 8
US Natural Gas Consumption

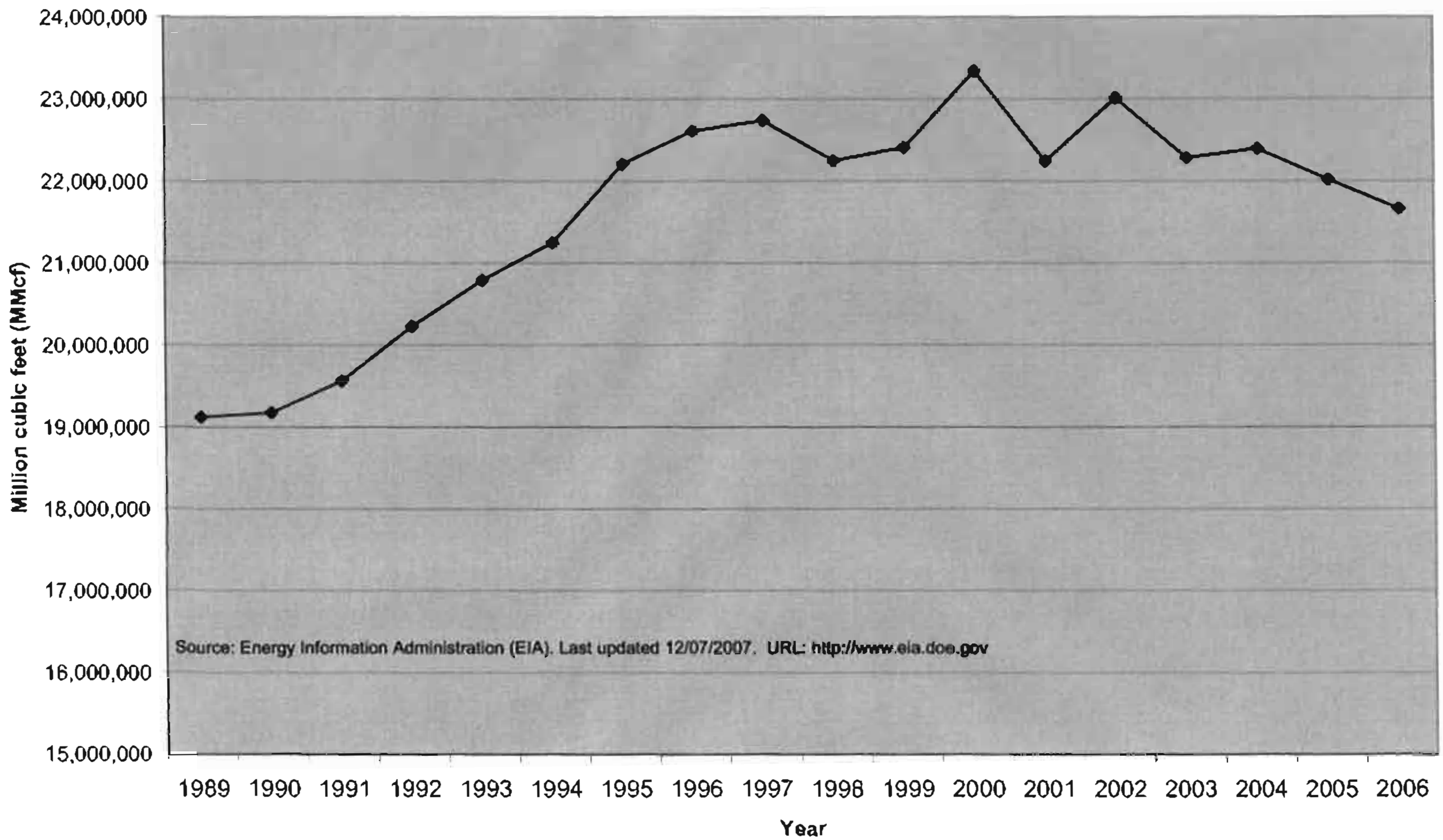


Figure 9
California Natural Gas Industrial Price

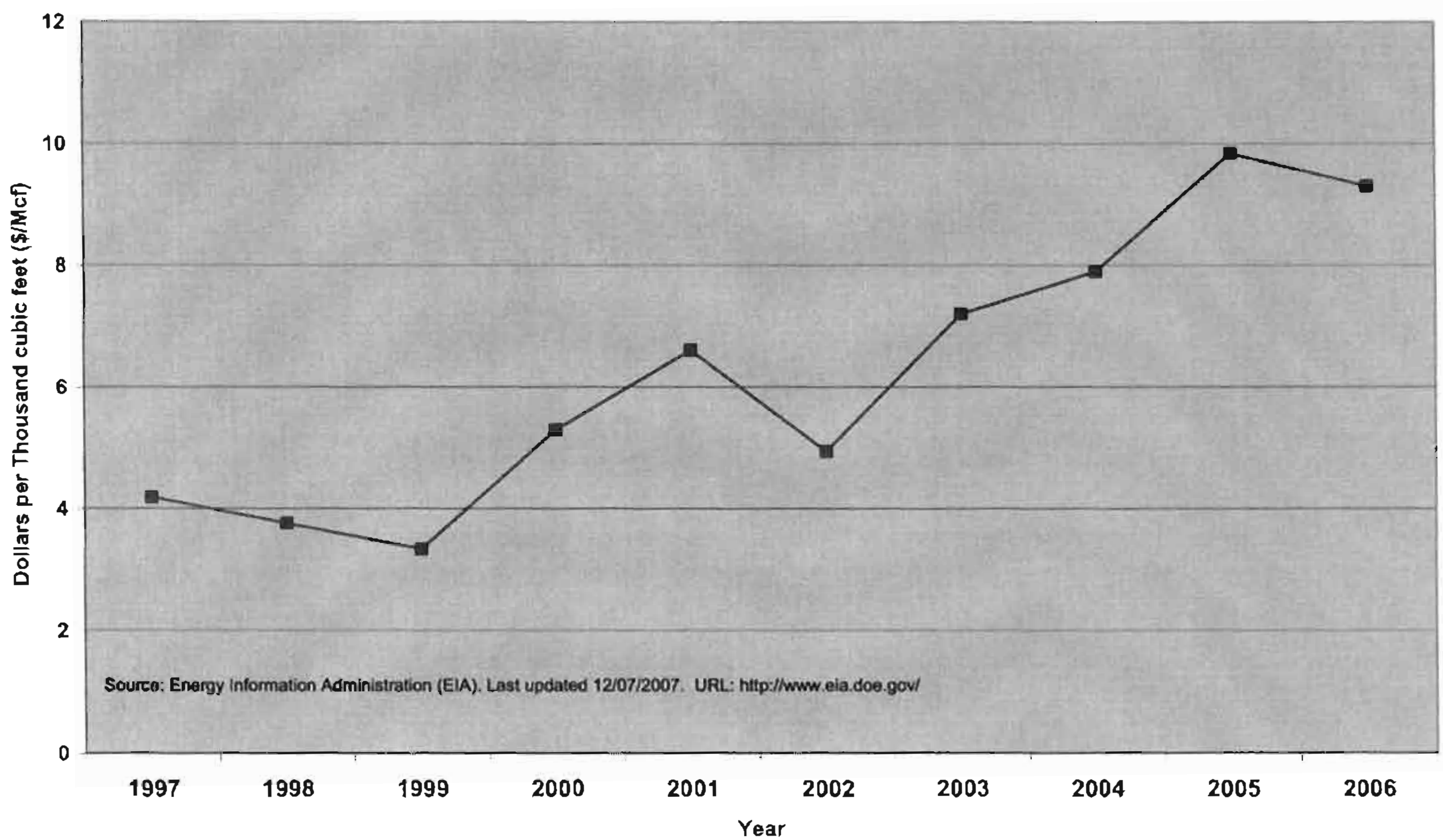
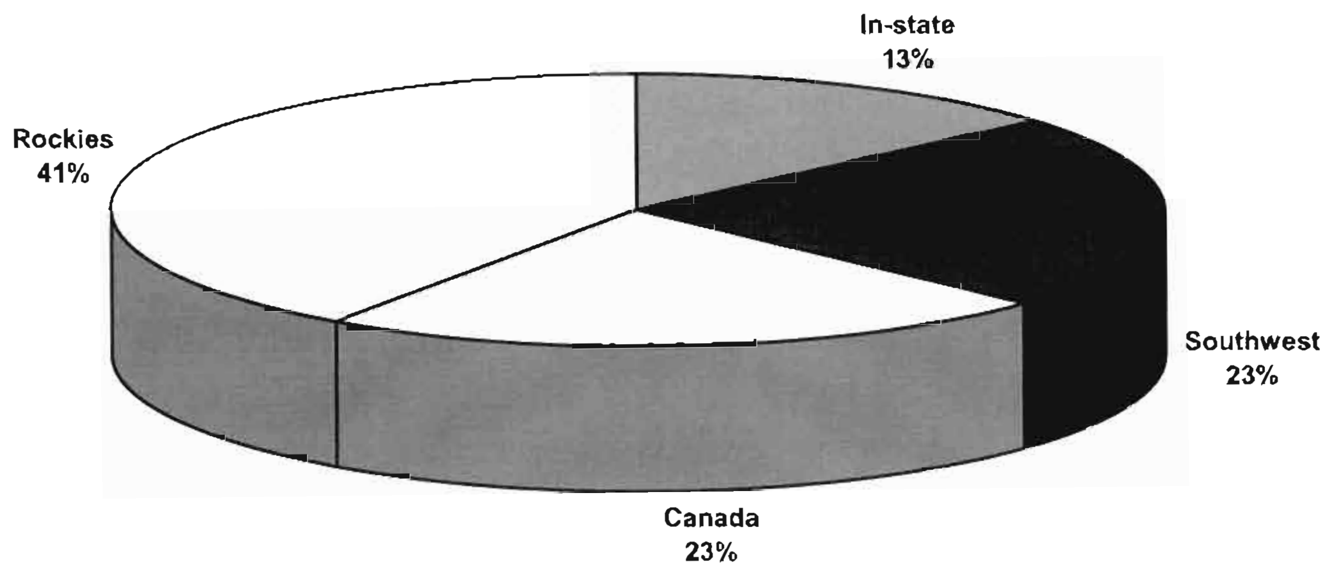


Figure 10
California Natural Gas Supply by Source



Source: California Energy Commission. Natural Gas in California. URL: http://www.energy.ca.gov/naturalgas/index.html

Tables

Table 1
Cost Effectiveness Ranges for Fuel Switching to 100% Natural Gas

Item	Coal	Natural Gas	Difference
Fuel rate (MMBtu/MT clinker) [1,2]	3.85	4.04	0.19
GHG emissions (kg CO_2/MMBtu)	92.77	53.05	-39.72
GHG emissions (kg CO_2/MT clinker)	357.2	214.5	-142.7
Fuel cost ($/MMBtu) [3]	$2	$10	$8
Fuel cost ($/MT clinker)	$7.70	$40.43	$32.73
Fuel cost ($/MT CO_2)			$229.31
Capital Cost (CC) Changes	**Case with Low CC**		**Case with High CC**
Capital cost [4]	$40,000,000		$200,000,000
Annualization factor ($/yr per $ capital cost)	0.0944		0.0944
Annualized capital cost ($/yr) [5]	$3,776,000		$18,880,000
Capital cost burden ($/MT clinker)	$2.52		$12.59
Capital cost burden ($/MT CO_2)	$17.64		$88.20
Overall Costs			
Total cost burden ($/MT clinker)	$35.24		$45.31
Total cost burden ($/MT CO_2)	$246.95		$317.51

Notes:

1. Coal fuel rate is 2006 average rate for California cement kilns, 3.85 MMBtu/MT clinker. (Portland Cement Association)
2. Natural gas fuel rate is based on adjusting the coal fuel rate assuming that there is a 5% increase in MMBtu requirements due to the lower heat transfer efficiency of natural gas. (Portland Cement Association)
3. Unit fuel costs shown are based on current costs for coal and natural gas as of June 2008.
4. Capital costs shown are an approximate range for a kiln with annual clinker production of 1.5 million MT/year, including capital costs incurred for NOx control equipment, kiln modifications to avoid a kiln de-rate, and natural gas infrastructure changes. (Portland Cement Association)
5. *Annualized CC= CC * CRF factor*

where: CC = installed capital cost and CRF = capital recovery factor

CRF factor = 0.0944 at 7% interest rate for 20 years (EPA 2002)

Abbreviations:

CC = capital cost

kg = kilogram

MMBtu = million british thermal units

MT = metric tonne

References:

EPA. 2002. Air Pollution Control Cost Manual. EPA 452-02-001. January.

Table 2
California Facility Coal and Natural Gas Energy Demand

California Cement Industry Energy Consumption [1]

Fuel	Energy Used	
Natural gas	2,810,838	MMBtu/yr
Coal	1,285,754	short ton/yr
Coal energy demand[2]	32,053,837	MMBtu/yr

Notes:

1. Energy consumption data for the California Portland cement industry obtained from PCA (Summary of California Portland Cement Plant Carbon Dioxide Emissions with Support Data. October 8, 2007) and represent fuel usage for the 2005 operating year. Energy consumption represents fuels used for kiln combustion, drying of raw materials and mineral components, on-site power generation, room heating and cooling, and equipment and on-site vehicles.

2. "Coal energy demand" is calculated using the heat content value for bituminous coal of 24.93 MMBtu per short ton (ARB, 2007).

Natural Gas Data (MMcf/yr) [3]

Supply & Demand	Total US 2006	Total California 2006	California Industrial Sector 2006	California Portland Cement Sector 2005 [(1)]
Natural gas production (dry)	18,531,292	301,153	-	-
Natural gas imports	4,186,281	2,070,473	-	-
Natural gas consumption	21,718,914	2,242,136	732,011	2,677
Projected increased demand[4]	-	31,443	31,443	31,443
% increase demand	-	1.4%	4.3%	1175%

Notes:

3. Natural gas data for the US and California obtained from EIA (2006).

4. The projected increased demand for natural gas is calculated from the coal energy demand assuming a heat content value of 1050 MMBtu per million cubic feet (MMcf) of natural gas (ARB, 2007). ENVIRON assumes an increased heat requirement for natural gas by 3% compared to coal due to losses in thermal transfer efficiency (Alsop, 2005).

Abbreviations:

$MMNm^3$/yr = million normal cubic meters per year.

MMBtu/yr = million british thermal units per year.

MMcf/yr = million cubic feet per year.

References:

Alsop, P.A. 2005. "The Cement Plant Operations Handbook". Fourth edition. January.

California Air Resources Board (ARB). 2007. Draft Emission Factors for Mandatory Reporting Program. August.

Energy Information Administration (EIA). Natural Gas Navigator 2006 Data. Site updated 10/31/2007. URL: http://tonto.eia.doe.gov/dnav/ng/hist/n3035ca2A.ht

Portland Cement Association (PCA). 2007. Summary of California Portland Cement Plant Carbon Dioxide Emissions with Support Data. October 8.

Table 3
Pipeline Infrastructure Cost Calculation[1]
Estimate for Plant A

Capacity-Mile Calculation	
California Cement Industry Projected Natural Gas Demand[2]	31,443 MMcf/yr
California Cement Industry Clinker Production[3]	11.4 MMT/yr
Natural Gas Demand per Metric tonne Clinker	2,755 cf/metric tonne clinker
Facility Clinker Capacity[4]	3,000 metric tonnes/day
Natural Gas Demand	8.27 MMcf/day
Pipeline distance[5]	36 miles
Capacity-miles	298 Capacity-miles
Cost Multipliers (CM)	
Regional CM (California)	1.7
Pipe diameter CM[6]	3.0
Type of pipe CM (default)	1
Hot Market CM (default)	1
Aggregate Cost Multiplier	5.1
Infrastructure Cost	**$ 1,669,321**

Notes:

1. Due to confidentiality, the identity of this facility is not presented and will be referred to as "Plant A".
The infrastructure cost calculation is based on methodology from NPC (2003).
The infrastructure cost is calculated as follows:
Infrastructure Cost = $1100 per Capacity-mile x Capacity-miles x Cost multipliers

Capacity-miles is calculated as follows:
Capacity-miles = Natural Gas demand x Miles in pipeline network link

2. The projected increased demand for natural gas for California is from Table 1.
3. Clinker production for the California cement industry is from PCA (Summary of California Portland Cement Plant Carbon Dioxide Emissions with Support Data. October 8, 2007).
4. In order to preserve the confidentiality of company-specific information, actual clinker capacity for this plant is not used here. Instead, the average clinker capacity for all California plants (excluding the highest outlier) is used.
5. The pipeline distance from Plant A to closest distribution point determined using Google Maps.
6. The pipe diameter cost multiplier is based on the daily natural gas demand. A cost multiplier of 3.0 corresponds to natural gas flow between 1 to 100 MMcf/day.

Abbreviations:

cf = cubic feet
CM = cost multiplier
MMcf/yr = million cubic feet per year.
MMT = million metric tonnes
PCA = Portland Cement Association

References:

- National Petroleum Council (NPC). 2003. Committee on Natural Gas. "Balancing Natural Gas Policy" Volume V. September. Appendix F.
- Portland Cement Association (PCA). 2006. U.S. Cement Plant Information Summary by State. December 31.
- Portland Cement Association (PCA). 2007. Summary of California Portland Cement Plant Carbon Dioxide Emissions with Support Data. October 8.

EXHIBIT 5

TRADABLE PERFORMANCE STANDARDS:

A POLICY FRAMEWORK FOR EFFECTIVELY, EFFICIENTLY, & EQUITABLY REGULATING GHG EMISSIONS IN THE CALIFORNIA CEMENT INDUSTRY

PREPARED ON BEHALF OF:

THE COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT

PREPARED BY:

KING & SPALDING, LLP

1700 PENNSYLVANIA AVENUE NW, SUITE 200

WASHINGTON, DC 20006

202.737.0500

KEYBRIDGE RESEARCH LLC

3050 K STREET NW, SUITE 220

WASHINGTON, DC 20007

202.965.9480

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EXECUTIVE SUMMARY

The release of the California Air Resources Board's "Climate Change Draft Scoping Plan" represented a major milestone in the effort to mitigate the impacts of global climate change and affirmed California's role as a leader in environmental policy. The Coalition for Sustainable Cement Manufacturing and Environment (CSCME) commends California for its leadership and notes that the California cement industry will play an important, multifaceted, and constructive role in helping the state to achieve both its economic and environmental goals. Indeed, building a sustainable future for California will require regulation that enables the cement industry to thrive – not simply to survive – in a carbon-constrained world. As correctly expressed by CARB in the Draft Scoping Plan (DSP),

> *With California's continuing growth comes an increase in demand for cement. Reducing GHG emissions from this sector needs to be done in a manner that minimizes the potential for both emissions and economic leakage and maintains a strong, competitive cement industry in California.*[1]

With this goal in mind, CSCME believes that a regulatory framework for the cement industry should be rooted in three fundamental principles: (1) environmental effectiveness, (2) economic efficiency, and (3) equity. A regulatory framework rooted in these three principles will ensure that the cement industry's twin challenges (relatively few low-cost abatement opportunities and a high potential for emissions leakage) are satisfactorily addressed – thereby advancing the environmental objectives of AB 32 while preserving the economic vitality of the California cement industry.

The regulatory framework proposed in the DSP represents an important contribution toward this goal. Building on concepts presented in the DSP, CSCME is pleased to present its proposed framework for a GHG reduction program for the California cement industry: a "Tradable Performance Standards" (TPS) system. The TPS system leverages both the "push" of command-and-control instruments and the "pull" of market-based mechanisms to create a regulatory framework that is tailored to the unique characteristics and challenges of the California cement industry. Recognizing that different problems require different solutions, the TPS system is composed of a parsimonious and complementary set of policy instruments, with each applied to the particular regulatory task for which it is best suited. The TPS system integrates these instruments with other programs to form a complete solution for delivering GHG reductions in an effective, efficient, and equitable manner.

The cornerstone of the TPS system is a cement performance standard. Conceptually equivalent to the Carbon Intensity Factor (CIF) proposed in the DSP, the cement performance standard specifies a target for GHG emissions per ton of cementitious material – thereby simultaneously enabling regulators to purposefully guide improvements in environmental performance and providing a measure of predictability to decision makers.

[1] CARB (June 2008), *Climate Change Draft Scoping Plan: A Framework for Change*, pg. ES-7.

The TPS system extends the CIF concept to include emissions trading. By issuing tradable permits for over compliance and accepting such permits for under compliance, regulators will be able to guarantee environmental performance, while providing manufacturers and importers with the flexibility needed to negotiate the diversity of abatement opportunities across sources and minimize compliance costs. Such a system can be implemented as either an integral part of a California cap-and-trade program or as a separate program with linkages to a state cap-and-trade program.

Importantly, the TPS system applies the same system of obligations and rights to all cement consumed in California, regardless of origin. The obligation to comply with the performance standard will rest with California cement manufacturers and cement importers and will apply to each ton of cement at the point at which it first enters the California market. Likewise, the TPS system requires that California cement manufacturers and cement importers enjoy the same rights and opportunities afforded by emissions trading. Ultimately, by imposing the same system of rights and obligations on locally-produced and imported cement, the TPS system satisfies a necessary condition for minimizing leakage in a WTO-consistent manner.

The third component of the TPS system is an offsets program that provides incentives for increasing the substitution rate of supplemental cementitious materials (SCMs) in concrete. Under this approach, concrete ready-mixers and concrete product manufacturers will be able to generate offset credits for increasing their use of SCMs. Verified and certified by California regulators to be real and additional, these offsets credits can then be sold into emissions trading markets. By providing positive financial incentives for SCM usage, rather than the negative incentives provided by a concrete CIF, an SCM offsets approach is consistent with the concrete industry's status as a relatively minor direct emitter of GHGs and an intermediary between cement producers and consumers.

The fourth component of the TPS system is a framework that integrates the sectoral approach for cement with other emissions trading programs, including a California cap-and-trade system, international offsets programs, and other TPS-like systems. Whether linked or fully incorporated into a cap-and-trade program, the TPS system can be integrated with other emissions trading markets to enhance the diversity of abatement opportunities and to further reduce compliance costs while maintaining the environmental integrity of the policy. Equally as important, program integration provides a mechanism for harmonizing and merging systems – providing a foundation for a truly *global* response to the challenge of *global* climate change.

CSCME recommends that California adopt a sectoral approach that recognizes the unique characteristics and challenges of a globally competitive California cement industry. Leveraging and integrating a variety of instruments, the TPS system provides a "command, control, and trade" approach to reducing the GHG emissions associated with California cement *consumption* in an environmentally effective, economically efficient, and equitable manner. Equally as important, the TPS system provides California with a unique opportunity to develop an effective sectoral approach for globally competitive industries that could serve as a model for national policy and international agreements on global climate change – advancing California's role as an international leader and policy innovator on environmental issues.

I. INTRODUCTION

In June 2008, the California Air Resources Board (CARB) released its "Climate Change Draft Scoping Plan" (DSP) – a policy blueprint for implementing the vision set forth in AB 32.[2] The release of the DSP represents a major milestone in the effort to mitigate the impacts of global climate change and affirmed California's role as a leader in environmental policy. The Coalition for Sustainable Cement Manufacturing and Environment (CSCME)[3], a coalition of all six companies with cement plant facilities in the state, commends California for its leadership and supports its "pioneering effort to protect the environment and improve public health while maintaining a vibrant economy."[4]

CSCME believes that the cement industry will play an important, multifaceted, and constructive role in building a sustainable future for California. As the primary component of concrete, cement is an indispensable building block of modern economies that is, quite literally, the foundation of cities, suburbs, factories, and the transportation systems that support growing populations and thriving societies. Furthermore, cement's durability and "green qualities" make it an environmentally superior alternative to competing construction materials (e.g., asphalt, steel, lumber), and it is critical to a variety of climate change mitigation and adaptation strategies, including the construction of energy efficient buildings and roads, wind turbines, flood control systems, and irrigation projects. In short, it is difficult to envision a sustainable future for California in the absence of policies that support a thriving cement industry and that leverage cement's qualities as a safe, durable, and eco-friendly construction material.

The cement industry's capacity to contribute to a sustainable future for California will depend on the state's ability to design and implement a regulatory framework for the industry that achieves greenhouse gas (GHG) reductions in an environmentally effective, economically efficient, and equitable manner – an ambitious but achievable goal. The California cement industry is defined by a set of characteristics that distinguish it from all other industries in California. This set of characteristics presents two primary challenges in the California cement industry's efforts to adapt to a carbon-constrained world: (1) relatively few low-cost abatement opportunities and (2) a high risk of leakage.[5] Given these unique challenges, a "one-size-fits-all" regulatory approach is likely to be inadequate and potentially counterproductive. Rather, the policymaker's task is to develop a customized regulatory framework that simultaneously addresses these unique challenges and achieves the policy objectives set forth by AB 32. This objective is correctly summarized in the DSP Appendices as follows:

> *With California's continuing growth comes an increase in demand for cement. Reducing GHG emissions from this sector needs to be done in a*

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[2] In July 2008, CARB also released a set of draft appendices that provide additional information about the potential regulatory approach to the DSP. A further supplement on the cap-and-trade program will be released later in the summer.

[3] CSCME is a coalition of the following six companies: CalPortland Company, Cemex, Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California, and Texas Industries, Inc. These six companies account for all cement production facilities in the state.

[4] CARB (June 2008), *Climate Change Draft Scoping Plan: A Framework for Change*, pg. ES-7.

[5] See, generally, CSCME (June 2008), "Economic Growth, Climate Change, and the California Cement Industry".

> *manner that minimizes the potential for both emissions and economic leakage and maintains a strong, competitive cement industry in California.*[6]

In an effort to assist with this task, CSCME is pleased to present a policy framework for an effective, efficient, and equitable GHG reduction program for the California cement industry: a Tradable Performance Standards (TPS) system. Designed with the unique characteristics and challenges of the California cement industry in mind, the TPS system integrates the policy building blocks presented in the DSP to create a hybrid instrument that combines the "push" of command-and-control instruments with the "pull" of market-based mechanisms. The result is a "command, control, and trade" approach to regulation that purposefully guides real improvements in environmental performance in a manner that maximizes cost-effectiveness and minimizes leakage.

Importantly, whether linked or fully incorporated into a California cap-and-trade system, the TPS system is a sectoral approach that is aligned with the direction of policy development at both the national and international level – representing a model for regulating globally competitive industries that has the potential to engage developing nations and forge a truly global response to the challenge of global climate change. As expressed in the DSP,

> *California is exercising a leadership role in global action to address climate change. It is also exemplifying the essential role states play as the laboratories of innovation for the nation.*[7]

Consistent with this objective, the TPS system provides an opportunity to demonstrate a workable framework for regulating globally competitive industries such as cement – thereby enhancing California's role as both a leader and innovator in environmental policy.

The policy proposal is organized as follows. Section II identifies CSCME's policy design principles. Section III reviews CSCME's understanding of the DSP, and Section IV offers an assessment of CARB's proposed regulatory approach to the cement industry. Section V describes the TPS system. Section VI concludes.

[6] CARB (June 2008), Appendices, pg. C-104.

[7] CARB (June 2008), pg. ES-7.

II. Policy Design Principles

To address the unique challenges faced by the California cement industry, CSCME believes that the design and implementation of a regulatory program to reduce GHG emissions in California should satisfy the following principles:

2.1 *Environmental Effectiveness*

The "effectiveness principle" requires that regulations be designed and implemented in a manner that achieves the intended environmental outcomes. On its surface, environmental effectiveness appears to be a relatively obvious and easily attainable policy objective. In reality, however, the potential for GHG emissions leakage in the cement industry presents a significant threat to a policy's environmental effectiveness, as the regulation's intended environmental outcomes will be partially or entirely offset by an increase in GHG emissions in other regions. Thus, the effectiveness principle requires that California regulators make every effort to eliminate the risk of leakage through appropriate policy design.

2.2 *Economic Efficiency*

The "efficiency principle" requires that regulations achieve environmental objectives in the least costly manner. Given an environmental objective, such as the GHG emissions target specified by AB 32, economic efficiency can be represented (conceptually and quantitatively) by the notion of cost effectiveness – that is, the cost of achieving a unit reduction in GHG emissions. As demonstrated by both economic theory and empirical evidence, flexible policy instruments, such as emissions trading and alternative compliance mechanisms, provide for more cost-effective reductions than strict command-and-control measures. In short, the efficiency principle requires that California regulators utilize flexible policy instruments to the greatest extent possible, provided that the application of such instruments will not aggravate leakage and threaten the policy's environmental effectiveness.

2.3 *Equity*

The "equity principle" requires that regulators provide equal consideration to each industry's unique circumstances, limitations, opportunities, challenges, and contributions to California's carbon footprint, and it requires that the design and implementation of regulations reflect these characteristics. For instance, the equity principle dictates that regulators should provide consideration of an industry's ability to pass through compliance costs to consumers and to design and implement regulations that are consistent with this constraint. Equity considerations also require that regulated entities have the authority and control to deliver the GHG reductions required of them.

III. Draft Scoping Plan Review

The Draft Scoping Plan and its appendices identify a variety of potential approaches for regulating the California cement and concrete industries. CSCME's understanding of each of these potential regulatory approaches is discussed below.

3.1 *A Multi-Sector Cap-and-Trade Program*

The DSP proposes to regulate the cement industry through its inclusion in a multi-sector cap-and-trade program, which will result in additional economic costs to the cement industry. It suggests that the cap-and-trade program would be similar to that adopted by the Western Climate Initiative (WCI) – facilitating the future linkage of these two systems to create a regional program. Importantly, the DSP recognizes that some industries may be unable to pass through the costs associated with a cap-and-trade system and, therefore, may require free allocations of permits. It does not, however, identify the industries that are likely to require free allocations or specify a methodology for determining allocations.

3.2 *Performance Standards*

The DSP identifies potential approaches that remain under evaluation, including performance standards for both the cement and concrete industries (although as discussed further below, it is not clear what the extent of regulation of the "concrete industry" is intended to encompass). Characterized by the DSP as "carbon intensity factors" (CIFs), the dual performance standards would specify a GHG emissions limit on a per unit basis.

The DSP suggests that the performance standard for the cement industry would specify a maximum amount of GHG emissions per ton of cement, which it could presumably achieve through a combination of energy efficiency improvements and greater substitution of low-carbon fuels (which CARB has sometimes referred to as "alternative fuels"). The performance standard for the concrete industry would specify a maximum amount of GHG emissions per ton of cementitious material, which it could presumably achieve through a combination of the use of more low-carbon cement and replacement of cement with supplementary cementitious materials (SCMs).

Although the DSP uses CIF values for illustrative purposes, it neither recommends specific values nor proposes a methodology for eventually establishing such values. The DSP does not discuss how performance standards will be integrated with other instruments and measures in a complementary manner.

3.3 *Carbon Fees*

CARB also indicates that it is evaluating the potential for applying a carbon fee for GHG emissions in the California cement industry. The DSP does not indicate if the fee will be supplemental to the coverage afforded by other instruments. Although a value for the carbon fee is not specified, the DSP suggests that fees would likely need to be between \$10 and \$50 per ton of CO_2-e to incentivize significant reductions.

In the DSP, CARB does propose the immediate imposition of a regulatory fee to pay for the cost of program administration. In addition, local air districts are advocating to charge their own fee, but there has not been any delegation of responsibility or regulatory authority to the local districts. It is not clear whether or how these taxes/fees would be equally applied to domestic and imported cement.

3.4 Anti-Leakage Measures

The DSP acknowledges that the risk of leakage presents a serious challenge in regulating the California cement industry and suggests that CARB is prepared to proactively manage this risk. The DSP also confirms that all of the potential approaches for the cement industry will "include consideration of both in-state production and imported cement."

The DSP does not, however, propose a specific instrument for minimizing the leakage that would result from the significant collective cost associated with all of the various regulatory approaches discussed, especially with respect to cap-and-trade.

3.5 Offsets

Although the DSP acknowledges the important role that offsets can play in reducing compliance costs, it also suggests that strong qualitative and quantitative restrictions will be applied to offsets. The DSP clearly signals CARB's intent to accept offsets for only a fraction of compliance obligations, but it does not indicate if the same limit will be applied to all regulated entities or if some entities will have higher limits due to unique regulatory issues, such as leakage. The DSP does recognize specific opportunities for offsets related to imported commodities, such as cement.

3.6 Other Measures

The DSP recommends performing energy/co-benefits audits on large industrial sources, including cement facilities. It does not indicate how the data might be used to develop future regulations. The DSP also suggests that CARB is evaluating a minimum concrete waste requirement and/or a carbon fee for wasted concrete.

IV. Draft Scoping Plan Evaluation

CSCME believes that the DSP represents several positive developments and it supports several encouraging conclusions:

- **A Hybrid Regulatory Approach:** By identifying a range of policy instruments, the DSP suggests that CARB is strongly considering a hybrid regulatory approach in its efforts to mitigate GHG emissions associated with California cement consumption. CSCME supports a complementary, non-duplicative hybrid approach and believes that effective, efficient, and equitable regulation of the cement industry may incorporate both the "push" of balanced command-and-control instruments and the "pull" of market-based mechanisms, provided that multiple policy instruments are integrated in a manner that minimizes leakage.

- **The High Risk of Leakage:** The DSP confirms that CARB recognizes the severe risk of leakage in the cement industry and intends to take proactive steps to minimize leakage. CSCME is encouraged by CARB's strong support for anti-leakage measures that will ensure that all cement consumed in California meets the same requirements and that both California cement manufacturers and cement importers are subject to the same obligations.

CSCME also believes, however, that many of the approaches identified in the DSP need to be defined further.

- **Cumulative Costs & Increased Leakage:** The instruments and measures identified in the DSP will place the California cement industry at a significant competitive disadvantage to foreign producers due to the direct and indirect costs associated with:
  - A cap-and-trade program
  - Command-and-control regulations, including:
    (A) A carbon intensity factor
    (B) Energy efficiency / co-benefit audits
    (C) Vehicle modifications/efficiency/design
  - Carbon fees, including:
    (A) A potential direct carbon fee
    (B) Administrative program fees to CARB
    (C) Administrative program fees proposed by local air districts
  - Increased electricity prices
  - Increased coal, petroleum coke, gasoline, and diesel fuel prices

  Due to the inability to pass through costs, *any* instance of cost increases to the California cement industry directly increases the potential for leakage. Consequently, CSCME recommends that CARB reevaluate the cumulative, layered costs to the cement industry potentially contemplated in the DSP, given the substantial leakage that is likely to result from the application of multiple, duplicative instruments and measures.

- **Reliance on Cap-and-Trade:** Although CSCME supports emissions trading as a valuable instrument for enhancing flexibility and minimizing costs, it does not believe that the "one-size-fits-all" approach of cap-and-trade is capable of effectively minimizing the significant risk of leakage in the cement industry. Rather, to minimize leakage, CSCME believes that California should develop a customized framework for the cement industry that is better aligned with the industry's unique characteristics and key challenges. Whether linked or fully incorporated into a California cap-and-trade program, such a framework would be consistent with the direction of international climate change policy, which has embraced sectoral frameworks as the approach most likely to achieve climate change objectives (particularly with respect to leakage) and engage developing nations.

- **Policy Instrument Integration:** The DSP identifies a mix of potential policy instruments but provides little insight into how these instruments might be used in concert to produce an effective, efficient, and equitable regulatory framework. Although it is possible for multiple policy instruments to be complementary, it is equally possible for them to be duplicative and counterproductive – especially in instances where leakage is a significant risk. CSCME believes that any successful policy must carefully integrate instruments in a manner that avoids unnecessary burdens and strikes an appropriate balance between environmental certainty, economic certainty, and cost minimization.

- **Inadequate Anti-Leakage Measures:** Although the DSP suggests that CARB is concerned about the significant risk of leakage in the cement industry, it does not include effective measures for minimizing leakage. To minimize leakage, CARB must avoid a regulatory framework where one manufacturer has a competitive advantage over another as a result of inequitably shared regulatory costs. As such, creating the same system of rights and obligations for both imports and California cement production is critical. CSCME recommends that CARB develop more specific proposals for controlling leakage and for avoiding a policy failure through leakage, which would result in higher GHG emissions while displacing California cement production – providing no environmental benefit while causing a substantial loss of income, jobs, and tax revenues for the state of California.

- **Commitment to Cost-Effectiveness:** As repeatedly demonstrated by both economic theory and empirical results, flexible compliance mechanisms allow GHG reductions to be achieved at the least cost. In addition, although flexible compliance mechanisms are important to reducing the policy cost burden for all Californians, they are particularly critical to those industries that are unable to pass through costs and that are exposed to international competition, because the minimization of costs also reduces the risk of leakage. CSCME strongly supports the broad-based use of flexible compliance mechanisms, such as offsets, to enhance cost-effectiveness.

- **Equity Considerations:** Good policy requires that measures be administered in an equitable manner and that the regulated entity have sufficient control to achieve the regulatory objective, especially when motivated with punitive measures. Consequently, CARB should reassess the appropriateness of regulating the concrete industry with punitive measures, such as those implied by the proposed CIF mandate. As discussed below, the concrete industry is a relatively minor direct GHG emitter and also lacks the ability to control or adopt a CIF mandate. Furthermore, applying mandatory, punitive measures to the concrete industry potentially raises legal issues.

V. CSCME Policy Proposal: Tradable Performance Standards

Reducing the GHG emissions associated with California cement consumption involves changing the amount of emissions released during the cement manufacturing process (both California-produced and out-of-state imported cement that is consumed within the state) and potentially reaching down to influence consumers' use of cement in concrete and concrete products[8] (hereinafter, collectively concrete). Each of these different elements of the California cement marketplace presents a unique set of challenges for regulators, and each set of challenges requires a different policy instrument to motivate effective, efficient, and equitable GHG emissions reductions. Importantly, additional benefits can be realized by integrating these instruments with other programs to form a single regulatory framework.

Consistent with this philosophy, the proposed TPS system consists of four components: (1) a cement performance standard; (2) emissions trading to meet the performance standard, (3) an SCM offsets program; and (4) a framework for integrating the TPS system with other market mechanisms, such as cap-and-trade programs and international offsets programs. The result is a "command, control, and trade" approach that allows regulators to purposefully guide real improvements in environmental performance in a manner that maximizes cost-effectiveness and minimizes leakage within the cement industry. The following sections describe each of the four components and discuss the environmental, economic, and equity benefits that each delivers as part of an integrated TPS system.

5.1 A Cement Performance Standard

The foundation of the proposed system is a cement performance standard. Conceptually equivalent to the Carbon Intensity Factor (CIF) proposed by CARB in the DSP appendices, the performance standard would specify the average carbon intensity of cementitious material *consumed* in California.[9] Formally, the CIF for any given year (Y) is calculated as:

$$CIF_Y = \frac{E_Y}{P_Y} \quad CIF_Y = \frac{E_Y}{P_Y}$$

Where,

CIF = target carbon intensity factor
E = metric tons of GHG emissions
P = metric tons of cementitious material
Y = year of regulation

[8] Concrete products include, but are not limited to, concrete block, roof tile, pipe, barrier rails, extruded concrete, stucco, etc. References to the "concrete industry" include producers of ready-mix concrete and concrete products.

[9] By establishing the CIF on a cementitious material basis, rather than a cement basis, the TPS system provides for the blending of SCMs at the cement facility or, for imports, at the import facility (or earlier in the supply chain, including at the out-of-state cement facility). Although very little blending of SCMs currently occurs at cement facilities in California, there appears to be no logical reason to restrict this capability in the future.

The exact values of the performance standard should be established using a collaborative, thorough, and transparent regulatory process. In addition to site-specific factors, regulators should consider a variety of other variables when establishing the performance standard, including:

- The California cement industry's existing energy and environmental performance.
- The availability of cost-effective and technologically feasible abatement strategies, with full consideration of system impacts (i.e., the impact of one action on other plant systems).
- Barriers to implementation, including existing regulatory constraints.
- The time needed to bring about investments in GHG abatement strategies and realize GHG emissions reductions.
- The capital stock age, turnover rate, and replacement times.
- The industry's ability to access alternative compliance mechanisms, such as offsets, and the projected costs of using them.

Notably, the TPS system applies the same performance standard to cement consumed in California regardless of origin of manufacture – an essential characteristic of a WTO-compliant measure.[10] Similar to the "first seller approach" applied to the electric power sector, the obligation to comply with the performance standard will rest with California cement manufacturers and cement importers – regulating cement consumption at the point at which it first enters the California market.

The carbon intensity of imported cement would be regulated in the same manner as cement produced in California. Specifically, each cement producer would have the option of submitting company-specific data on the carbon intensity of its product. This data would be subject to on-site verification. If no data is submitted or if on-site verification is refused, the state would apply a pre-determined "default" CIF.

As the centerpiece of the TPS system, the cement performance standard provides several key benefits:

(1) **Regulatory Control & Customization:** The performance standard allows regulators to set the carbon intensity of cement to drive improvements in environmental performance over time. The performance standard also provides regulators with the ability to customize the regulatory requirements for the cement industry in a manner that is consistent with the cement industry's unique characteristics and evolving market conditions – thereby enabling sustainable growth in manufacturing capacity to meet the state's future construction and infrastructure needs.

(2) **Predictability:** Industry decision makers will always "know where they stand" relative to the performance standard – reducing the costs associated with uncertainty and enabling them to make informed investments in GHG abatement and new capacity. Moreover, the TPS system

[10] For a more detailed discussion about the risk of leakage in the California cement industry and the legal issues associated with implementing effective leakage minimization measures, see CSCME (September 2008), *The Application of Anti-Leakage Measure in the California Cement Sector to Achieve AB 32's Climate Change Objectives*.

enables cement manufacturers to eliminate their downside financial risk by bringing their plants into full compliance.

(3) **Leakage Minimization:** By applying the same performance standard to both locally produced and imported cement, the TPS system imposes equal compliance obligations on both California cement manufacturers and cement importers – a first-order condition for minimizing leakage within the industry. Consistent with WTO requirements, such an approach provides additional assurances that investments in GHG abatement and new capacity will not be placed at risk or eventually devalued. Finally, it is important to note that an appropriately calibrated performance standard may actually incentivize investment in new capacity, as those who invest in state-of-the-art facilities will be assured that they will over comply with the performance standard, and thereby encourage a "reverse leakage" effect- shrinking the carbon footprint associated with California cement consumption.[11]

5.2 An Emissions Trading Program

The second component of the TPS system is a market mechanism that enhances overall efficiency while maintaining environmental effectiveness. Specifically, the TPS system extends the CIF framework proposed in the DSP to include an emissions trading program – transforming an otherwise rigid and less efficient policy instrument (i.e., traditional performance standards) into a flexible and more efficient policy instrument (i.e., tradable performance standards). This is achieved by measuring the carbon intensity of cementitious material sold into California markets by a particular entity (regardless of origin) relative to the California industry performance standard. Those entities that over comply with the performance standard will be issued permits, while those that under comply with the performance standard will be required to submit permits.

Specifically, each cement manufacturer or importer will receive or submit permits at the end of each compliance period according to the difference between its individual CIF, as verified by regulators, and the industry CIF, as specified by regulators, and the quantity of cement supplied to the California market. More formally, the total number of permits received or submitted by an individual cement plant or importer is calculated as:

$$Permits = \left(CIF_{Industry} - CIF_{Plant/Importer}\right) \times Output_{Plant/Importer}$$

Where,

Permits = Permits submitted or received by plant or importer
CIF = Carbon intensity factor for the industry (i.e., performance standard), or an individual plant or importer.
Output = Metric tons of cementitious material supplied to the CA market by an individual plant or importer.

By issuing transferable permits to those plants that over comply with the performance standard and accepting permits in lieu of under compliance with the performance standard, regulators will enable

[11] This "reverse leakage effect" is the result of a displacement of more carbon intense cement imports, given that the average carbon intensity of California cement tends to be lower than the average carbon intensity of cement produced in nations that export to California.

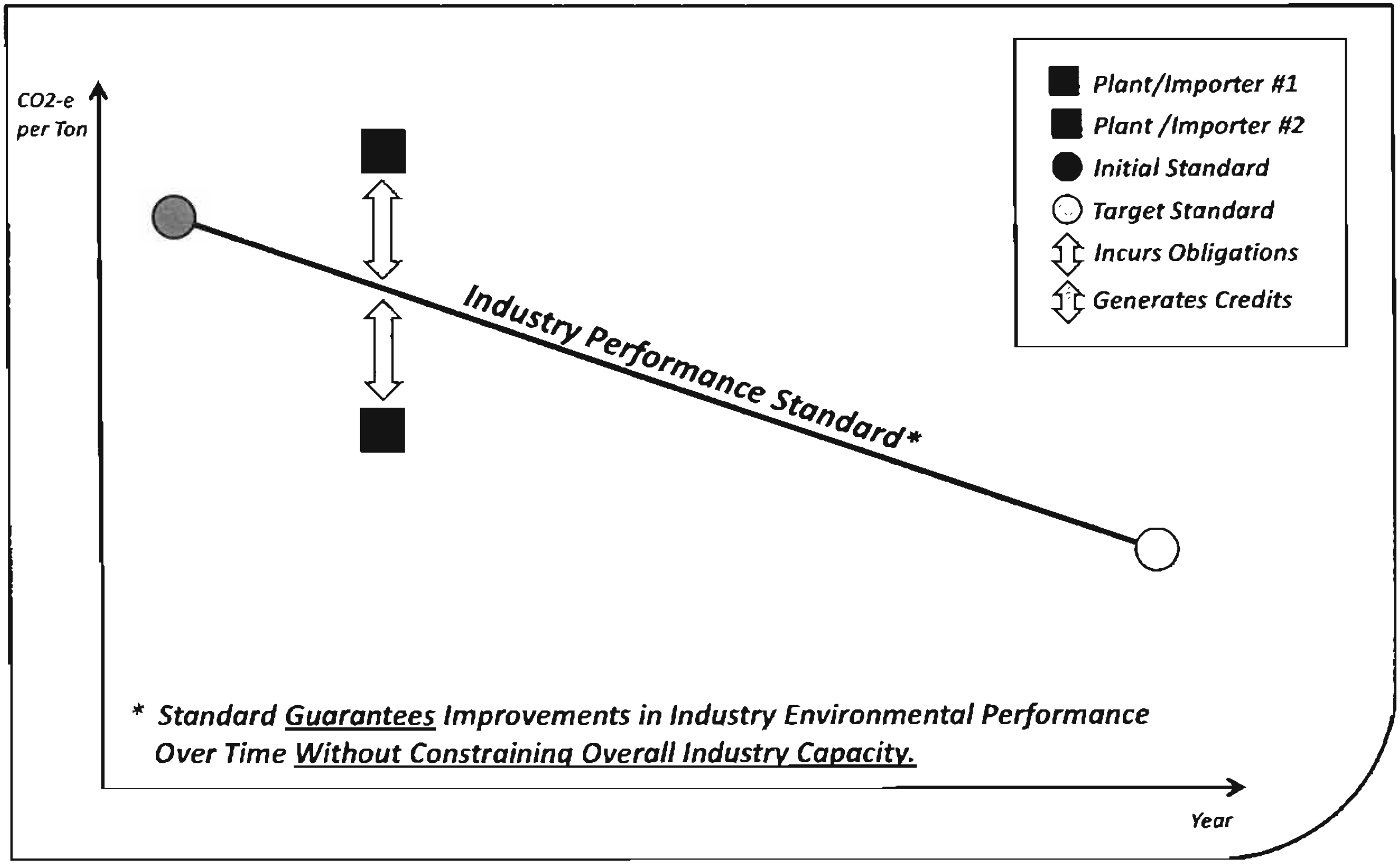
cement manufacturers and importers to utilize emissions trading as a mechanism to cost effectively meet the industry standard. Each entity will then be incentivized to compare the costs of direct abatement (i.e., taking action to reduce the carbon-intensity of cement) with the costs of indirect abatement (i.e., purchasing permits to compensate another entity for taking action) and choose the least costly approach. It is through this market mechanism that the industry is able to minimize the costs of achieving a given environmental objective (i.e., the performance standard).

Ultimately, the TPS system leverages the "pull" of a market-based mechanism to provide benefits beyond those offered by the "push" of a traditional performance standard approach:

(1) **Cost Minimization:** As is well known, the primary benefit of emissions trading is cost minimization. The TPS system allows regulated entities to achieve an overall environmental objective (i.e., the performance standard) in the most cost-effective manner. By providing price signals and compliance flexibility, an emissions trading program leverages diversity in abatement costs and opportunities to deliver cost savings. Given the significant diversity in abatement costs and opportunities among California cement plants, the savings achieved by integrating emissions trading with a traditional performance standard are likely to be substantial.

(2) **Persistent Incentives:** A traditional performance standard, such as that proposed in the DSP, incentivizes regulated entities to do "just enough" to meet the performance standard and bring manufacturing plants or import facilities into compliance. In contrast, the TPS system incentivizes regulated entities, regardless of their position relative to the performance standard, to pursue technologically feasible and cost-effective GHG reductions. By providing incentives to go beyond the performance standard, tradable performance standards are likely to generate greater improvements in environmental performance than a traditional performance standard alone.

Tradable Performance Standards: An Illustrative Example



5.3 An SCM Offsets Program for California Concrete Ready-Mixers

The third component of the TPS system is an offset program that provides incentives for the use of supplemental cementitious materials (SCMs) in concrete.[12] Such an offset program would enable concrete ready-mixers and manufacturers of concrete products to generate TPS offset credits for blending SCMs in concrete.[13] These credits could then be sold to cement manufacturers and importers and used to comply with the performance standard, or sold into other emissions trading markets, such as a California cap-and-trade program.

Importantly, the environmental quality of the offset credits would be certified by California regulators. The verification methodology would incorporate the best available data and information on SCM substitution, including a lifecycle analysis of the GHG reductions associated with SCM substitution in California. As part of the methodology, regulators would account for business-as-usual SCM substitution rates and ensure that reductions are additional to those that would have been achieved in absence of the program. With the environmental quality of offsets verified and certified by regulators to be real and additional, the TPS system provides for offset credits to be transferable, fully fungible, and approved for compliance without quantitative restrictions.

While CSCME recognizes the important contribution that SCMs can make to reducing GHG emissions and supports the increased use of SCMs, it strongly believes that increased SCM usage should not be mandated or otherwise motivated through punitive measures, as is implied by the CIF for concrete facilities proposed in the DSP. Given that the concrete industry is a relatively minor direct emitter of GHGs, the principle of equitable regulation suggests that they should not be subjected to punitive measures. Moreover, to mandate or otherwise motivate with punitive measures, the principle of equitable regulation dictates that regulated entities must have sufficient control to achieve the regulatory objective. As intermediaries between cement producers and end-users, concrete manufacturers do not have sufficient control to achieve a mandated CIF.

- On the supply side of the equation, desired quantities of SCMs have not been available in California in the past and the supply outlook for key SCMs remains highly uncertain given the future implementation of mercury emissions controls at coal-fired power plants and the high likelihood of federal climate change legislation.[14]

[12] CSCME is in the process of conducting a comprehensive study on SCMs that will be submitted to CARB upon completion.

[13] To avoid double crediting, the TPS system does not provide offset credits to the concrete industry for purchasing blended cements, as the SCMs contained in those cements would be credited to the cement manufacturer toward compliance with the performance standard. A concrete manufacturer would receive credit, however, for any SCMs it adds to blended cements. In short, the TPS system specifies that the entity that blends the SCMs receives the credit.

[14] The use of activated carbon injection (ACI) technology to control mercury emissions at coal-fired power plants may significantly decrease the national supply of concrete-quality fly ash. In addition, federal climate change legislation is likely to severely economically disadvantage coal-fired generation and, consequently, severely limit national fly ash supplies. Federal climate change legislation is also likely to significantly increase the demand for concrete-quality fly ash in other states – thereby restricting the available supply in distant, incremental markets such as California.

- On the demand side of the equation, the concrete specification decision is made by the end-user. Considering that the concrete industry merely produces a product that meets the customer's specifications – which are driven by a variety of non-market factors such as building codes, site conditions, performance requirements, and historical practices – a mandate on the concrete ready-mix industry will not translate into a mandate on the end-user.

Although a theoretical case can be made for higher SCM-intensive concrete, end-user acceptance is a major hurdle to overcome that will require changes to building codes and practices that traditionally evolve over long periods. Absent reaching down and changing the regulations that govern the use of concrete, any attempt to increase SCM usage via mandates is likely to be ineffective.

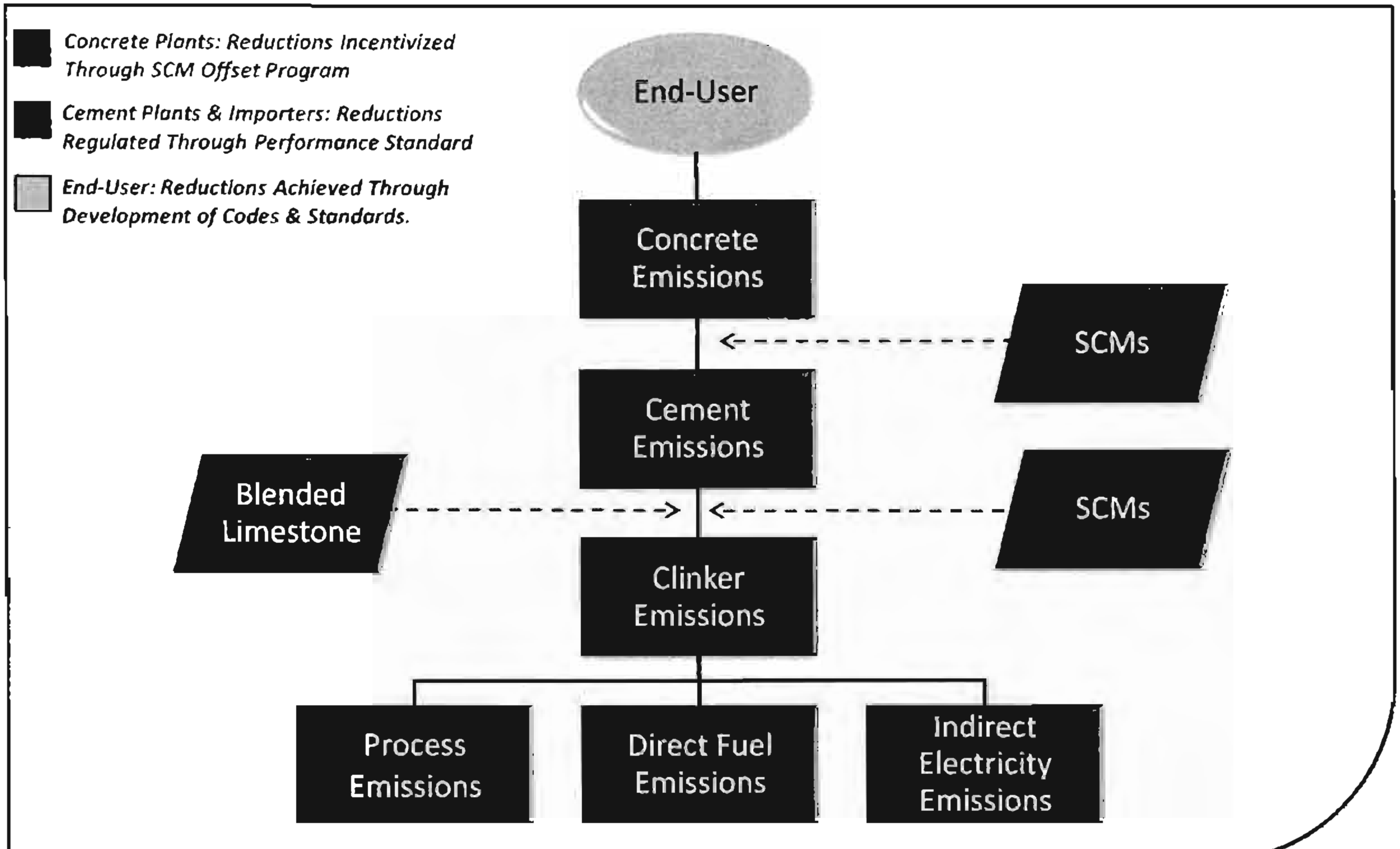
Given these considerations, CSCME believes that the positive financial incentives provided by an SCM offset program can deliver significant increases in SCM usage in a more cost-effective and equitable manner than the punitive measures provided by a traditional command-and-control measure, such as the concrete CIF proposed in the DSP. Specifically, an SCM offset program has several key characteristics:

(1) **Environmental Effectiveness:** The forces associated with a competitive marketplace will insure that the savings associated with higher SCM usage – or, alternatively, the foregone savings associated with lower SCM usage – will be passed through to the consumer. As a result, an instrument that provides positive incentives, such as SCM offsets, utilizes price signals to deliver the same changes in consumer behavior, producer behavior, and environmental outcomes as an instrument that imposes negative incentives, or a mix of positive and negative incentives.

(2) **Responsiveness to Prevailing Market Conditions:** In contrast to command-and-control instruments, such as a mandated average SCM substitution rate, a purely incentives-based approach provides the flexibility that individual concrete manufacturers require to appropriately respond to evolving market conditions. Provided with positive financial incentives, individual manufacturers will be motivated to maximize SCM usage and minimize cement usage, subject to prevailing market realities such as the availability of SCMs and the specification demands of their customer base.

(3) **Low Information Requirements:** Unlike a concrete CIF (the effectiveness and efficiency of which heavily depends upon regulators assumptions about the future state of the cement, SCM, and concrete markets), an incentives-based instrument such as an SCMs offset program uses market forces to reveal the level of SCM substitution that is consistent with existing supply constraints, demand conditions, and prevailing carbon prices. Simply put, unlike a CIF instrument, the environmental effectiveness and economic efficiency of an SCM offset market does not hinge on accurate assumptions about future states of the world.

The Cement Carbon Supply Chain: Primary Instruments & Points of Regulation



5.4 INTEGRATION WITH OTHER POLICY INSTRUMENTS

The fourth and final component is integrating the TPS system with other market-based mechanisms, such as cap-and-trade programs, international offset programs, and other relevant systems. The integration of emissions trading systems offers a variety of benefits, including enhanced abatement options, increased market liquidity, and reduced compliance costs. Equally as important, program integration offers a mechanism by which to harmonize disparate industry, state, regional, and national policies and to establish a basis for effective international agreements on climate change.

5.4.1 Integrating with Cap-and-Trade Programs

To maximize economic efficiency and minimize leakage, the TPS system further leverages the benefits of emissions trading by either linking or fully incorporating the sectoral approach into cap-and-trade programs, including a California program, a Western Climate Initiative program, and a national program, if realized.

As noted in the Market Advisory Committee's (MAC) "Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California",

> *The most important question in deciding to link with other programs is whether this step will maintain or expand the environmental benefits that would otherwise be obtained without linkage.*[16]

It is for this reason, presumably, that the MAC also notes:

> *Permits in a system that regulates absolute emissions can be traded into a regime that regulates emissions intensity – but not vice versa.*[17]

At face value, the MAC's statement implies, correctly, that a TPS system can be integrated with cap-and-trade systems through a so-called "one-way link". CSCME believes, however, that the MAC's statement is incomplete. Permits from a relative target system can, *under certain policy designs*, be traded into an absolute target system without threatening the environmental integrity of either system.

Specifically, permits from a regime that regulates emissions intensity (i.e., the TPS system) can be traded into a system that regulates absolute emissions (e.g., a California cap-and-trade program) *provided that the permits generated in the former are associated with real, verifiable, and additional GHG reductions.*[18] There are compelling reasons to believe that the credits generated under a TPS design would satisfy these criteria, especially in the context of the California cement industry:

[16] Market Advisory Committee (June 2007), *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*, pg. 70.
[17] Market Advisory Committee (June 2007), pg. 71.
[18] Indeed, this is the same logic that underpins the trading of offsets into a cap-and-trade system.

- To the extent that existing cement capacity is subject to a credible performance standard, the GHG reductions associated with *exceeding* that standard would be additional to the reductions that would have otherwise occurred in the absence of the policy.

- To the extent that the policy incentivizes new capacity that would otherwise not have occurred, the GHG reductions associated with a combination of *exceeding* a credible performance standard and *displacing more carbon-intensive cement imports* would result in both a shrinking of California's carbon footprint and a net reduction in global GHG emissions.

In short, through the generation of real, verifiable, and additional GHG reductions, a TPS system would effectively serve as a source of high-quality California offsets that could be freely traded in emission markets. By integrating the TPS system with a California cap-and-trade program, California can expand the potential for cost-effective reductions, enhance market liquidity in both systems, and maintain environmental effectiveness.

5.4.2 Integrating with International Offsets Programs

The issues related to linking a TPS system with international offset programs are not materially different than those that arise in the context of cap-and-trade. Namely, the primary concern in integrating any system with an international offset program is the environmental quality of the offset. As noted by the MAC,

> *All offset projects should meet the criteria of being: real, additional, independently verifiable, permanent, enforceable, predictable, and transparent.*[19]

CSCME supports the establishment of standards that ensure the environmental quality of offsets entering emissions trading markets, including the TPS system.[20] Given the development and application of such standards, CSCME also agrees with the MAC's "sense of the committee" recommendation that,

> *California should reject geographic or quantitative limitations on offset credits so as to maximize the opportunity to reduce GHG emissions at the lowest cost.*[21]

To the extent that such limitations are imposed, regulators should provide additional opportunities to the most vulnerable players in the California economy. For instance, regulators should, at a minimum, provide opportunities for the cement industry to comply using a greater number of offsets than those industries that are able to pass through compliance costs to consumers. Regulators could, for example, establish a cement-specific offset program that allows for the use of credits that originate in certain geographic areas, such as China or Mexico, and for projects that meet certain standards in relation to

[19] Market Advisory Committee (June 2007), pg. 62.
[20] For a more detailed discussion of CSCME's position on offsets, see CSCME (September 2008), *The Role of Offsets in AB 32: The Cement Industry's Perspective.*
[21] Market Advisory Committee (June 2007), pg. 65.

cement-specific GHG reductions. Such a sector-specific approach could formally or informally link with the UN and EU registries and, coupled with the TPS model of regulation, provide the foundation for a global sectoral approach to offsets for the cement industry.

5.4.3 Integrating with Other TPS Systems

In addition to being compatible with cap-and-trade systems and international offset programs, TPS systems can be easily linked with other TPS systems in the future to develop regional, national, and international systems. Indeed, one of the greatest benefits of the TPS approach is that it offers a practical and effective solution for addressing the unique challenges of globally competitive industries – providing a model for regional initiatives, national policy, and international agreements. Sector-specific frameworks, such as TPS, are already gaining traction in policy circles as the approach most likely to engage developing nations and minimize leakage. Through its regulation of the cement industry, California has an opportunity to demonstrate that such approaches can succeed in reducing GHG emissions while resolving the unique challenges of vulnerable industries and to further its legacy as a leader and innovator in environmental policy.

5.4.4 Summary

Ultimately, the integration of a California TPS system with other market-based mechanisms – whether it be a cap-and-trade system, an international offset program, or a TPS-like system – will provide significant environmental and economic benefits:

- **Cost Minimization:** As is well known, the integration of systems expands the potential pool of abatement opportunities and brings additional low-cost reductions into the system. With the assistance of smart policy design, the TPS system can be either linked or fully incorporated into the California cap-and-trade system to improve economic efficiency while maintaining the environmental integrity of a cap. By taking advantage of low-cost abatement opportunities in less developed and less carbon efficient economies, offsets allow regulated entities to achieve the same amount of GHG reduction at the least cost. The ability to use offsets and minimize costs is particularly important for the California cement industry, which suffers from a relative lack of low-cost abatement opportunities and a high risk of leakage.

- **International Engagement:** As is widely recognized, avoiding the worst impacts of global climate change will require action from the entire international community. In the short-run, international offset programs, such as the Clean Development Mechanism (CDM), offer the greatest opportunity to *immediately* engage developing nations in GHG reduction efforts and to accelerate the global deployment of advanced environmental technologies. In the medium and long-term, the integration of relative target systems, such as TPS, is likely to provide the foundation of sector-specific approaches that have real potential to engage developing nations and minimize leakage.

VI. Conclusion

CSCME believes that the design and implementation of regulations should reflect the unique challenges of the California cement industry, including the lack of low-cost abatement opportunities and the high risk of leakage. Consistent with this concept, CSCME recommends that California adopt a sector-specific approach for the cement industry and integrate it with market based mechanisms. This "command, control, and trade" approach provides for GHG reductions in the cement industry in an environmentally effective, economically efficient, and equitable manner – providing a model for national policy and international agreements.

EXHIBIT 6

The Application of Anti-Leakage Measures in the California Cement Sector to Achieve AB 32's Climate Change Objectives

Prepared on Behalf of:

The Coalition for Sustainable Cement Manufacturing & Environment

Prepared By:

King & Spalding, LLP

1700 Pennsylvania Avenue NW, Suite 200
Washington, DC 20006
202.737.0500

Keybridge Research LLC

3050 K Street NW, Suite 220
Washington, DC 20007
202.965.9480

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Executive Summary

The principle of environmental effectiveness requires that policymakers design and implement regulations in a manner that achieves the intended environmental outcomes. In the context of achieving the objectives of AB 32, ensuring the policy's environmental effectiveness requires the minimization of leakage – that is, an offsetting increase in GHG emissions outside of the state as a result of regulation. Simply put, given the global nature of GHGs, a failure to minimize leakage will result in the worst of all possible policy outcomes for California: additional economic costs without any corresponding environmental benefits.

As is well known, the severe risk of leakage in the California cement industry represents a fundamental challenge in its efforts to adapt in a carbon-constrained world. Indeed, the California cement industry is endowed with an unfavorable set of characteristics that limit its ability to directly defray the costs of climate change regulation and pass residual costs through to consumers. The result is a natural predisposition towards leakage that will be realized unless climate change regulations impose comparable requirements on all competing products. As expressed by CARB in the Draft Scoping Plan,

> *If GHG requirements were applied to California cement manufacturing facilities only, the cost of cement from those facilities would rise relative to imports, and imports could displace California production {sic}. Generally, California's cement manufacturing plants are more efficient than those that produce imported cement. California plants would decrease their GHGs produced, but increased imports would likely result in a net worldwide increase in GHG emissions. To minimize leakage, in-state and imported products need to be subject to the same standards.*[1]

The ideal method to impose equal obligations on all competitors in an industry is through a global framework. Although sector-specific global agreements hold great promise, their development is likely to lag significantly behind California's GHG reduction efforts. The second-best policy for addressing leakage is to apply "anti-leakage measures" that impose the same rights and obligations on all cement consumed in California. Absent such measures, the costs associated with climate change regulation will place the California cement industry at a severe disadvantage to competing products, result in severe leakage, and undermine the environmental objectives of AB 32.

The design and implementation of an effective and durable anti-leakage measure must satisfy a variety of legal criteria. It must conform to the provisions of the U.S. Constitution, which places restrictions on the regulation of both interstate and foreign commerce. An effective and durable anti-leakage measure must also be consistent with the agreements of the World Trade Organization (WTO), which imposes obligations on the United States in relation to how it regulates international trade. Ultimately, the

[1] CARB (June 2008), *Climate Change Draft Scoping Plan: A Framework for Change,* pg. ES-7.

minimization of leakage in the California cement industry requires regulators to design and implement a regulatory framework that is consistent with these legal constraints.

The Tradable Performance Standards (TPS) framework proposed by CSCME achieves these objectives by providing the flexibility necessary to ensure cost-effective GHG reductions by applying the same system of rights and obligations to all cement consumed in California, regardless of origin. Thus, an identical performance standard is applied to both domestic and imported cement, and both California cement manufacturers and cement importers would have the same opportunity to buy and sell permits within the TPS and buy and sell permits or offsets in the state-wide program. In addition, it is critical that the TPS approach involves only one layer of costs in order to avoid further competitive disadvantage to California cement production caused by additional regulatory burdens that cannot be passed through to consumers and that will not equally impact imports. In short, the TPS system provides CARB with an effective tool to meet its GHG reduction objectives in AB 32, while accounting for the unique characteristics of the California cement industry.

I. Introduction

The Coalition for Sustainable Cement Manufacturing and Environment (CSCME)[2] is pleased to submit comments on "leakage," an issue that is of critical importance to the achievement of a global reduction in greenhouse gas (GHG) emissions and to the economic survival of the California cement industry.

The Draft Scoping Plan (DSP) presented by the California Air Resources Board (CARB) acknowledges that the risk of leakage presents a serious challenge in regulating the California cement industry and suggests that CARB is prepared to proactively manage this risk. The DSP also confirms that all of the potential approaches for the cement industry will "include consideration of both in-state production and imported cement." The DSP does not, however, propose a specific instrument for minimizing leakage as a result of the significant collective cost associated with all of the various regulatory approaches discussed.

"Leakage" is defined in the California Global Warming Solutions Act of 2006 (AB 32) as "a reduction of emissions of greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state."[3] In adopting regulations to reduce GHG emissions under AB 32, CARB is required to minimize leakage.[4] Simply put, a failure to address the severe threat of leakage in the California cement industry will result in a policy failure by allowing an overall net increase in global GHG emissions. These offsetting increases in GHG emissions caused by leakage from California will not only be "exported" to unregulated developing countries (*i.e.*, countries that lack the comparable environmental regulatory programs that limit California's industrial emissions) but will also generate significant additional criteria pollutants and air toxic emissions in these countries.

Leakage arises when climate change policies do not impose comparable regulatory requirements on all products competing in a given market. If customers can easily shift away from the regulated product to any substitutable, unregulated, and, thus, lower cost product, significant leakage will occur. In the short term, unregulated firms facing a lower cost burden are able to expand market share by selling their products at a lower price than their competitors. In the long term, such a cost advantage will lead to disinvestment in the regulated market and increased investment in the unregulated market, causing further losses of market share for firms in the regulated market. To the extent that unregulated firms have a larger GHG footprint than regulated firms, the increase in market share will result in GHG emissions leakage.

An industry's susceptibility to leakage is primarily based upon (1) the extent to which it is energy- and carbon-intensive and, therefore, incurs higher compliance costs under a climate change program; and (2) whether it has a limited ability to pass through higher compliance costs to the final customer. As discussed in more detail below, cement is an energy-intensive good that also separately generates CO_2

[2] CSCME is a coalition of the following six companies with cement production facilities in California: CalPortland Company, Cemex, Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California, and Texas Industries, Inc.

[3] AB 32, Section 38505(j).

[4] AB 32, Section 38562(b)(8).

as a by-product of the chemical reaction associated with its production process.[5] Moreover, because cement is a homogeneous, fungible commodity, California cement producers cannot pass on higher costs to their customers if unregulated cement from outside of California is available at lower prices. Thus, the implementation of AB 32 poses a significant risk of leakage to the California cement industry.

Failure to account for the enormous risks faced by the California cement industry in this unique context will result in significant detrimental effects, including (1) an increase in global GHG emissions due to leakage, (2) the potential contraction and eventual loss of the California cement industry to foreign production, (3) a shift to more carbon intensive and less "green friendly" cement or other alternatives, and (4) substantially reduced security and stability of the supply of affordable cement to support California's public and private infrastructure and other construction building needs (essentially a reliance on foreign production of a necessary product, akin to reliance on OPEC for petroleum).

With these challenges in mind, the following analysis provides additional information on the significant risk of leakage in the California cement sector and evaluates potential measures that could mitigate this risk. If designed properly, "anti-leakage" measures could contribute significantly to ensuring that the environmental goals of AB 32 are achieved and may provide a transitional "bridge" to an effective global framework covering the cement sector.

II. Leakage Risk Factors

Every industry is defined by its own set of characteristics, and many of these characteristics are "risk factors" that determine the potential for leakage. Generally speaking, these risk factors come in one of two varieties: "risk drivers" and "risk reducers." The following sections explore these risk factors in more detail, including their relative importance and their potential interaction.

2.1 Risk Drivers

"Risk drivers" are characteristics that determine the initial cost burden and competitive impact that a climate change policy may have on an industry.[6] There are two primary risk drivers for exposed industries such as cement: (1) the share of energy costs in relation to the total production cost structure; and (2) the presence of significant process emissions.

2.1.1 Energy Costs

For the vast majority of exposed industries, the primary risk factor for leakage is the share of energy costs in the production cost structure. Simply put, the higher the proportion of energy costs to product value, the more severe the cost difference will be between regulated and unregulated competitors and the higher the likelihood that consumers will shift to unregulated products.

[5] Throughout this paper, we have only referred to "cement." The production of cement first involves the production of "clinker," which is the highly energy- and carbon-intensive process. "Clinker" is then ground into cement and sold to downstream customers. To facilitate the analysis, we have not addressed those issues that may be relevant to the small amount of imported clinker. These issues can easily be addressed in due course.

[6] The California cement industry is particularly vulnerable to climate change regulations that increase its costs, given the fact that the cost of producing cement in California is already higher than in other states and in most countries.

Compared to other U.S. manufacturing industries typically identified as having a risk of leakage, the cement industry has one of the highest energy costs as a proportion of its product value.[7] California energy costs are already among the highest in the United States. Significant increases for electricity rates are proposed in the short term, and rates will further increase in the long term due to the implementation of AB 32.[8] The significant role that energy costs play in a cement manufacturer's overall cost structure will create a severe competitive disadvantage vis-à-vis imported cement and, thus, will result in substantial leakage.

2.1.2 Process Emissions

The presence of significant unavoidable process emissions poses an additional risk factor for certain industries, particularly cement. Similar to the situation of high energy costs, higher process emissions lead to higher compliance costs for regulated companies. Process emissions in the cement industry result from the calcination of limestone – a chemical process that is fundamental to the manufacturing of cement and results in the release of CO_2. Process emissions account for 57% of emissions in California cement manufacturing,[9] and it is physically impossible to reduce such emissions per unit of clinker produced.

Process emissions (and, in fact, the balance of energy related CO_2 emissions) are direct targets of AB 32's proposed regulatory system. Consequently, California-produced cement will face an initial increase in compliance costs under AB 32 related to (1) a California cap-and-trade program; (2) carbon fees that are intended to drive demand away from carbon-intense products and to pay for the administrative programs of CARB and local air districts; and/or (3) command-and-control regulations that, according to the DSP, make up 60% of the GHG reductions. Unless this series of regulatory requirements is equally placed upon imported cement, every incremental increase in cost to California-produced cement will place the industry at a greater economic disadvantage and, thus, will result in substantial leakage.

2.2 Risk Reducers

"Risk reducers" are characteristics that enhance an industry's capacity to respond to risk drivers and thereby reduce the impact associated with rising compliance costs associated with energy and process emissions. For exposed industries, there are four primary risk reducers: (1) energy efficiency improvements, (2) substitution toward low-carbon fuels, (3) fundamental product changes, and (4) the availability of substitutes.

[7] See *Leveling the Carbon Playing Field*, Peterson Institute of International Economics, World Resources Institute (May 2008), at page 7, Table 1.1.

[8] Increased costs of coal and petroleum coke, which are also utilized by the cement industry, as a result of GHG legislation will similarly weaken domestic producers' ability to compete with unregulated foreign production. These across-the-board price increases on California cement manufacturers' energy requirements will have a significant impact due to the inability to pass through these costs to cement consumers.

[9] Estimate from the Portland Cement Association based on confidential plant data.

2.2.1 *The Potential to Improve Energy Efficiency*

Even where energy constitutes a significant share of a manufacturer's total production costs, higher energy costs need not necessarily translate into higher production costs on a one-for-one basis. As energy costs rise, manufacturers will have additional incentives to defray those costs by pursuing energy efficiency improvements. Although improving energy efficiency is an option for all exposed industries, each industry's capacity to pursue that option will vary depending on its existing level of efficiency and the state of technology.

As set forth in previous comments to CARB,[10] the California cement industry has relatively few cost-effective options for achieving further improvements in energy efficiency. The industry has invested heavily in energy efficiency improvements over the past 20 years – making it one of the most efficient and technologically-advanced cement industries in the world. Unable to significantly defray higher energy costs through energy efficiency improvements, California cement manufacturers are more likely to experience a severe competitive disadvantage vis-à-vis imported cement unless appropriate policies are established.

2.2.2 *The Ability to Switch to Low-Carbon Fuels*

As with improvements in energy efficiency, the rising cost of fossil fuels might be partially offset by substituting toward low-carbon fuels. A manufacturer's capacity to do so, however, depends on securing the necessary permits as well as a variety of other factors, including the cost of retrofits needed to use alternative fuels, the availability of alternative fuels, and the cost of alternative fuels.

In the context of the California cement industry, two options have been suggested:

- ***Fuel Switching to Natural Gas:*** Although some have advocated for fuel switching from coal to natural gas in the California cement industry, this option has been demonstrated not to be cost effective, with the associated costs in excess of $200 per metric ton of CO_2.[11]
- ***Fuel Switching to Waste Fuels:*** The burning of waste tires and other alternative waste fuels in kilns are potentially viable and attractive options for many cement manufacturers. Many plants currently utilize waste tires and other alternative wastes as fuel, although there is the potential for greater use. Several barriers to increased use of these fuels remain, however, including intensive public resistance due to perceptions about air quality, which makes the permitting process extremely difficult and very costly. Moreover, the utility of these fuels in reducing GHG emissions depends upon how emissions of these fuels are counted or credited in any broader regulatory regime.[12]

In short, switching from coal to natural gas is not a cost-effective option, and switching to low carbon fuels requires additional regulatory permits that are extremely difficult to obtain in view of the

[10] *See* CSCME Briefing, *Building A Sustainable Future: Economic Growth, Climate Change, And The California Cement Industry* (June 18, 2008).

[11] CSCME directs CARB to CSCME's separate paper on fuel switching.

[12] CSCME is preparing additional papers on the use of tire-derived fuel as well as other biogenic alternative fuels.

substantial resistance from nearby residents and environmental groups. Absent local acceptance and regulatory support to facilitate permits, California cement manufacturers will have very limited options to substitute toward alternative waste fuels.[13]

2.2.3 The Capacity to Make Fundamental Product Changes

Another option for reducing the initial cost burden and, therefore, the risk of leakage associated with a climate change policy is to make fundamental product changes. As indicated in previous comments, however, the California cement industry is a technologically-advanced group of companies in a technologically-mature industry. Consequently, there is little, if any, capacity for fundamental product changes with respect to cement.

With respect to the downstream use of cement, it is possible to reduce the amount of cement used to produce a unit of concrete through the utilization of supplementary cementitious materials (SCMs), such as slag and fly ash. Increasing the use of SCMs in the production of concrete in California, however, is beset with complexities, including regulatory barriers, uncertain availability of supply, product liability risks, and market acceptance by end-users (*e.g.*, contractors, engineers, architects, and building owners).[14] Overcoming these barriers will be critical to reducing process emissions, defraying compliance costs, and thereby contributing to a reduction of the risk of leakage in the California cement industry.

2.2.4 The Availability of Substitutes

To the extent that price increases cannot be mitigated through efficiency improvements, substituting toward alternative fuels, or fundamental product changes, the risk of leakage will be determined by the availability of substitutes. This includes perfect substitutes (*i.e.*, imported cement), partial substitutes (*e.g.*, asphalt, steel, lumber), and supplemental substitutes (*e.g.*, fly ash and slag). As the availability of substitutes increases, a manufacturer's ability to pass cost increases through to consumers is compromised.

According to the Organization for Economic Cooperation and Development, "{i}nternational competition is the most important factor in reducing the ability to pass on cost increases, followed by the price responsiveness of demand, and the market structure and the geography of the sector market."[15] Thus, industries that are susceptible to significant import competition are at a substantially higher risk for leakage, because a virtually unlimited supply of imported products may be available to displace higher-priced domestic products. Also, industries that produce relatively fungible commodities in open markets are subject to greater substitution from foreign imports. Finally, the structure and geography of certain markets may make them more susceptible to import displacement. When all of these factors are considered together, it may be virtually impossible to pass through higher compliance costs to customers and sustain the California cement industry.

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[13] CSCME directs CARB to CSCME's separate paper on alternative fuels.

[14] CSCME directs CARB to CSCME's separate paper on the use of SCMs, which is currently under development.

[15] World Bank, *International Trade and Climate Change: Economic, Legal, and Institutional Perspectives*, 2007 at 23 (citing Organization for Economic Cooperation & Development, *The Political Economy of Environmentally Related Taxes*, 2006).

The California cement industry represents the textbook example of all of these factors coming together:

- The California cement market is highly competitive and is subject to intense international competition;
- Cement is a homogeneous, fungible product that is sold on the basis of price;
- California cement and imported cement are nearly perfect substitutes; and
- The California market is an isolated geographic market served almost exclusively by California production and imports that enter at deepwater ports with virtually no barriers to entry.[16]

Accordingly, the California cement industry has a proven record of inability to pass on higher costs to its customers.[17] Thus, the absence of any of the above "risk reducers" demonstrates that the implementation of AB 32 will result in substantial leakage in the California cement sector unless appropriate anti-leakage measures are implemented as an integral part of the AB 32 regulatory framework.

III. POLICY OPTIONS FOR ADDRESSING LEAKAGE

3.1 GLOBAL SECTOR-BASED FRAMEWORKS

The ideal method to address leakage is through a global framework that places equal obligations on all competitors in an industry, thereby maintaining competitive dynamics and avoiding the potential for leakage altogether. Although future sectoral agreements for certain sectors, including cement, hold great promise, a global framework on climate change will significantly lag behind efforts in California.

The cement industry has made progress on its own to create an international dialogue on environmental sustainability. The Cement Sustainability Initiative was created by 18 major cement producers accounting for 28% of the world's cement production.[18] This group has identified critical next steps in working toward sustainable development in the cement industry and provides a framework that other cement companies can follow.

The creation of an international government-backed program that includes *all* competitors in a global market, however, will realize much greater gains than any limited sector or geographic program can. Absent such a global sectoral program, significant competitive distortions are inevitable. As the European Union's cement producers are now experiencing, allowance prices and utility costs under the Emissions Trading Scheme (ETS) are rising, and the option of relocating to unregulated markets is

[16] Because of its low value-to-weight ratio, cement cannot be shipped long distances by land in a cost-effective manner. Maritime transportation of cement, however, is significantly less expensive. Most cement is sold within relatively short distances of the production plant or the import terminal.

[17] *See generally* CSCME Briefing, *Building A Sustainable Future: Economic Growth, Climate Change, And The California Cement Industry* (June 18, 2008).

[18] "Core" members of the Cement Sustainability Initiative include: Cementos Portland Valderrivas, CEMEX, Cimpor, CRH plc, Heidelberg Cement, Holcim, Italcementi, Lafarge, Taiheiyo Cement, and Titan Cement Company S.A.

becoming more attractive.[19] Europe now waits precariously for the 2009 international climate change meeting in Copenhagen to see if its investment for being a first-mover on the issue will pay off.[20] If it does not, an increased market share for imports and the possible relocation of companies outside the EU will likely become a reality.

3.2 Anti-Leakage Measures

As the momentum builds for a possible global sectoral framework, the best method to address the risk of leakage is to apply "anti-leakage measures" that seek to restore competitive dynamics by imposing identical rights and obligations on California-produced and imported cement. By helping to restore the competitive balance, these policies will help to minimize leakage and preserve the environmental effectiveness of California's climate change policy. In contrast, the absence of a global sectoral framework combined with the absence of effective anti-leakage measures in the cement sector will certainly decimate the California cement industry and will undermine California's climate change objectives by shifting its large and increasing cement consumption to imports of cement that have a greater GHG footprint.

Notably, because of the unique characteristics of the California cement industry, measures addressing imports are not subject to the same potential pitfalls of other sectors. For example, the downstream product of cement (*i.e.*, concrete) is not imported. Therefore, it is unnecessary to debate where to draw the line in terms of the products to which the import measures should apply. For example, how should import measures applicable to steel slabs be extended to downstream products such as hot-rolled coils, wire rod, or automobiles?[21] Moreover, although certain staunch free trade advocates state that import measures would have a limited impact on competitiveness, such views are normally based on the total impact across all sectors and do not reflect the unique circumstances of the California cement industry or the strategic importance of a stable and secure supply of affordable cement in the state.

IV. A Cumulative Approach Under the DSP will Result in Significant Leakage

CARB has clearly recognized its obligation to minimize leakage and the importance of doing so in order to achieve the objectives of AB 32:

> *To apply a cap-and-trade program effectively and comply with the requirements of AB 32, the potential for emissions "leakage" must be considered. While important for all sectors, the assessment of the risk of leakage for industrial facilities must particularly consider the potential for production to shift outside of California or outside of WCI. California and the WCI Partners are examining these risks, and are working to*

[19] Karsten Stumm, "Killing Jobs to Save the Climate," *Spiegel Online*, July 17, 2008.

[20] Mark Scott, "Is Europe Leading or Losing on CO_2 emissions?" *Spiegel Online*, August 5, 2008.

[21] Although this analogy is instructive on GHG emissions from primary vs. secondary products, a different but important issue relates to steel. As discussed below, if prices of cement are forced to rise, construction products could move to alternative imported materials, such as steel, with the identical issue of GHG leakage from one product (domestic cement) to another (foreign produced steel).

identify approaches for mitigating leakage potential, thereby ensuring that production in California and the WCI Partner jurisdictions remains competitive and real emissions reductions are achieved.[22]

The DSP also highlights the issue of leakage specifically in relation to the cement sector and confirms that leakage can only be addressed by applying the same standards to both cement produced in California and imported cement:

Leakage has been a key consideration in developing the GHG emissions reduction strategies in [the cement] sector. If GHG requirements were applied to California cement manufacturing facilities only, the cost of cement from those facilities would rise relative to imports, and imports could displace California production {sic}. Generally, California's cement manufacturing plants are more efficient than those that produce imported cement. California plants would decrease their GHGs produced, but increased imports would likely result in a net worldwide increase in GHG emissions. To minimize leakage, in-state and imported products need to be subject to the same standards.[23]

It is clear, therefore, that CARB understands the gravity of the leakage problem in the cement sector.

CARB's DSP presents a variety of policy options for regulating the cement industry, including those that are direct to the industrial processes and operations (such as energy efficiency and vehicles/trucks) and indirect (through energy, such as fuels and electricity). The policy options include a multi-sector cap-and-trade system, a carbon intensity factor (CIF) for both cement and concrete, a carbon fee, and traditional command-and-control measures.[24] Although the DSP appears to recommend a multi-sector cap-and-trade as the primary policy option for the cement industry, all of these measures are described as "complementary" to one another, suggesting that one option is for CARB to apply them simultaneously or cumulatively. Applying any one of these policies, let alone applying them all together, would create an immensely complicated system with prohibitively high compliance costs[25] for the California cement industry that, without a similarly complicated and imperfect collection of anti-leakage measures, would cause substantial and irreparable leakage through the permanent loss of California production to meet future cement demand in California.[26]

[22] CARB (July 2008), Appendix C, C-102.

[23] CARB (July 2008), Appendix C-105.

[24] The DSP also describes a potential role for offsets in meeting emissions targets: "{c}ompliance offsets can provide regulated entities a source of low-cost emission reductions to use for specific regulatory obligations . . . {and} also provide opportunities for the most cost-effective reductions to be pursued early in the program." pg. 44. CSCME directs CARB to CSCME's separate paper outlining its position on offsets.

[25] Additional layers of costs are anticipated from local district administration fees and the consequent enormous increase in the cost of electricity – which at present is more expensive than in cement exporting nations and, based upon present PUC rate applications, will increase significantly.

[26] In addition, AB 32 explicitly notes that greenhouse gas reduction activities proposed by CARB should be "nonduplicative." AB 32, Section 38561(a).

First, in order to ensure that the benefits and burdens of this layered GHG regulatory system are applied equally to both domestic and imported cement, each ton of cement sold into the California market would be subject to a CIF. Thus, each producer/importer would be required to incur the costs associated with reducing its CIF to the regulatory minimum or would be required to pay penalties for failure to meet the minimum. An administrative system for verifying the CIF for domestic and foreign producers would need to be developed consistent with U.S. practices in other areas.

Second, if the California cement industry is also included under a cap-and-trade program, the industry will be required to obtain and submit permits for each ton of CO_2 emissions up to the CIF. To offset these costs and to minimize leakage, imports of cement would also need to be subject to a requirement to submit permits for each ton of CO_2 emitted in the production and transportation of the ton of imported cement. The permit for imports, however, would need to be set up and administered separately in order to avoid breaking the overall California "cap."

Foreign producers would still benefit, however, because the additional cost of permits for the cement exported to California can be spread over their entire sales, thus limiting the cost burden and increasing the risk of leakage. By contrast, each ton of cement sold by California producers would embody the full cost associated with its emissions, leading to a cost advantage for imports and leakage.[27] For example, if a permit for one ton of cement costs $100:

- A California company producing 100 tons of cement annually (and selling them all in California) will pay $10,000 for its permits for the year – averaging $100 per ton of cement produced;
- By contrast, a foreign company producing 100 tons of cement annually (and selling 20 tons to California, and 80 tons to unregulated locations) will pay $2,000 for its permits for the year – averaging $20 per ton of cement produced.

The enormous cost increases associated with multiple programs also elevates the risk of significant leakage even with the imposition of corresponding anti-leakage measures. The costs may create an incentive, for example, for foreign producers to shift trade patterns in order to reroute the least carbon-intensive cement to California. Australia's recent Green Paper explicitly recognized this potential in the cement industry:

> *{E}xisting trade share data might not accurately reflect the threat of international competition and hence the ability of industries to pass on costs. Some industries, such as cement, produce products that are clearly traded on world markets, although their Australian trade levels may be low, even over a long period. The imposition of a significant*

[27] This disparity underscores the need for CARB to minimize incremental costs to the California cement industry that will not be fully imposed on foreign cement plants.

carbon cost on those industries could plausibly lead to a significant change in trade patterns.[28]

Such a shift in trade patterns will lower the carbon intensity of cement imports without any real reductions in global GHG emissions. Indeed, to the extent that the change in trade patterns results in an increase in transportation emissions, such a reallocation will result in a *net increase* in GHG emissions.[29]

Thus, regulatory-based cost increases (and therefore higher prices) must be minimized to avoid leakage in an industry that is unable to pass through costs.

Third, CARB is evaluating the use of carbon fees, including a fee for funding administration of the AB 32 regulations as well as a fee to redirect consumer choice away from carbon-intense products.[30] If utilized, the fees would be imposed under a "downstream" approach (presumably per ton of CO_2 emissions by a cement plant), under an "upstream" approach (on relevant fuels or electricity when entering the California economy), or under a hybrid approach. "Downstream" fees would be a direct additional cost on California cement producers that must be offset by an identical fee on imported cement in order to avoid leakage. "Upstream" fees would also result in an indirect cost increase to California cement producers through increased fuel and electricity costs. These fees would also result in significant leakage because imports would not face these higher energy costs. Some form of fee on imported cement would need to be developed and applied in the "upstream" approach in order to adjust for these additional energy costs.

Thus, with each additional layer of regulation on the cement industry, a similar layer of anti-leakage measure must be developed and applied. Without such companion measures, significant leakage will occur. For example, if imports are subject to the CIF but not to the requirement to purchase cap-and-trade permits or to pay carbon fees, imported cement would immediately realize a significant cost advantage, and consumers would necessarily shift to the lower-cost alternative.[31]

Importantly, although the application of anti-leakage measures to cement imports is necessary to minimize leakage, CARB also needs to address the impact of the overall cost burden imposed on California cement producers. Effective anti-leakage measures would help to reduce leakage to imported cement but would not prevent leakage to other generally less eco-friendly substitutes for cement, such as steel, asphalt, and wood. None of these substitutes is being regulated at a similar level as the cement industry. For example, imports of structural steel will not be regulated, yet the GHG footprint of these steel products may be significantly greater than cement. Moreover, although CARB proposes to regulate emissions from cement at the concrete plant (despite concrete plants not being a significant or

[28] Department of Climate Change, Commonwealth of Australia, *Carbon Pollution Reduction Scheme Green Paper* (July 2008), 310.

[29] This situation is similar to the "contract shuffling" issue identified in relation to the electricity sector.

[30] Although not explicitly noted in the DSP, CSCME presumes that a carbon fee would not be directly applied to cement manufacturing emissions in conjunction with a cap-and-trade system, as the combination of the explicit tax of the carbon fee and the implied tax of the cap-and-trade system would be duplicative.

[31] *See* Letter from California Large Energy Consumers Association (CLECA) to Mary Nichols, August 11, 2008, page 4.

reportable GHG emissions source), it has not taken the same step to regulate refinery emissions downstream at the asphalt plant.

Thus, it is imperative that CARB selects a regulatory program that minimizes the cost pressure on the cement industry, which in turn will also minimize the potential for leakage and preserve the environmental goals of AB 32.

V. A Better Option to Minimize Leakage: Tradable Performance Standards (TPS)

The regulatory scheme that best acknowledges the unique position of the cement industry is a tradable performance standards (TPS) system – that is, a performance standard combined with an emissions trading program that interfaces with cap-and-trade systems and offsets programs.[32] Like a CIF, such a program would involve setting a performance standard for cementitious material at the point where the material enters the California economy (*i.e.*, the cement plant or the import terminal). Thus, the performance standard would apply equally to domestic and imported cement.[33] If the ton of cement being introduced into the market exceeds the performance standard, the producer/importer would generate credits. If the ton of cement fails to meet the standard, the producer/importer would be required to submit permits or offsets in the amount of the difference. The producer/importer could purchase permits from a variety of sources, including other cement producers within the TPS system or a California or Western Climate Initiative (WCI) cap-and-trade system, or obtain offsets from general international offset programs, an SCM offset program for the California concrete ready-mix industry, and/or from possible sector-specific offset programs.[34]

The TPS approach provides the maximum possible protection against leakage because it applies the same system of rights and obligations to all cement consumed in California, regardless of origin. The same performance standard is applied to both domestic and imported cement, and both California cement manufacturers and cement importers would have the same opportunity to buy permits to comply with the performance standard. The TPS could be administered consistent with other legal regimes that require the submission and verification of data (*e.g.*, antidumping investigations) and could rely on the California and federal reformulated gasoline programs, and associated WTO case law, for guidance. Finally, the TPS involves only one layer of costs and results in verifiable reductions, without hampering investment in new capacity in California. This would mean that increases in California's future consumption of cement can be satisfied with the smallest possible GHG footprint.

[32] CSCME directs CARB to CSCME's separate paper discussing the TPS approach in more detail.

[33] For purposes of this paper, the term "cement" should generally be read as "cementitious material" that is produced by the cement plant or entered at the import terminal. Thus, "cement" may include, for example, "blended cements" that are produced and sold by the cement plant or import terminal.

[34] CSCME directs CARB to CSCME's separate paper discussing the use of offsets.

VI. Application of The U.S. Constitution and WTO Obligations to Anti-Leakage Measures

6.1 Overview Of U.S. Constitutional Issues Related To Anti-Leakage Measures

Anti-leakage measures enacted by California may implicate various provisions of the U.S. Constitution.

6.1.1 Commerce Clause

The Constitution assigns to Congress the power to regulate interstate commerce, thereby restricting states' power to do so. A state measure that affects interstate commerce may be subject to strict scrutiny (a very high standard) if it is facially discriminatory or facially neutral with a discriminatory effect.[35] CARB's objective, therefore, should be to ensure that all products sold in California are regulated in a non-discriminatory manner based on their corresponding GHG footprint.

If the law is not discriminatory on its face or in effect, it will be reviewed under a balancing test. To survive this test, the state's interest must be deemed legitimate, the regulatory scheme must be the least restrictive alternative for accomplishing the state's goal, and the benefits to the state must outweigh the burdens on interstate commerce.[36] In light of the U.S. Supreme Court's recent decision in *Massachusetts v. EPA*[37] and the Court's recognition that resource conservation and environmental quality are "substantial state interests,"[38] California's desire to protect the chemical composition of the Earth's atmosphere should be seen as legitimate. In addition, California's goals of reducing the detrimental effects of climate change on public health and the environment cannot be accomplished without significantly reducing CO_2 emissions, including those from products made overseas and transported to California for consumption. The various potential climate change measures, therefore, appear to be the least restrictive means of achieving these goals. Finally, the benefits of controlling climate change are significant and now well documented. These benefits, therefore, should outweigh any burden on interstate commerce in the form of compliance with a climate change program.

6.1.2 Foreign Commerce Clause

Another relevant provision of the Constitution is the Foreign Commerce Clause, which grants Congress the authority to manage commerce with other countries, thereby restricting the states' power to do so. California may regulate foreign commerce to a certain extent, so long as it meets the interstate commerce test and two additional requirements: the measure does not create a substantial risk of multiple taxation or prevent the federal government from speaking with one voice.[39]

[35] *Hunt v. Washington State Apple Advertising Commission*, 432 U.S. 333, 352-353 (1977).

[36] *Pike v. Bruce Church, Inc.*, 397 U.S. 137 (1970).

[37] *Massachusetts v. EPA*, 127 U.S. 1438, 1456 (2007). In that case the Court recognized the legitimacy of a state's concerns about increased greenhouse gas emissions and pointed to the dangerous effects of rising sea levels on coastal areas such as Massachusetts. In light of its extensive coastline, California can make a similarly strong argument for anti-leakage measures.

[38] *Minnesota v. Clover Leaf Creamery Co.*, 449 U.S. 456, 473 (1981).

[39] *Japan Line, Ltd. v. County of Los Angeles*, 441 U.S. 434 (1979).

If the anti-leakage measure is not considered a tax, there is no technical risk of multiple international taxation. The measure would also not affect the federal government's ability to speak with one voice, because neither Congress nor the executive has forbidden a state climate change program. In fact, there is ample evidence of the federal government's *encouragement* of states' efforts on climate change.[40]

6.1.3 Federal Preemption

The Constitution's Supremacy Clause dictates that all federal laws shall be the supreme law of the land. This preemption over state laws may be either express or implied. Express preemption pertains to federal laws that explicitly forbid state regulation in a particular area. Implied preemption is somewhat more complicated, however, and the U.S. Supreme Court has found such preemption of state laws or regulations in three distinct situations:

- State laws will be struck down if there is a direct conflict between the state measure and a federal law, constituting so-called "conflict preemption."
- Implied preemption will be found if a state law is deemed to impede the achievement of federal objectives.
- In so-called "field preemption," the Court will invalidate a state action if it encroaches upon a subject area for which Congress clearly intended to "occupy the field."

California climate change measures that are designed to reduce the leakage of CO_2 emissions in the California cement industry and to protect public health and the environment are not currently preempted, because no federal law currently prohibits states from regulating this field. In addition, as mentioned above, the federal government has made numerous statements in the past in support of states' efforts on climate change.

6.1.4 Foreign Relations Power

The U.S. Supreme Court has recently taken a more expansive view of federal supremacy in foreign relations, going one step further than implied preemption by reviving the so-called foreign relations power, which designates the federal government as the appropriate level of government to manage foreign relations. In 2003, the Court set forth a two-step test for judging whether a particular state regulation runs afoul of this designation:[41]

- A reviewing court will ask whether or not the action in question regulates an area of traditional state interest or competence.

[40] For example, in 2003, the State Department's Senior Climate Negotiator, Harlan Watson, highlighted "the efforts being made by State and local governments in the United States to address climate change," noting that states can "act as laboratories where new and creative ideas and methods can be applied and shared with others and inform federal policy – a truly bottom-up approach to addressing climate change." *Statement to the Second Meeting of the Plenary, Ninth Session of the Conference of the Parties (COP-9) to the UN Framework Convention on Climate Change,* Milan, Italy (December 4, 2003).

[41] *American Insurance Association v. Garamendi*, 539 U.S. 396 (2003).

- Regulations that meet this requirement are then subject to a balancing test, weighing the foreign policy interest against the state's interest.

The protection of public health and the environment is a clear and traditional state interest, and California's desire to protect this interest is therefore legitimate. In addition, although the U.S. federal government is engaged in international climate change negotiations, it has not entered any agreement to date, and California's interests in the local effects of climate change should be significant enough to outweigh any potential negative effect its measure will have on foreign policy.

6.2 Overview Of WTO Issues Related To Anti-Leakage Measures

State actions are also subject to review under the multilateral agreements of the World Trade Organization (WTO). Although California, as a state, is not technically a Member of the WTO, the United States is generally responsible at the WTO for the actions of its lower levels of government. Any anti-leakage measure that is implemented by California, therefore, can be challenged under the WTO agreements, including the General Agreement on Tariffs and Trade 1994 (GATT) and the Agreement on Technical Barriers to Trade (TBT Agreement). If a state measure is found to violate U.S. WTO obligations, however, the U.S. federal government is only obligated to "take such reasonable measures as may be available to it."[42]

6.2.1 Most-Favored-Nation Principle

The most-favored-nation (MFN) principle generally prohibits a WTO Member from discriminating in law or in fact in favor of one WTO Member country versus another, even for social or other policy reasons.[43] It specifically applies to "products" from Member countries, rather than just to a Member country's entire industry. Therefore, evidence that a Member's measure is granting an "advantage, favor, privilege or immunity" to a specific *product* from one Member country that it is not granting to the like product from another Member country may violate the MFN principle embodied in GATT Article I:1. The MFN provision would be relevant if an anti-leakage measure resulted in less favorable treatment to cement originating from one WTO Member country compared to cement originating from another WTO Member country.

6.2.2 Schedules of Concessions

"Border" measures[44] are subject to GATT Article II, which prohibits Members from levying duties on imports in excess of their negotiated or "bound" tariff level. If any of the anti-leakage measures is interpreted to be the equivalent of ordinary customs duties, for example, such measures may violate GATT Article II if the additional "duties" exceed the U.S. negotiated tariff cap.

[42] GATT Article XXIV:12; Understanding on the Interpretation of Article XXIV of the General Agreement on Tariffs and Trade 1994.

[43] Appellate Body Report, *Canada – Certain Measures Affecting The Automotive Industry*, WT/DS129/AB/R (adopted 19 June 2000) at para. 78.

[44] Whether a measure is classified as a "border" measure or an "internal" measure can be a complicated analysis. Although it is clear that a tax on *products* would qualify as an internal measure, it is unclear whether a tax on the *way in which a product is made*, rather than some physical aspect of the product itself, will be interpreted as a border measure or an internal measure.

6.2.3 Elimination of Quantitative Restrictions

Border measures are also subject to GATT Article XI, which prohibits quantitative restrictions on imports. To the extent that an anti-leakage measure is considered a border measure that is not the equivalent of ordinary customs duties, for example, it may be considered, in law or in fact, a quantitative restriction or prohibition.

6.2.4 National Treatment Principle

"Internal" measures are generally evaluated under the national treatment principle of GATT Article III, which specifies that imported goods should be treated no less favorably than a Member's domestically-produced goods. Article III:2 applies to internal taxes or charges, while Article III:4 applies to internal regulations.

In analyzing a national treatment claim, a WTO panel will first determine whether the domestic products and imported products that are subject to the internal measure are *like products*. Domestic and imported cement would likely be viewed as "like" products by a WTO panel.

If the anti-leakage measure is considered a tax under GATT Article III:2, the measures would need to apply the relevant fees or taxes equally to imported and domestic cement. In such case, the measure should avoid charging a tax on imports that is "in excess of" that charged on domestic products.

If the measure is considered a regulation under GATT Article III:4, the panel will determine whether the regulation affords treatment to imported products that is *less favorable* than that afforded to *like* domestic products. The optimal approach, therefore, is to apply the same measures to imports that apply to domestic products, including the same compliance requirements[45] and the same opportunity to take advantage of any market-based mechanisms. Importantly, the WTO Appellate Body has found that a negative impact on imported products that is unrelated to the foreign origin of the product does not constitute less favorable treatment.[46] Thus, a structure that applies a consistent obligation to all products, regardless of origin, based on their GHG emissions footprint at the point of sale in the California economy, should increase the chances of surviving a national treatment challenge.

6.2.5 General Exceptions

To the extent that a measure violates GATT Articles I, II, III, or XI, such measure may still survive WTO scrutiny if it can be justified under the GATT Article XX exceptions, in particular, Article XX(b) (human health) or Article XX(g) (conservation of exhaustible natural resources).

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[45] Based on the WTO panel's findings in a case against certain aspects of the U.S. reformulated gasoline program, a WTO Member country can avoid a national treatment claim by structuring a program where the method used for calculating the GHG emissions of domestic producers, for example, is identical to that used for foreign producers. *See* Panel Report, *United States – Standards for Reformulated and Conventional Gasoline*, WT/DS2/R (adopted May 20, 1996).

[46] In *Dominican Republic – Cigarettes*, the Appellate Body stated, "the existence of a detrimental effect on a given imported product resulting from a measure does not necessarily imply that this measure accords less favourable treatment to imports if the detrimental effect is explained by factors or circumstances unrelated to the foreign origin of the product." Appellate Body Report, *Dominican Republic – Measures Affecting the Importation and Internal Sale of Cigarettes*, WT/DS302/AB/R (adopted May 19, 2005) at para. 96.

(A) Human Health Exception

To qualify for the GATT Article XX(b) exception, the measure must be "necessary to the protection of human, animal or plant life or health." In order to determine if a measure is for the protection of human health, for example, a WTO panel would examine the design of the contested measure. A measure designed to reduce GHG emissions clearly relates to the protection of "human, animal or plant life or health." The Intergovernmental Panel on Climate Change has found that climate change will "increase malnutrition and consequent disorders, including those relating to child growth and development;" increase the number of people "suffering from death, disease and injury from heatwaves, floods, storms, fires and droughts;" and "increase cardio-respiratory morbidity and mortality associated with ground-level ozone."[47] AB 32 contains similar findings.[48] These findings, along with additional widespread reporting of the dangers to human health of climate change, would likely convince a WTO panel that the prevention and mitigation of climate change has the effect of protecting human health.

In order to determine if a measure is "necessary" for the protection of human health, a WTO panel would apply a "weighing and balancing" test among the following: (1) the importance of the value protected; (2) the trade restrictiveness of the measure; and (3) the extent the measure contributes to the climate change objectives. In light of increasing evidence of climate change's effects on human health, the importance of the value that California is seeking to protect is clearly significant. The trade restrictiveness of potential anti-leakage measures is also relatively limited, because under the TPS approach, for example, there is no prohibition or limitation on the volume of imports. Finally, a persuasive argument could be made that anti-leakage measures are critical to meeting California's climate change objectives because without such measures, California's efforts to reduce GHG emissions would actually cause a net increase in GHG emissions through substantial leakage.

(B) Conservation of Exhaustible Natural Resources Exception

To qualify for the exception under GATT Article XX(g), the measure must be "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption." In previous cases, the WTO has confirmed that conservation of clean air and migratory sea turtles qualify as exhaustible natural resources.[49] Any California anti-leakage measure should qualify for the Article XX(g) exception because the chemical composition of the Earth's atmosphere (protected by measures to reduce GHG emissions) should qualify as an "exhaustible natural resource." In order to be "made effective in conjunction with restrictions on domestic production or consumption," there must be "even-handedness" in the way the law is applied to domestic and foreign

[47] Intergovernmental Panel on Climate Change, *Working Group II Report "Impacts, Adaptation and Vulnerability,"* Chapter 8 (2007).
[48] AB 32, Section 38501(a).
[49] Appellate Body Report, *United States – Standards for Reformulated and Conventional Gasoline*, WT/DS2/AB/R (adopted May 20, 1996) (*"U.S. – Gasoline (AB)"*) at pp. 14-19; Appellate Body Report, *United States – Import Prohibition of Certain Shrimp and Shrimp Products*, WT/DS54/AB/R (adopted November 6, 1998) at paras. 125-145.

products.[50] As long as the measure covers *both* imports and domestic products in an even-handed manner, it should meet this additional requirement.

(C) Chapeau

In addition to qualifying for one of the GATT Article XX exceptions, a measure must also meet the standards set out in the "chapeau" (introductory paragraph) to Article XX. In all cases in which justification under Article XX has failed, it was due to non-compliance with the chapeau. This paragraph states that measures falling under one of the listed exceptions shall be "{s}ubject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade."

In order to determine if a measure constitutes "arbitrary or unjustifiable discrimination," a WTO panel may examine various issues, including:

- Whether the rationale for the discrimination between countries where the same conditions prevail bears any rational connection to the objective under one of the paragraphs of Article XX, or would go against that objective;
- Whether the measure essentially requires foreign countries to adopt U.S. policies, without consideration of local conditions in those countries;[51]
- Whether the United States has engaged in "serious, across-the-board negotiations with the objective of concluding bilateral or multilateral agreements" on the issue;
- Whether the implementation and administration of the measure respects basic fairness and due process.

When examining whether a measure constitutes a "disguised restriction on international trade," a WTO panel looks to whether the country is applying the measure in a good faith effort to address a particular policy objective under the Article XX exceptions, or whether it appears to be carrying out a protectionist measure under the guise of one of these exceptions.

6.2.6 Technical Barriers to Trade

The TBT Agreement governs the application of "technical regulations" to imported goods. A "technical regulation" is generally defined as a document that lays down mandatory "product characteristics or their related processes and production methods" and the applicable administrative provisions.[52] Technical regulations have included, for example, labeling requirements for cigarettes, motor vehicle emissions caps, and requirements for seatbelts in cars, among others.

Article 2.1 of the TBT Agreement imposes a national treatment requirement, and Article 2.2 introduces requirements for a technical regulation similar to the standard found under the GATT exceptions. In

[50] *U.S. – Gasoline (AB)* at pp. 20-21.
[51] For example, in developing its methodology to implement a program such as the TPS, CARB may need to consider other countries' climate change programs and/or level of economic development.
[52] Annex 1, Section 1 of the TBT Agreement.

particular, this provision requires that the technical regulation not create unnecessary obstacles to international trade and not be more trade-restrictive than necessary to meet a legitimate objective, including "protection of human health or safety, animal or plant life or health, or the environment."

To the extent that California adopts anti-leakage measures based on a performance standard for California-produced and imported cement, the TBT Agreement is likely to apply. If the anti-leakage measure is limited to a requirement to buy permits, however, the TBT Agreement is unlikely to apply. An anti-leakage measure that qualifies as a technical regulation, however, will likely face similar scrutiny under the TBT Agreement as it would face under the GATT. The treatment of all products the same (whether domestic or foreign) will limit the risk under both agreements.

6.3 Optimal Design For An Anti-Leakage Measure

As the discussion above details, an anti-leakage measure could be challenged under either the U.S. Constitution or the WTO agreements, and depending on the design of the measure, it would have varying chances of survival. What is clear, however, is that the measure should not explicitly discriminate between domestic and foreign products (*i.e.*, it should generally apply the same requirements to cement produced in California and cement produced out-of-state) or between one foreign country and another (*i.e.*, it should generally apply the same requirements to cement from all countries). The measure should also offer the same benefits and opportunities to all cement producers, regardless of their location. Finally, the measure should be tailored to problems that are specific to California's environment and population, rather than trying to regulate the effects of climate change outside of the state.

Based on these considerations, the optimal design for an anti-leakage measure would be one that is part of a TPS structure. This type of measure would have the greatest likelihood of surviving any potential legal challenges for the following reasons:

- The measure would not explicitly discriminate between in-state and out-of-state products, or between foreign countries, because an identical performance standard would be applied equally to all cement, without regard to its origin.
- The measure would effectively offer the same benefits and opportunities to all producers, because any producer, regardless of location, could participate in the trading of permits or use of offsets, and all producers, regardless of location, would have the same opportunity to submit company-specific emissions data.
- The measure would be integrated into a California-specific climate change regime, because it would be applied to cement only upon entering the California market and would not affect the production of any cement that is not sold in California.

Achieving comparable reductions in GHG emissions from both California-produced and imported cement, without creating a system that results in an imbalance of costs, is critical to a successful anti-leakage measure.

VII. Conclusion

Addressing the risk of leakage under AB 32's emissions reduction requirements is essential to ensuring the success of the law's environmental goals and the survival of the California cement industry. As discussed above, the industry faces certain risk factors that increase its exposure to leakage. There are, however, various steps that may be taken to minimize this risk. First, CARB should recognize the dangers inherent in combining multiple GHG reduction programs for the California cement industry. Each such program would require a corresponding anti-leakage measure on imports and, consequently, would lead to unnecessary legal complexity and risk compared to the single non-discriminatory performance standard envisioned under the TPS approach. Moreover, even with anti-leakage measures in place for each program, the significant costs to comply with multiple programs would result in leakage to other generally less eco-friendly substitutes for cement and would, therefore, still undermine AB 32's environmental objectives. Second, regardless of the regulatory program that it chooses, CARB should apply the same requirements to (and, thus, compliance costs on) both California-produced and imported cement. Finally, it is important to design a system that has a high likelihood of surviving a legal challenge so that the program's environmental goals can actually be achieved. The TPS approach, for example, appears most likely to survive a constitutional[53] and WTO legal challenge, with these risks declining further if such a sectoral approach is adopted under a federal climate change program.

[53] In a similar analysis, the California Public Utilities Commission concluded in a January 2007 opinion that a performance standard applied to utilities would not violate the Commerce Clause or be preempted by federal law. California Public Utilities Commission, *Interim Opinion on Phase 1 Issues: Greenhouse Gas Emissions Performance Standard*, January 25, 2007.

EXHIBIT 7

THE ROLE OF OFFSETS IN AB 32:
THE CEMENT INDUSTRY'S PERSPECTIVE

PREPARED ON BEHALF OF:

THE COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT

PREPARED BY:

KING & SPALDING, LLP

1700 PENNSYLVANIA AVENUE NW, SUITE 200
WASHINGTON, DC 20006
202.737.0500

KEYBRIDGE RESEARCH

3050 K STREET NW, SUITE 220
WASHINGTON, DC 20007
202.965.9480

SEPTEMBER 8, 2008

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EXECUTIVE SUMMARY

The California Air Resources Board's "Climate Change Draft Scoping Plan" (DSP) highlights the importance of offsets to the implementation of AB 32. In particular, offsets provide opportunities "for the most cost-effective reductions to be pursued early in the program, which can help meet the AB 32 emission reduction target sooner and at a lower-cost." CARB also recognizes that high quality offsets outside California can help to lower compliance costs in California and explicitly cites cement as a sector in which the use of offset programs may be particularly helpful in achieving GHG emissions reduction objectives.

The Coalition for Sustainable Cement Manufacturing and Environment (CSCME) supports the implementation of a broad-based offset program with no quantitative or geographic limitations that is properly designed to deliver GHG emissions reductions at the lowest costs. The program should be sufficiently robust to ensure the high quality of offsets, thereby eliminating the need for quantitative or geographic limitations. With sufficient safeguards in place, such high quality offsets would all contribute to reducing global GHG emissions.

Although not a substitute for effective anti-leakage measures, the adoption of a broad-based offset program is critical to address the significant risk of leakage in the California cement industry. Without access to a sufficient quantity of offsets, California cement producers will face significant cost increases that will drive California's cement consumption to unregulated sources (or to competing lower-cost alternative products) that have a higher GHG emissions footprint. Accordingly, the California cement industry must have meaningful access to a broad-based offset program in order to mitigate compliance cost increases and prevent substantial leakage that would undermine the GHG emissions reduction objectives of AB 32.

As required under AB 32, CARB must also consider the benefits of offset programs to low-income, local communities both inside and outside California and should recognize that local co-benefits achieved through offset projects in developing countries may far outweigh marginal co-benefits in California. As stated in the DSP,

> *High quality offset projects located outside California can help lower compliance costs in California while reducing GHG emissions in areas that would otherwise lack the resources needed to do so.*

Alternatively, if any quantitative or geographic limitations are imposed, CSCME supports the implementation of additional offset opportunities for the California cement industry, given its high vulnerability to leakage. For example, CARB could impose a less stringent limitation under the broad-based program and could develop innovative sector-specific and geographically-specific offset programs. Such sectoral programs could form the genesis for a global sectoral approach to offsets for the cement industry.

I. OFFSETS PLAY A CRITICAL ROLE IN CLIMATE CHANGE POLICY

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME")[1] urges the California Air Resources Board ("CARB") to incorporate the unlimited use of greenhouse gas ("GHG") emissions offsets into the implementation of Assembly Bill 32, The Global Warming Solutions Act of 2006 ("AB 32"). The use of offsets will facilitate the achievement of the legislation's mandate of both reducing GHG emissions and protecting the economy of the state of California. In addition to a broad-based offset program applicable to all sectors, CSCME also supports the development of sector-specific offset programs for the California cement industry that will enable CARB to account for the unique characteristics and opportunities presented by the industry.

Offsets represent a reduction in GHG emissions, or an avoidance of creating such emissions, that are sold by uncovered sectors to covered sectors in order to "offset" the covered sectors' emission reduction requirements. Offsets provide many benefits, including lower compliance costs, emissions reductions in non-regulated sectors, higher environmental co-benefits, abatement technology transfers, and economic opportunities. Importantly, the use of offsets will allow industries in California to adapt to the new regulations in an economically sustainable manner.

CARB should implement rigorous approval procedures to ensure that all offsets are real, additional, verifiable, enforceable, and permanent. If such procedures are in place, no environmental or economic reason justifies any limitation on the quantity or location of offsets. International offsets, for example, will provide equivalent GHG emissions reductions while allowing other countries, particularly developing countries, to share in environmental co-benefits and achieve sustainable growth. As the Draft Scoping Plan makes clear:

> *High quality offset projects located outside California can help lower compliance costs in California while reducing GHG emissions in areas that would otherwise lack the resources needed to do so. Projects in the Mexican border region may be of particular interest, considering the opportunity to realize considerable co-benefits on both sides of the border. Additionally, defining project types related to imported commodities (such as cement) would enable California to provide incentives to reduce emissions associated with products that are imported into the state for our consumption.*[2]

CSCME agrees with CARB's assessment that a robust offset program will generate a multitude of opportunities to expand the scope of benefits consistent with the objectives of AB 32.

[1] CSCME is a coalition of the following six companies with cement production facilities in California: CalPortland Company, Cemex, Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California, and Texas Industries, Inc.

[2] California Air Resources Board, *Climate Change Draft Scoping Plan: June 2008 Discussion Draft*, page 44.

II. THE CEMENT INDUSTRY'S COST STRUCTURE REQUIRES SPECIAL CONSIDERATION

The California cement industry faces high costs due to the inherent nature of cement production and its geographic location in California. As indicated in CSCME's June 2008 comments, these costs will increase significantly with the imposition of GHG emissions reduction requirements, and such increased costs will result in significant leakage that could undermine the objectives of AB 32.[3] Therefore, CARB should consider all regulatory options that minimize the cement industry's compliance costs while also preserving GHG reduction objectives.

2.1 THE CALIFORNIA CEMENT INDUSTRY'S COSTS ARE ALREADY HIGH AND WILL BE HIGHER UNDER AB 32

California is one of the most expensive places in the world to produce cement, due to existing environmental compliance costs, labor costs, taxes, and energy costs, especially electricity rates. In fact, according to *Forbes*, California dropped from 34th to 40th in terms of state business climate and is now last in the U.S. rankings for business costs.[4] With the passage of AB 32 and its requirements for GHG emissions reductions, costs will increase even further. Therefore, it is essential that CARB's regulations minimize these additional costs and take advantage of mechanisms that enable the cement sector to conform to AB 32's goals in a cost-effective manner.

2.2 THE CEMENT INDUSTRY IS CAPITAL-INTENSIVE

Cement production is highly capital intensive. Fixed costs of production are high relative to variable costs. As a result, producers must operate at a high rate of capacity utilization to limit unit production costs and thereby sustain profitability.. In short, a cement plant has two long-term options – operate at high levels of capacity utilization on average over a business cycle or shut down. Cost efficiency is a main driver of profit, and any increase in cost has a very direct and immediate impact on the bottom line. Due to the high energy and regulatory costs in California, cement manufacturers are already heavily motivated to be among the most efficient in the world. In addition, replacing or upgrading equipment, or retiring equipment early, is extremely expensive.

2.3 THE CEMENT INDUSTRY CANNOT PASS ON ADDITIONAL COSTS TO CONSUMERS

Cement is sold on the basis of price, and the U.S. market is highly competitive. Because cement produced in California is readily substitutable with lower cost imported cement from foreign plants (operating under much lower or non-existent regulatory requirements relating to the environment, the workplace, energy, etc.), California cement producers must keep prices competitive to maintain market share. Unlike electric utilities, which are guaranteed profitability, cement manufacturers cannot pass along increased costs to their customers without losing market share to imports.[5]

[3] *See* CSCME Briefing (June 2008), "Economic Growth, Climate Change, and the California Cement Industry".
[4] "The Best States for Business," 2006 and 2007 Rankings, *Forbes.com*, July 11, 2007 and July 31, 2008.
[5] CSCME directs CARB to CSCME's separate paper discussing potential anti-leakage measures.

III. Imposing Quantitative or Geographic Limits on Quality Offsets Is Unjustified

3.1 Properly Designed Offsets Deliver GHG Reductions At The Lowest Costs

AB 32 requires that CARB design regulations in a manner that "seeks to minimize costs."[6] CARB can minimize compliance costs by allowing the use of offsets, which provide for emissions reductions by non-regulated sectors at a lower cost than equivalent emissions reductions by regulated sectors in California. Offsets will provide California industries with additional time to invest in new research and to develop cleaner technologies, while simultaneously spurring immediate innovation and technology development by offset suppliers.

As CARB described in its Draft Scoping Plan:

> *Offsets can provide regulated entities a source of low-cost emission reductions to use for specified regulatory obligations. . . . Offsets also provide opportunities for the most cost-effective reductions to be pursued early in the program, which can help meet the AB 32 emission reduction target sooner and at a lower-cost.*[7]

An analysis conducted by New Carbon Finance, a global carbon markets research center, estimated that allowing even just 15% international offsets in the context of a national cap-and-trade program would reduce the price of allowances by 44% in the year 2020.[8] Similarly, in an analysis of 2007 U.S. Senate legislation for a cap-and-trade program, the U.S. Environmental Protection Agency estimated that if the program did not permit offsets, the price of carbon in 2015 would be 266% higher than if offsets could be used to satisfy 30% of emissions reduction requirements.[9]

3.2 The View That Limited Co-Benefits In California Outweigh Enormous Co-Benefits In Developing Countries Is Misguided

Some have argued that limitations should be imposed on the quantity of offsets under AB 32 because of the potential that unlimited offsets may reduce incentives for co-benefits through the reduction of pollution in urban areas of California.[10] This suggests, however, that co-benefits for certain populations in California are preferable and outweigh co-benefits achieved through offset projects in more vulnerable communities in developing countries. Such a view is fundamentally misguided.

The potential environmental co-benefits for developing countries are numerous, and they do not preclude economic benefits for California as well. As CARB described in its Draft Scoping Plan:

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[6] AB 32, §38562(b)(1).

[7] California Air Resources Board, *Climate Change Draft Scoping Plan: June 2008 Discussion Draft*, page 44.

[8] New Carbon Finance, North America White Paper – February 2008.

[9] Environmental Protection Agency, *EPA Analysis of The Climate Stewardship and Innovation Act of 2007*, 2007.

[10] Market Advisory Committee Recommendations, June 30, 2007, page 65.

High quality offset projects located outside California can help lower compliance costs in California while reducing GHG emissions in areas that would otherwise lack the resources needed to do so.[11]

Offset projects located in developing countries promote sustainable development, and certain projects can have lasting effects on problems that, while present in all countries, are particularly prominent in developing countries. Offsets can also help countries with rapidly growing industrial sectors to "leap frog" over old, inefficient technologies and build new energy-efficient facilities instead.

For the cement industry, the opportunities for immediate and significant co-benefits around the world are substantial. Both the United States and California already impose laws and regulations that make the California cement industry one of the cleanest in the world. Cement producers in some exporting countries, however, have substantially less stringent environmental protection laws and consequently operate facilities that employ outdated technology and equipment for energy efficiency and pollution control. They lack the type of regulations that California cement producers must meet each and every day to reduce criteria pollutants and toxic emissions. From a cost-benefit perspective, therefore, direct health improvements to the world's population through cement-specific international offset programs are likely to far exceed any incremental improvements in the already heavily regulated and energy efficient California cement industry.[12]

Potential cement-specific international offset programs for the California cement industry may include:

- Actions to improve abatement technology and equipment at overseas cement producers;
- Programs to lower cement carbon intensity factors of foreign cement producers through blending with locally-available supplementary cementitious materials ("SCMs");[13] and
- Actions to increase the energy efficiency of cement kilns of foreign cement producers.[14]

These programs would provide extremely low-cost GHG reduction opportunities while providing exponentially more co-benefits for the local communities in developing countries, such as China.

Moreover, CARB's primary policy objective is to achieve GHG emissions reductions, and it must be cautious when simultaneously assessing GHG emissions reduction measures together with measures to reduce other pollutants. A mixed approach that pursues marginal increases in co-benefits at the expense of significant reductions in GHG emissions is likely to result in regulations that are not the most effective for achieving either objective. Thus, CARB should ensure that its consideration of "local" co-benefits does not distort its consideration of alternative options and creative solutions, particularly in the area of offsets.

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[11] California Air Resources Board, *Climate Change Draft Scoping Plan: June 2008 Discussion Draft*, page 44.

[12] Evidence of this potential was recently on display with China being forced to close industry to improve air quality for the 2008 Beijing Summer Olympics.

[13] CSCME directs CARB to a separate paper on the use of SCMs that is currently under development.

[14] *See, e.g.*, Center for Clean Air Policy, *Greenhouse Gas Mitigation in China: Scenarios and Opportunities through 2030*, November 2006, page 78.

Finally, AB 32 provides that, in the development of market-based mechanisms, CARB must "{m}aximize additional environmental and economic benefits for California, as appropriate."[15] This requirement is reiterated in other parts of AB 32, where the reference to California is explicit.[16] Importantly, in other provisions of AB 32, California legislators did not limit the obligations to California. For example, CARB shall:

- "Ensure that activities undertaken to comply with the regulations do not disproportionately impact low-income communities;"[17]
- "Consider the overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health;"[18] and
- "Consider the potential for direct, indirect, and cumulative emission impacts from {market-based compliance} mechanisms, including localized impacts in communities that are already adversely impacted by air pollution."[19]

Thus, in order to give the language of AB 32 effect in designing its general and sector-specific offset programs, CARB should consider the exponentially greater co-benefits of certain GHG emissions reduction projects to low-income, local communities outside California.

3.3 Alternatives Exist To Structure Offset Programs To Maintain Environmental Effectiveness

Some critics of offsets maintain that they are too difficult to verify or that emissions reductions that would have occurred anyway would be given credit as offsets. CSCME believes that if offsets are held to sufficient standards, these concerns will be appropriately addressed and that, accordingly, there should be no quantitative or geographic limitations on the use of offsets.

As is well known, an administrative system can be designed that ensures the integrity of offsets by setting standards for authenticity and verifiability. The Offset Quality Initiative, a partnership of climate change research organizations, recently suggested various criteria for measuring the credibility of offsets. They recommended that the offsets should be real, additional, based on a realistic baseline, quantified and monitored, independently verified, and unambiguously owned; that they should address leakage and permanence; and that they should do no harm.[20]

The most important step is verifying that the emission reductions are "additional" – that is, they would not have occurred but for the incentive of being sold as an offset. This step is critical to ensuring that actual net emissions reductions have occurred. Systems and methodologies should be put into place for

[15] AB 32, § 38570(b)(3).
[16] AB 32, § 38501(h), § 38562(b)(1).
[17] AB 32, § 38562(b)(2).
[18] AB 32, § 38562(b)(6).
[19] AB 32, § 38570(b)(1).
[20] Offset Quality Initiative, *Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets Into North American Cap-and-Trade Policy*, July 2008. Section 38562(d)(1) of AB 32 requires that regulations shall ensure that the emission reductions are "real, permanent, quantifiable, verifiable, and enforceable." CARB is therefore already bound to most of these standards set forth in the law.

measuring and evaluating offset projects in order to determine if they indeed represent *additional* emissions reductions.

3.4 Lowering Costs Will Reduce Potential Leakage

A significant concern about the effects of AB 32 on the California cement industry is the risk of leakage – a reduction of GHG emissions within California that is offset by an increase in GHG emissions outside California. One reason for this concern is that the impact of compliance costs will drive California's cement consumption to unregulated sources (or to competing lower-cost alternative products) that have a higher GHG emissions footprint in terms of both production- and transportation-related GHG emissions. As CARB has noted, "{g}enerally, California's cement manufacturing plants are more efficient than those that produce imported cement."[21] Therefore, if the implementation of AB 32 results in any shift in demand from California to these other countries, global GHG emissions would increase, contrary to the spirit and intent of AB 32.

California-produced cement is already highly vulnerable to competition from imports. In fact, the U.S. International Trade Commission has found that producers in California have been injured by imports from Mexico and Japan in past antidumping trade remedy cases. As mentioned in CARB's Draft Scoping Plan, imports have historically represented a significant proportion of California's cement consumption.[22] A robust offset program is not a substitute for effective anti-leakage measures, but offset programs that reduce the cement industry's compliance costs could play an important role in minimizing the significant risk of leakage in the California cement sector.[23]

IV. Preferred Design of The Offset Program

4.1 CARB Should Develop A Sufficiently Robust Program To Eliminate The Need For Quantitative Or Geographic Limitations

GHG emissions reductions, wherever they occur, provide equal benefits in mitigating the impact of global climate change. The Congressional Research Service has noted that "{f}rom a global climate change perspective, it does not matter where or from what source the reduction occurs: the effect on the atmospheric concentration of GHGs would be the same."[24] Restricting the amount, type, or location of offsetting emission reductions would ignore these principles and would increase the overall cost of these offset programs.

In addition, AB 32 already requires that CARB consider "all relevant information pertaining to greenhouse gas emissions reduction programs in other states, localities, and nations"[25] and consult with "other nations to identify the most effective strategies and methods to reduce greenhouse gases,

[21] California Air Resources Board, *Climate Change Draft Scoping Plan: June 2008 Discussion Draft Appendices*, page C-105.

[22] California Air Resources Board, *Climate Change Draft Scoping Plan: June 2008 Discussion Draft*, page 39.

[23] CSCME directs CARB to CSCME's separate paper discussing potential anti-leakage measures.

[24] Congressional Research Service, *The Role of Offsets in a Greenhouse Gas Emissions Cap-and-Trade Program: Potential Benefits and Concerns*, April 4, 2008, page CRS-3.

[25] AB 32, § 38561(c).

manage greenhouse gas control programs, and to facilitate the development of integrated and cost-effective regional, national, and international greenhouse gas reduction programs."[26] Any geographic limitation to California's offset program would undermine this requirement.

If offset programs are developed with sufficient safeguards for ensuring their environmental quality, there is no justification to limit them by quantity[27] or geographic region.[28] As discussed above, certification measures can be put into place that evaluate the environmental quality of offset programs to ensure that they are truly resulting in reduced global GHG emissions. With these assurances, CARB can confidently allow regulated entities to comply with an unlimited quantity of certified offsets, thereby (1) reducing global GHG emissions and (2) minimizing the compliance costs of the California cement industry.

4.2 To The Extent That Limits Are Imposed, Additional Sector-Specific Or Regional Offsets Should Be Available

Alternatively, if CARB decides to impose quantitative or geographic limitations on the use of offsets, it should provide additional offset opportunities for the California cement industry, given its high vulnerability to leakage. CARB should, for example, allow a greater number of offsets for the California cement industry under its broad-based offset program. CARB should also consider developing innovative sector-specific and geographically-specific offset programs that enhance the cement industry's ability to reduce its compliance costs with offsets.[29] For example, CARB could establish a cement-specific offset program that allows for the use of CDM credits for projects in certain areas, such as China, and for projects that meet certain standards in relation to cement-specific GHG reductions. This sector-specific approach could formally or informally link with the United Nations and European Union registries and could form the genesis for a global sectoral approach to offsets for the cement industry.

The sector-specific offset program could be coordinated with the efforts of the Cement Sustainability Initiative to develop a new CDM sector methodology that would use global or regional benchmark data of cement plant performance to determine if a CDM project was providing "additional" reductions.

[26] AB 32, § 38564.

[27] In its June 2007 report, the Market Advisory Committee recommended that there be no quantitative restriction on offsets. Market Advisory Committee, *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*, June 30, 2007, page 65.

[28] In its June 2007 report, the Market Advisory Committee also recommended that there be no geographic restriction on offsets. The Committee noted that "(a)llowing offsets from outside the state, in particular, will ensure that global emission reductions are obtained at the lowest possible cost and may also encourage other states to follow California's lead on climate change." Market Advisory Committee, *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*, June 30, 2007, page 64.

[29] California has already established a precedent for a sector-specific and geographically-specific approach in its August 15, 2008 Memorandum of Understanding between the States of California, Baja California, Sonora, Chihuahua, Coahuila, Nuevo León, and Tamaulipas and Pacific Gas and Electric Company and California Climate Action Registry.

CARB should pursue opportunities to work with other institutions to adopt a uniform standards-based approach for project approval that will be far more efficient than a case-by-case analysis.[30]

V. Conclusion

Offsets can play a crucial role in mitigating compliance costs for covered sectors in California and in promoting sustainable development and new technologies in both California and around the world. CARB should acknowledge the significant benefits of incorporating offsets into AB 32 regulations by establishing a robust verification and certification program that permits the use of offsets without quantitative or geographic limitations. Moreover, CARB should consider the unique situation of the California cement industry in creating additional opportunities for offsets. In doing so, CARB can minimize the industry's compliance costs, lower the significant risk of leakage, and create incentives that pair low-cost reductions with major local benefits in developing countries. CARB can also take the precedent-setting step of creating an offset system that considers unique sectoral opportunities and that can therefore establish the foundation for a global sectoral approach for cement.

[30] *See* www.csiprogress2007.org. *See also* Market Advisory Committee Recommendations, page 65 (recommending that California reject geographic and quantitative limitations and rely upon a standards-based approach rather than a case-by-case review to assign offset credits).

EXHIBIT 8

December 10, 2008

Ms. Mary Nichols
Chair, California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: California Cement Industry's Comments on the Proposed Scoping Plan

Dear Ms. Nichols,

The Coalition of Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all of the six cement manufacturers operating the 11 cement plants in California,[1] would like to take the opportunity to comment on the California Air Resources Board ("CARB") Proposed Scoping Plan for the implementation of AB 32.

CSCME congratulates CARB on its efforts to design policies for the implementation of this important law that reflect both the environmental goals of the state and the pragmatic considerations that accompany any legislation. The California cement industry is committed to helping the state achieve its long-term climate change goals and hopes to continue working closely with CARB toward the goal of achieving meaningful cost-effective reductions that minimize leakage and preserve a strong cement industry for the benefit of the California economy.

The following comments represent CSCME's specific observations about certain critical elements of the Proposed Scoping Plan.

(1) The Proposed Scoping Plan's economic analysis of the cement` industry is inadequate.

As part of its efforts to quantify the economic costs and benefits of the Proposed Scoping Plan policies, CARB performed a cost-savings analysis of implementing the measures proposed for the California cement industry. CSCME's analysis of these cost-savings calculations revealed several inaccurate assumptions, unclear methodologies, and unsubstantiated conclusions, including:

- The analysis dramatically underestimates the investments associated with improving energy efficiency in the California cement industry. Indeed, CSCME's preliminary analysis suggests that total investment costs assumed by CARB for all 11 California cement plants are approximately equal to the actual investment cost needed to bring a single cement plant into compliance with the intensity target specified in the analysis. The investments needed to bring the entire industry into compliance with the specified intensity target are significantly higher. This particular example is consistent with a more systemic pattern of cost underestimation found throughout the economic analysis, as identified by peer review.[2]
- The analysis combines multiple potential measures (*e.g.*, energy efficiency improvements and greater use of alternative fuels) in the calculation of costs and savings. This approach has the effect of making certain less cost-effective measures (*e.g.*, fuel switching to natural gas) appear

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[1] *The Coalition includes CalPortland Company, Cemex, Inc., Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California Inc., and Texas Industries, Inc.*
[2] Stavins (October 2008), *Comments by Professor Robert Stavins for the California Air Resources Board,* at 5.

more attractive than they would be if evaluated on their own merits. In order to provide useful guidance and to satisfy the statutory requirement of cost-effectiveness, individual measures must be evaluated independently.[3]

- The analysis is unclear and lacks sufficient transparency. Conversations with CARB staff revealed, for example, that the analysis was a preliminary estimate based on limited information and that a more rigorous analysis will take place during the rule-making process. CSCME agrees with CARB staff that a more comprehensive, rigorous, and transparent analysis of any and all proposed measures that impact the cement industry needs to be conducted during the rule-making process, particularly given that such measures expose the industry to the severe risk of economic dislocation and increased carbon leakage, not only from cement imports but also from competing building materials. CSCME is concerned, however, that CARB is currently poised to adopt a Proposed Scoping Plan that is based on false economic assumptions and conclusions about the impact on the cement industry (and, according to reviews of the economic analysis, this particular problem is likely indicative of similar ones across the spectrum of many other proposed measures). The public was led to believe that the economic impacts of the recommendations in the Scoping Plan are either minor or perhaps positive. Before heading down the path of regulatory development based upon the Proposed Scoping Plan, the actual severe economic impacts to the cement industry need to be fully understood and explained. The purpose of including an accurate assessment at this juncture is to provide an informed decision making process that provides direction toward a valid cost-effective strategy.
- The analysis concludes that the proposed measures could be implemented at a cost savings to cement manufacturers. It does not, however, provide a compelling explanation as to why the cement industry would not have already identified and implemented these measures if they truly deliver cost savings.[4] Cement manufacturing is an energy-intensive process, and energy costs are a primary driver of overall production costs. Absent a compelling argument as to why market failures or barriers prevent cement companies from implementing such measures, the results of the cost-savings analysis are inconsistent with mainstream economic principles and deserve more careful scrutiny.

(2) The intensity standard for cement must be carefully constructed.

As identified in the Proposed Scoping Plan, CARB is considering regulating GHG emissions in the California cement industry using an intensity standard. CSCME generally supports this approach, and it believes that a hybrid instrument that integrates a cement intensity standard with market-based mechanisms has the greatest potential to purposefully guide cost-effective improvements in environmental performance while mitigating the severe risk of carbon leakage.

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[3] More generally, CSCME believes that CARB's analysis is inadequate for demonstrating that proposed measures satisfy the AB 32 requirement of cost effectiveness. As expressed by the Legislative Analyst's Office evaluation of the economic analysis, "Selection of particular measures and the mix of measures appear not to have been directly influenced by cost-effectiveness considerations or macroeconomic analysis. In fact, ARB deemed all measures included in the plan to be "cost-effective" simply because they reduce GHG emissions, whatever the cost." (Pg. 2)

[4] It should be noted that CARB's analysis also fails to provide a clear and compelling explanation for its conclusion that the proposed *portfolio of measures* would result in net negative costs to the California economy. As expressed by Dr. Kahn in his peer review comments, "We need a clear explanation for how it could be the case that the national models indicate that there are costs to mitigating carbon while the California E-DRAM model and ARB's key economic document predict that it will have negative net costs." (Pgs. 24-25)

Nevertheless, the effectiveness of this approach will depend on the careful construction of an intensity standard that is consistent with the unique characteristics of the California cement industry. In addition to site-specific factors, regulators should consider a variety of other variables when establishing an intensity standard, including:

- Projected California cement demand and the need for cement industry investment, growth, and revitalization;
- The California cement industry's existing energy and environmental performance;
- The California cement industry's existing energy and environmental performance relative to that of out-of-state cement industries and the use of best available technology ("BAT");
- The availability of cost-effective and technologically feasible abatement strategies, with full consideration of system impacts (*i.e.*, the impact of one action on other kiln systems);
- Barriers to implementation, including existing regulatory constraints and market acceptance barriers;
- Expected technological developments (*i.e.*, the projected improvement in BAT);
- The time needed to bring about investments in GHG abatement strategies and realize GHG emissions reductions;
- The capital stock age, turnover rate, and replacement times; and
- The industry's ability to access alternative compliance mechanisms, such as offsets, and the projected costs of using them.

(3) The establishment of an intensity standard for the cement industry is critical to addressing the threat of leakage.

As noted in the text of AB 32, leakage occurs when efforts to reduce emissions within the state result in an offsetting increase of emissions outside of the state. CARB recognizes this problem in the Proposed Scoping Plan, noting that differing environmental standards can cause production to shift to outside of California, thereby causing emissions to "remain unchanged or even increase"[5] and resulting in "reduced employment and economic activity in California without reducing overall greenhouse gas emissions."[6] Such leakage of emissions drastically decreases the environmental gains achieved by the state's policies and substantially harms local producers. Certain industries, such as cement, are particularly vulnerable to leakage due to the fungible nature of the product, significant global competition, and the consequent inability to pass through costs to consumers.

Finding an effective way to minimize leakage within the cement industry is a great challenge, and the establishment of an intensity standard is a critical component of the solution. Leakage occurs when there is an economic incentive for consumers to purchase imports that have a greater GHG emission footprint than California production. Intensity standards work well to minimize this leakage because they impose identical requirements on all products – whether produced in-state or out-of-state. All

[5] *See* PSP at 31.
[6] *See* PSP at C-16.

products compete on a level playing field and must adhere to the same emissions standards, thereby maintaining a competitive environment and achieving worldwide emissions reductions simultaneously. An intensity standard is, therefore, the ideal method for reducing the risk of leakage to imports.[7]

(4) The calculation of the carbon intensity for each ton of cement sold in California should be based on its total GHG footprint.

In the Proposed Scoping Plan, CARB describes potential "life cycle intensity standards" that account for out-of-state emissions.[8] In order to effectively measure the total carbon emissions of cement products, CARB should design a cement intensity standard that accounts for the entire GHG footprint of the cement products. Such a "life cycle" standard should include all emissions generated in bringing the product to the California market, including those from transportation. Transportation emissions account for a significant percentage of the emissions associated with bringing cement to the market, and without their inclusion, the intensity factor calculated for a ton of imported cement would not accurately reflect the total GHG footprint, and the risk of leakage would remain.

CARB is already considering a similar methodology in its Low Carbon Fuel Standard program, where emissions will be measured on a "life-cycle" or "wells-to-wheels" basis, including all emissions generated during the production, processing, transportation, and use of the fuel before it reaches the ultimate consumer. It is clear, therefore, that CARB recognizes the importance of accounting for the full GHG footprint in meeting its climate change objectives.

(5) The Proposed Scoping Plan's 49 percent limit on offsets unnecessarily reduces the opportunity to extend the global reach of the program and maximize the program's cost effectiveness.

The Proposed Scoping Plan recommends limiting the use of offsets to *49 percent of total emissions reductions*. Given the GHG targets established by AB 32, the proposed policy would effectively limit the use of offsets to *less than 10 percent of a regulated entity's total compliance obligations* between 2012 and 2020. Such a low percentage of offsets utilization is incompatible with a cost-effective approach to GHG mitigation and is inconsistent with mainstream discussions on offsets policies at the national and international level.[9] As expressed by Dr. Stavins in his peer review of the AB 32 economic analysis,

> The harshest critics of the use of offsets, such as David Victor and Michael Wara of Stanford University, have written about the fact that the problem of the *quality* of offsets cannot and should not be

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[7] For additional detail on CSCME's proposed intensity standard program and the effect on leakage, please see the following position papers submitted to CARB on September 8, 2008: *Tradable Performance Standards: A Policy Framework for Effectively, Efficiently & Equitably Regulating GHG Emissions in the California Cement Industry*, and *The Application of Anti-Leakage Measures in the California Cement Sector to Achieve AB 32's Climate Change Objectives*.

[8] *See* PSP at C-16.

[9] For example, the Lieberman-Warner bill – a focal point of climate change debate at the federal level – allows regulated entities to satisfy 30% of their compliance obligations with emissions reduction generated outside of the cap-and-trade system.

> addressed through *quantitative* or *geographic* constraints, but through employment of better *quality* criteria.[10]

The proposed policy also directly disregards the Market Advisory Committee's expert opinion that

> California should reject geographic or quantitative limitations on offset credits so as to maximize the opportunity to reduce GHG emissions at the lowest cost.[11]

It is widely recognized and accepted that offsets policies, perhaps more than any other program design decision, can significantly reduce the economic costs associated with a cap-and-trade system. CSCME supports the establishment of standards that ensure the environmental quality of offsets entering emissions trading markets. Assuming those standards are imposed, however, there is no compelling economic or environmental rationale to place geographic or quantitative limitations on the use of offsets.

As a result, CSCME strongly recommends that CARB reevaluate its proposed offsets policy and design an approach that achieves a more appropriate balance between California's economic, energy, and environmental objectives. This reevaluation should be informed by economic analysis, beyond what is contained in the Proposed Scoping Plan, that credibly examines the extent to which various offsets policies can reduce the costs associated with implementing a cap-and-trade system.

(6) The Proposed Scoping Plan will dramatically increase electricity costs for the cement industry.

In addition to the direct costs associated with regulating GHG emissions, the indirect costs associated with higher electricity prices will dramatically increase the production costs associated with cement manufacturing – further disadvantaging California cement producers and enhancing the risk of carbon leakage. As Dr. Kahn notes in his peer review comments on the AB 32 economic analysis,

> The micro-econometrics literature has concluded that increased energy prices retards manufacturing employment growth. The manufacturing results reported here contradict the findings from the micro-econometric literature on firm locational and employment choice.[12]

It is commonly known that firms making transportable goods have a tendency to locate production facilities in areas in which inputs are cheapest. Electricity is one of the largest variable costs for cement manufacturing and any future rate increases create a direct financial incentive to the marketplace to substitute imported products with far lower overall costs, resulting in a net increase in GHG emissions. The indirect costs associated with higher electricity prices only increase the importance of pursuing cost-effective measures, adopting a more robust offsets policy, and implementing an anti-leakage mechanism that properly accounts for the *cumulative costs* associated with an asymmetrical climate change policy.

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[10] Stavins (October 2008), at 3.

[11] Market Advisory Committee (June 2007), at 65.

[12] Kahn (2008), *Peer Review of the Economic Modeling Analysis of the California ARB Greenhouse Gas Reduction Scoping Plan,* at 5.

(7) CSCME supports the development of proposed state-provincial partnerships as potentially valuable measures in support of a sectoral approach to the cement industry under AB 32.

In Section V of the Proposed Scoping Plan, CARB describes state-provincial partnerships that would aim to reduce GHG emissions of certain industries that export products to California. CSCME supports CARB's efforts to pursue these partnerships as an additional component of a sectoral approach to regulating the cement industry under AB 32. If designed correctly, these programs could contribute to lowering the costs of California emissions reduction measures (a consideration required by AB 32) by expanding accessibility to low cost compliance options.

(8) As part of its "Green Building Strategy," CARB should closely evaluate the long-term environmental impact of various building materials in order to maximize efficiency gains and minimize leakage.

In Section II and Appendix C of the Proposed Scoping Plan, CARB outlines a "Green Building Strategy" that calls for making further reductions in emissions related to California's buildings. CSCME applauds CARB's efforts in this regard and encourages CARB to evaluate the life-cycle emissions of various building materials in order to minimize long-term building-related emissions. Life-cycle emissions of concrete buildings, for example, compare favorably to wood and steel frame buildings. Commercial and residential structures built with concrete exterior walls can have enhanced energy efficiency, and concrete has a high thermal mass that allows it to store heat better than other materials. In addition, homes using insulated concrete forms ("ICFs") combine concrete and foam insulation to provide energy savings versus wood or steel frame homes.[13] ICF walls can earn credits under the LEED homes program.[14]

As part of this life-cycle analysis, CARB should also factor in the transportation-related emissions associated with using imported building materials. As CARB acknowledges, "{t}he mining, harvesting, processing, and transportation of building materials used in construction"[15] of buildings contributes to GHG emissions. For example, transporting cement within the state results in additional emissions that are small in comparison to emissions from cement production. The importation of cement from distant locations, however, can result in substantial additional emissions.

CARB should also consider such a life-cycle emissions analysis in specifications for state infrastructure projects. For example, concrete roads have an average life span of over 35 years before needing any significant maintenance work, which is many times longer than asphalt roads. By avoiding the periodic maintenance and major resurfacing requirements of asphalt roads, concrete roads eliminate the GHG emissions from producing, transporting, and placing asphalt for repairs and resurfacing work as well as the GHG emissions from vehicle idling due to the construction bottlenecks. In addition, studies indicate that because of its rigidity, concrete pavement enhances fuel efficiency of vehicles when compared to flexible pavements. [16]

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[13] Portland Cement Association (2002).
[14] U.S. Green Building Council (2007).
[15] *See* PSP at C-138.
[16] Portland Cement Association (2005).

Moreover, in recommending alternatives to address the "heat island effect" in urban areas, the U.S. EPA refers to "cool coatings" containing cement particles as well as to concrete tile.[17] With respect to concrete pavements, the Cool Pavement Report prepared for EPA similarly confirms that concrete exhibits much more favorable "cooling" characteristics than any other materials examined, most notably asphalt.[18]

Finally, in its "Proposed Early Actions to Mitigate Climate Change in California," ARB has already identified both "cool roofs" and "light-colored paving" as options for GHG reductions.[19] As the key ingredient in concrete, the availability of cement is necessary for California to implement these early actions and to take advantage of other climate change benefits attributable to concrete. Thus, preservation of California cement capacity is critical for lowering GHG emissions and contributing to California's overall climate change objectives.

The Proposed Scoping Plan represents the enormous efforts of many people to address the critical issue of climate change facing the world today, and CSCME applauds California's remarkable leadership on this issue. CSCME looks forward to continue working with the government of California in order to achieve the goals of AB 32.

Sincerely yours,

John T. Bloom, Jr.

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
Linda Adams, California Environmental Protection Agency
Darren Bouton, California Governor's Office
Victoria Bradshaw, California Governor's Office
David Crane, California Governor's Office
James Goldstene, California Air Resources Board
John Moffatt, California Governor's Office
Dan Pellissier, California Environmental Protection Agency
Chuck Shulock, California Air Resources Board
Cindy Tuck, California Environmental Protection Agency

[17] U.S. Environmental Protection Agency, Heat Island Effect, *Frequent Questions* (available at www.epa.gov/heatisland/resources/faq.html).
[18] Cambridge Systematics, Inc., *Cool Pavement Report*, EPA Cool Pavements Study - Task 5 (June 2005), at 14 (Figure 4.2).
[19] Air Resources Board, California Environmental Protection Agency, *Proposed Early Actions To Mitigate Climate Change In California* (Apr. 20, 2007), at 7 (Table 2).

EXHIBIT 9

February 6, 2009

Ms. Mary Nichols
Chair, California Air Resources Board
1001 "I" Street
Sacramento, California 95812

Subject: Comments on the ARB Mandatory Reporting Regulations for Identifying Emissions as Biomass Emissions in Reports

Dear Ms. Nichols:

The purpose of this letter is to provide comments on the California Air Resources Board (ARB) AB32 mandatory reporting (MR) regulation section 95125 (h)(2), which defines procedures to be used for identifying emissions as biomass emissions in required annual reports. The following is an explanation of the existing rule provisions, current limitations, requested modifications, and justification for the recommended changes to the 95125 (h)(2) section.

General background on cement plant use of fuels containing biomass:

Cement plants currently use a wide variety of fuels, including fuels that are 100% biomass such as wood waste, dried biosolids, and others, and also waste derived fuels (WDF) that contain less than 100% biomass, such as tire derived fuel (TDF, which can be either whole tires or tire chips). The cement industry has worked diligently with members of the ARB, Cal EPA and the Climate Action Team in order to provide input toward the development of an environmentally effective, economically efficient and equitable regulatory framework for this industry. In this regard, it has been recognized by all parties that the use of alternative fuels represent an important measure for reducing the industry's Green House Gas emissions. As such, it is extremely important that the reporting protocols that ARB will put in place incorporate appropriate methods to measure the use of such fuels accurately and in a manner that is not overly burdensome and costly so as to not discourage increased use of alternative fuels that can make an important contribution toward reducing Green House Gases. Therefore, the cement plants would like to report the biomass portion of CO_2 emissions, from both fuels that are 100% biomass and that portion of WDF that is less than 100% biomass, as biomass emissions.

In the past, ARB's cement group has advocated increased TDF use as a GHG reduction measure for compliance with AB32. However, under the current AB32 MR language, it would not be possible to record an emissions reduction due to TDF (a shifting from fossil fuel to biomass emissions) unless the TDF fraction used (fraction of the overall fuel mixture) exceeds a certain value, which depends on the TDF biomass content. Furthermore, the proposed procedure for determining biomass content of TDF (exhaust sampling) has significant drawbacks as explained in more detail below. The cement industry would like to remove the restriction on when biomass emissions can be reported as biomass and is recommending an alternate sampling procedure involving fuel sampling, which is more accurate and has previously been done under the EU-ETS. Provisions for generating credits for biomass use and other carbon-neutral waste fuels is also of concern to the industry, however we intend to address this issue more thoroughly in a subsequent submission. At this point, our primary concern is the development of an appropriate sampling and reporting protocol that will allow us to accurately report the fraction of emissions that are biomass emissions from alternative waste fuels that are less than 100% biomass.

Existing rule provisions for determining the biomass-derived portion of emissions:

Section 95125(h)(2) specifies test procedures for determining the biomass-derived portion of CO_2 emissions for fuels that are not 100% biomass. For fuels that are 100% biomass, these CO_2 emissions are reported as biomass, and Section 95125(h)(2) does not apply. Section 95125(h)(2) currently includes the following language:

> The operator that combusts fuels or fuel mixtures that are at least 5 percent biomass by weight and not pure biomass, except waste-derived fuels that are less than 30 percent by weight of total fuels combusted for the report year, shall determine the biomass-derived portion of CO2 emissions using ASTM D6866-06a as specified in this article. The operator shall conduct ASTM D6866-06a analysis at least every three months, and shall collect each gas sample for analysis during normal operating conditions over at lease 24 consecutive hours. The operator shall divide total CO2 emissions between biomass-derived emissions and non-biomass derived emissions using the average proportionalities of the samples analyzed. If there is a common fuel source to multiple units at the facility, the operator may elect to conduct ASTM D6866-06a testing for one of the units.

Therefore, section 95125(h)(2) currently calls for exhaust gas sample analysis. In addition, paraphrasing section 95125(h)(2), there are three conditions that need to be met for 95125(h)(2) to be applicable (in which case biomass testing is **required**, if called out in the section for that specific type of facility):

- The fuel mixture contains fuels that contain biomass but are not 100% biomass, and
- The overall fuel mixture is > 5% biomass, and
- In the case of units combusting waste-derived fuel (WDF) containing biomass, the WDF containing biomass represents >30% of the total fuel mixture

Section 95111(d)(8), which governs cement plant AB32 MR requirements, specifies when biomass testing per 95125(h)(2) is **required**:

> Operators that co-fire waste-derived fuels that are partly biomass but not pure biomass with other fuels, shall determine the biomass-derived portion of total CO_2 emissions resulting from the combustion of the co-fired fuels, using the method specified in section 95125(h)(2), if applicable.

In addition, Section 95115(b)(2)(D) indicates that operators may **elect** to conduct biomass testing under the following circumstances:

> Operators who co-fire with waste-derived duels that are partly but not pure biomass may elect to determine the biomass portion of total CO_2 emissions resulting from the combustion of the co-fired fuels using the method specified in section 95125(h)(2).

Therefore, it is possible for facilities to elect to report biomass emissions as biomass, and to apply the procedures in 95125(h)(2). The following discussion addresses both cement plants that are required to perform biomass content testing (if any) and plants that elect to do so.

Examples of Potential Application of 95125(h)(2) and problems encountered:

For cement manufacturers that use fuels that are 100% biomass (e.g. wood waste, dried biosolids, others), the CO2 emissions from these fuels can be reported as biomass without any special testing requirements. However, for cement plants that also (or instead) use fuels containing biomass that are not 100% biomass, such as TDF, to report the biomass portion as biomass emissions, these plants must apply 95125(h)(2), either because they are required to do so, if the percent WDF containing biomass exceeds 30%, or because they elect to do so. Under these circumstances of either being required or electing to determine the biomass portion, the cement plants face the following problems:

- The specified test method in 95125(h)(2) must be applied to the exhaust, for which the composition varies depending on the WDF fraction used, rather than to the fuel itself, and the use of exhaust sampling makes biomass content determination difficult and inaccurate. For example, if the WDF biomass content is 25% and the WDF fraction used is 20%, then the biomass portion of the exhaust (and of the overall fuel mixture) will be 5%. On the other hand, if the WDF biomass content is 25% and the WDF fraction used is 30% on the sampling day, then the biomass portion of the exhaust will be 7.5%.
- It is implied that the application of the 95125(h)(2) test method is limited to cases where the biomass content of the overall fuel mixture is 5% or higher. For example, for a WDF with a 25% biomass content, the required WDF fraction used would be 20% or higher, for the overall fuel mixture to have a biomass portion of 5% or higher. For TDF, which has an average biomass content of 25%, there are cement plants where the TDF fraction used is less than 20% and hence these plants would **not** be able to report these emissions as biomass. Given that the biomass content of TDF varies in the range of 15% to 44%, the required WDF fraction used to be able to report these emissions as biomass could be even higher.

The following table further illustrates the relationship between the two variables, WDF biomass content and WDF fraction used, and the biomass portion of the exhaust.

Case #	WDF Biomass Content	WDF Fraction Used	Biomass portion of overall fuel mixture (see note below)	Will the plant be able to report the biomass emissions as biomass?
1A	25	10	2.5	No
1B	25	20	5.0	Yes
1C	25	30	7.5	Yes
2A	15	20	3.0	No
2B	25	20	5.0	Yes
2C	40	20	8.0	Yes

Note: This example assumes that there are no other biomass-containing fuels used.

Requested modifications to 95125(h)(2):

We are asking that 95125(h)(2) be modified in the following two ways:

1. To allow for fuel sampling as an option in lieu of exhaust sampling and
2. To allow biomass emissions from fuels with biomass content of 5% or more (in the individual fuel rather than the overall fuel mixture) to be reported as biomass emissions.

The following is the proposed modified language for Section 95110(d)(8):

> Operators that co-fire waste-derived fuels that are partly biomass but not pure biomass with other fuels, are required to determine the biomass-derived portion of total CO_2 emissions resulting from the combustion of the co-fired fuels, using the method specified in section 95125(h)(2), if applicable, <u>or may elect to make this determination using the method specified.</u>

The following is the proposed modified language for Section 95125(h)(2):

> The following procedure is required for operators that combusts fuels that are at least 5 percent biomass by weight and not pure biomass or fuel mixtures containing fuels that are at least 5 percent biomass by weight and not pure biomass, except waste-derived fuels that are less than 30 percent by weight of total fuels combusted for the report year. In addition, operators may elect to perform this procedure for fuel mixtures containing fuels that are at least 5 percent biomass by weight and not pure biomass. The operator shall determine the biomass-derived portion of CO_2 emissions using ASTM D6866-06a as specified in this article. The operator shall conduct ASTM D6866-06a analysis at least every three months, and shall collect each gas or fuel sample for analysis during normal operating conditions over at least 24 consecutive hours. The operator shall divide total CO_2 emissions between biomass-derived emissions and non-biomass derived emissions using the average proportionalities of the samples analyzed. If there is a common fuel source to multiple units at the facility, the operator may elect to conduct ASTM D6866-06a testing for one of the units.

Arguments for modifying Section 95125(h)(2):

The following is a list of arguments supporting the modification of Section 95125(h)(2) as specified above:

1) Exhaust measurements are not a good way to address biomass in WDF, because there are two variables in the biomass content of the overall fuel: WDF biomass content and WDF fraction used in the overall fuel mixture. The WDF fraction used varies significantly over time, and any result obtained from exhaust measurements would have to be ratioed to adjust for varying WDF fractions used.

2) Even if the WDF fraction is well defined (which is unlikely), the exhaust measurement may be less accurate than the fuel measurement, because the WDF is diluted.

3) Measurements of biomass content under the EU-ETS are performed on fuel, not exhaust.

4) If the biomass content measurement were performed on the fuel, the 5% biomass limitation would apply to the individual fuel, not the fuel mixture, so that facilities would be able to record emissions as biomass-derived at all WDF fractions, not just fractions over the value that brings the biomass content of the overall fuel mixture to 5%. (Note that, according to the labs that provide biomass content services, it is feasible to measure biomass content in fuel directly and it is possible to measure biomass content accurately down to percentages of 1% or less.)

5) In response to concerns that ARB staff expressed about representativeness of whole tire samples used for biomass content analysis (for facilities using whole tires rather than tire chips), we have the following responses:
   - Given that sampling whole tires is already required for HHV measurements, any limitation on representativeness of whole tire samples has been ignored by ARB in its current rule provisions.
   - We are currently developing a representative sampling procedure for whole tires, involving taking a slice of the tire cross-section for a representative number of whole tires (collected on a weekly basis over the entire month, as specified in the regulations) and having the laboratory grind the slices prior to sample compositing and analysis.
   - Consideration should also be given to the required frequency of sampling. If sampling over a period of say 6 months shows very little variance in biomass content (say less than some acceptable standard deviation), then we would recommend that the rules allow for a transition to quarterly or semi-annual sampling intervals.

We would be happy to meet with the appropriate members of ARB to discuss our recommendation further.

Sincerely yours,

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
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James Goldstene, California Air Resources Board
John Moffatt, California Governor's Office
Dan Pellissier, California Environmental Protection Agency
Chuck Shulock, California Air Resources Board
Cindy Tuck, California Environmental Protection Agency

EXHIBIT 10

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

February 13, 2009

Ms. Mary Nichols
Chair, California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: California Cement Industry's Comments on the AB 32 Administrative Fee Regulation

Dear Ms. Nichols,

The Coalition of Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of six cement manufacturers operating the 11 cement plants in California,[1] would like to take the opportunity to comment on the California Air Resources Board ("CARB") proposed Administrative Fee Regulation for The Global Warming Solutions Act of 2006 ("AB 32").

These comments are based on the Administrative Fee Regulation proposal as presented in the Scoping Plan and in the recent workshop held on January 27, 2009. Based on the available information, CARB is essentially proposing what would amount to 50 to 100 percent increase in the amount of fees that California cement producers *already* pay to CARB for other environmental programs, while excluding both imported cement and 25 percent of the other California sources of greenhouse gas ("GHG") emissions from the impact of these additional anti-competitive costs. By favoring imported cement that is not subject to the same stringent environmental regulations (if any) faced by California producers, CARB would invite significant leakage that may undermine the fundamental objectives of AB 32, and by exempting one quarter of GHG emission sources in California, CARB would act inconsistently with the guiding principle of equity set forth in AB 32.

Under AB 32, CARB is required to minimize leakage[2] – an increase in GHG emissions outside of the state that is caused by a shift of California consumption to imported products with a higher GHG footprint, thereby partially offsetting or potentially reversing the GHG emissions reductions achieved within California. This requirement applies to CARB's development of a comprehensive regulatory structure, but CARB cannot ignore this requirement when taking other action, such as imposing an administrative fee, if doing so would directly conflict with this obligation and would undermine the fundamental climate change objectives of AB 32.

CARB addressed the issue of leakage in the Scoping Plan, noting that differing environmental standards can cause production to shift outside of California, thereby causing emissions to "remain unchanged or

[1] *The Coalition includes Cemex, Inc., National Cement Company of California Inc., California Portland Cement Company, Mitsubishi Cement Corporation, Texas Industries, Inc. and Lehigh Southwest Cement Company.*
[2] AB 32 § 38562(b)(8).

even increase"[3] and resulting in "reduced employment and economic activity in California without reducing overall greenhouse gas emissions."[4] Emissions leakage results in a fundamental policy failure by erasing the climate change gains achieved by the state's policies while also harming California's economy. Certain industries, such as cement, are particularly vulnerable to leakage due to the fungible nature of the product, significant global competition, and the consequent inability to pass through costs to consumers. Under such conditions, even seemingly small differences in costs resulting from local or state policies can result in large shifts in market share to imported cement and significant emissions leakage.

The California cement industry is already subject to regulatory costs that substantially exceed those faced by producers outside California, including higher environmental compliance costs, higher labor costs, and higher fuel costs. As CSCME has stated in previous comments, the implementation of AB 32 will lead to an exponential increase in existing regulatory and energy costs (which are already among the highest in the world) that will create a significant competitive disadvantage for California cement producers. According to the Scoping Plan, these cumulative costs will include:

- A cap-and-trade program (if included)
- Command-and-control regulations, including:
  - (A) A carbon intensity factor
  - (B) Energy efficiency/co-benefit audits
  - (C) Vehicle modifications/efficiency/design
- Carbon fees, including:
  - (A) A potential direct carbon fee
  - (B) Administrative program fees to CARB
  - (C) Administrative program fees proposed by local air districts
- Increased electricity prices
- Increased energy and fuel prices.[5]

The California cement industry has highlighted in previous comments that there is growing international recognition of the cement industry's significant susceptibility to leakage, particularly under the current economic conditions. Each and every additional cost that the numerous regulatory programs add to the cost of doing business in California threatens to eventually displace California manufacturers with foreign production.

As CSCME has noted in the past, in order to effectively address the leakage problem, CARB must design regulations that impose equal costs and burdens on all products consumed in California, whether originating from in-state or out-of-state producers. The burden of applying the administrative fee to imported products will be minimal. CARB could select only the subset of imported products for which the risk of leakage is significant, such as cement. For products imported from outside of California, CARB could apply a default or individually-calculated administrative fee at the point of resale into the California market based on procedures applicable to California producers.

Importantly, the fact that the administrative fee may subjectively appear low on a per unit basis does not eliminate the significant risk of leakage for industries like cement. Given the enormous regulatory

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[3] *See* Scoping Plan at 31.
[4] *See* Scoping Plan at C-16.
[5] CSCME, *Tradable Performance Standards: A Policy Framework for Effectively, Efficiently & Equitably Regulating GHG Emissions in the California Cement Industry* (September 8, 2008), 6.

burden already facing California producers and the unique competitive conditions in the isolated California cement market (*i.e.*, a globally-competitive commodity product sold on the basis of price with no ability to pass-through higher costs), CARB's proposal to significantly increase the fees charged to California cement producers as indicated earlier, will further erode the industry's ability to compete with imports that are exempt from the administrative fees especially when taking into account the cumulative costs associated with existing regulations and new AB 32 measures.

Notably, CARB's current proposal to apply administrative fees to sources emitting a total of only 75 percent of all California emissions is inconsistent with statutory language. AB 32 clearly requires CARB to apply any fee to *all* sources of GHG emissions, regardless of their relative contribution to the state's overall emission levels. CARB must therefore also apply the administrative fees to the sources of the remaining 25 percent of overall emissions in order to ensure that the burden is shared equitably as envisioned under AB 32.

CSCME urges CARB to apply any administrative fees equally to all products consumed in California where there is a significant risk of leakage and to all types of emissions sources. The application of fees to imports is expressly permitted under World Trade Organization rules (*e.g.*, under GATT Article VIII as a fee in connection with importation or under GATT Article II:2(a) as a border tax adjustment) and an across-the-board application of fees to all emissions sources would ensure the equitable application of these new costs on California industry.

CSCME's primary issue on the potential administrative fee is maintaining equity and fairness. Treating the product, regardless of source, on an identical basis ensures that nobody receives an unfair advantage merely on the basis of location. Subjecting domestic production to additional costs and not foreign produced products exposes our industry to carbon leakage, which is inconsistent with the goals of environmental effectiveness and equity. We urge CARB to continue to recognize and incorporate these goals at every step of regulatory development.

Thank you for your consideration of these comments.

Sincerely yours,

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
Linda Adams, California Environmental Protection Agency
Jeannie Blakeslee, California Air Resources Board
Darren Bouton, California Governor's Office
Vickie Bradshaw, California Governor's Office
Jon Costantino, California Air Resources Board
David Crane, California Governor's Office
James Goldstene, California Air Resources Board
John Moffatt, California Governor's Office
Dan Pellissier, California Environmental Protection Agency
Chuck Shulock, California Air Resources Board
Cindy Tuck, California Environmental Protection Agency

EXHIBIT 11

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

August 10, 2009

Mr. Kevin Kennedy, Chief
Office of Climate Change
California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: Draft Language for California Cement Industry Tradable Performance Standard

Dear Mr. Kennedy,

As requested by your offices and discussed during recent meetings, the Coalition for Sustainable Cement Manufacturing and Environment ("CSCME") is providing the attached draft regulatory language for a California Cement Industry Tradable Performance Standard ("TPS"). Given the unique circumstances facing the California cement industry under AB 32, the TPS framework represents the optimal policy approach for achieving California's climate change objectives in a cost-effective manner, while also minimizing the severe risk of leakage in the cement sector.

We request that the attached first draft be considered confidential and not be disclosed publicly. Accordingly, any additional internal distribution is left to your discretion. The draft does not represent CSCME's final position on any of the text, and we are continuing to develop and refine the proposed text in a number of highly technical areas. Moreover, we have included certain text in brackets to highlight provisions that require further work.

We thank you for your consideration of our proposed regulatory text, and look forward to future conversations with your offices on this issue.

Sincerely yours,

John T. Bloom, Jr.

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
James Goldstene, California Air Resources Board

CALIFORNIA:

TRADABLE PERFORMANCE STANDARD REGULATION FOR CEMENT

Section 1. Purpose

The purpose of this regulation is to implement the California Global Warming Solutions Act of 2006 (Health & Safety Code (H&S), section 38500 et. seq.) to reduce greenhouse gas emissions attributable to the consumption of cement in the state of California. This regulation establishes a tradable performance standard and associated measures designed to reduce greenhouse gas emissions in a cost-effective manner that minimizes leakage.

Section 2. Applicability

The California cement tradable performance standard ("TPS") applies to all cement that is consumed in the state of California, including cement that is manufactured in California and cement that is imported into California.

Section 3. Definitions and Acronyms

(a) *Definitions*

For the purposes of sections ____ through ___, the definitions in Health and Safety Code sections 39010 through 39060 shall apply, except as otherwise specified in this section, section ____, or sections ____ through _____:

(1) "Blended cement" means [cement as defined in ASTM C 618, C 989, C 595, C 1157, and other similar standards covering cement blended with SCMs].

(2) "Carbon dioxide equivalent" as defined in Health and Safety Code section 38505(c).

(3) "Carbon intensity factor" means the amount of greenhouse gases emitted into the atmosphere per unit of cement produced in California or received by a regulated party in California expressed in metric tons of carbon dioxide equivalent (CO_2E) per metric ton of cement.

(4) "Cement" means all ASTM cement [, including, but not limited to, ASTM XX] that does not contain any SCMs and the cement portion of any such cement containing SCMs.

(5) "Clinker" means [the mass of fused material produced in a cement kiln from which finished cement is manufactured by milling and grinding.]

(6) "Direct emissions" means [process emissions reported under section 95110(a)(2) and stationary combustion emissions under section 95110(a)(3) of Title 17 of the California Code of Regulation implementing Health & Safety Code section 38530 {mandatory reporting requirement}].

(7) "Executive Officer" means the Executive Officer of the State Air Resources Board, or his or her designee.

(8) "Foreign production facility" means a cement production facility that [produces cement from clinker] [or that is a source of SCMs] that is located outside of the state of California.

(9) "Greenhouse gas" or "greenhouse gases" as defined in Health and Safety Code section 38505(g).

(10) "Import" means to bring a product from outside California into California.

(11) "Importer" means the person who owns an imported product when it is received at the import facility in California.

(12) "Import facility" means, with respect to any imported product, the location to which the imported product is first delivered from outside California into California.

(13) "Indirect electricity emissions" means metric tons of CO_2E emitted from the generation of electricity used during the cement production process.

(14) "Offset" means verifiable reductions in greenhouse gas emissions whose ownership can be transferred to others and that are real, permanent, quantifiable, verifiable, enforceable, and additional.

(15) ["Other compliance instrument"] means [an instrument, other than a TPS Permit, denominated in units of metric tons of CO_2E and acquired under section ____ {SCM credit program} and from other greenhouse gas reduction initiatives including, but not limited to, programs established pursuant to AB 32 (Nunez, Stats. 2006, ch. 488) subject to the authorities and requirements of those programs.

(16) "Output" means metric tons of cement [produced or, if the regulated party is an importer, metric tons of cement received in California].

(17) "Producer" means, with respect to cement, the person who owns the cement when it is supplied from the production facility.

(18) "Regulated party" means any person, as defined under Health and Safety Code section 19, who, pursuant to section ___, must meet the industry performance standard in section ____ or ____.

(19) "Supplementary cementitious materials" means [a cementitious material other than portland cement or blended cement having cementing properties or contributing to the formation of hydrated calcium silicate compounds. Common types of SCMs include: fly ash, ground granulated blast-furnace slag, silica fume, calcined clay, metakaolin, calcined shale, natural pozzolans, and rice husk ash].

(20) "SCM Credit" means the instrument distributed under section ___ {SCM Credit Program} denominated in units of metric tons of CO_2E.

(21) "TPS Permit" means the instrument used for determining a regulated party's compliance with the industry performance standard in section ____. TPS permits are denominated in units of metric tons of CO_2E, and are calculated pursuant to section ___. [TPS permits shall not constitute securities or any other form of property.]

(22) "Transportation emissions" means emissions generated by the transportation of a product for import from any foreign production facility to an import facility.

(b) *Acronyms*

For the purposes of sections ____ through _____, the following acronyms apply.

(1) "ASTM" means ASTM International

(2) "CARB" means California Air Resources Board

(3) "CO_2E" means carbon dioxide equivalent

(4) "CIF" means carbon intensity factor

(5) "GHG" means greenhouse gas

(6) "SCM" means supplementary cementitious material

(7) "TPS" means tradable performance standard

Section 4. Cement Industry Performance Standard

(a) *Establishment of the Cement Industry Performance Standard*

(1) A regulated party must meet the cement industry performance standard set by the Executive Officer for its cement produced in California or received into the California market in each calendar year. This requirement shall be effective in the calendar year following adoption of [regulations to implement a comprehensive GHG emissions reduction program under section ____ of the Health and Safety Code {AB 32}].

(2) If the requirement becomes effective in calendar year 2012, the cement industry performance standard shall be equal to the average emissions factor for cement produced in California during the years [XXXX] through [XXXX]. The average emissions factor shall be calculated by dividing

(A) Total GHG direct and indirect electricity emissions resulting from the production of cement produced in California, as determined by [XXXX] through [XXXX] emissions data reported under Health and Safety Code section 38530 {mandatory reporting requirement}], by

(B) The total quantity of cement produced in California during the years [XXXX] through [XXXX].

(3) When the requirement becomes effective in any calendar year after 2012, the cement industry performance standard shall be calculated in accordance with section ___ {Section 4(b)(1)}.

(b) *Ongoing Cement Industry Performance Standard*

(1) From 2013 to 2020, the cement industry performance standard shall be equal to the average emissions factor for cement produced in California during the [X] calendar years prior to the relevant compliance period.

(2) CARB determinations regarding the industry performance standard will undergo public notice and comment prior to enactment and [are subject to appeal by any regulated party].

(3) The cement industry performance standard shall not vary by more than [XX]% between any two years.

(4) If the change in the average emissions factor exceed [XX]%, the difference shall be carried over and applied to the industry's average

emissions factor in the subsequent year, subject to the same limitation specified in section ____. This procedure shall be applied until the effective industry performance standard equals the actual average emissions factor, as calculated in section ____.

Section 5. Requirements for Regulated Parties

(a) *Identification of Regulated Parties*

The regulated parties include cement producers located in California and importers of cement that is produced outside of California.

(b) *Compliance Requirement*

(1) *Submission of TPS Permits and Other Compliance Instruments*

By [September 1] of the calendar year following each annual compliance period, or 30 days after CARB completes its issuance of TPS permits for a given compliance year, whichever date comes later, a regulated party that exceeds the cement industry performance standard shall submit TPS permits or other compliance instruments for the amount of the difference multiplied by its output.

(2) *Issuance of TPS Permits*

In each annual compliance period, if the CIF for regulated party is less than the cement industry performance standard, CARB shall issue by [September 1] of the calendar year following the compliance period TPS permits to such regulated party in the amount of the difference multiplied by its output.

(3) *Acquisition, Banking, Borrowing, and Trading*

(A) A regulated party or a third party acting at the direction and on behalf of a regulated party may

1. bank TPS permits without expiration for compliance with this regulation.

2. acquire or transfer TPS permits.

3. acquire other compliance instruments for compliance with this regulation.

4. [borrow or use TPS permits from anticipated future carbon intensity reductions].

(B) A regulated party may not export TPS permits into another greenhouse gas initiative, including, but not limited to, programs established pursuant to AB 32.

(c) *Individual CIF Calculation*

(1) *CIF Calculation:* A regulated party's CIF for each compliance period shall be calculated by the sum of the applicable direct emissions factor, indirect electricity emissions factor, and transportation emissions factor.

(2) *Direct Emissions Factor:* The direct emissions factor for each facility in each compliance period expressed as metric tons of carbon dioxide equivalent emissions per metric ton of cement produced shall be calculated based on emissions data [reported under Health & Safety Code section 38530 {mandatory reporting requirement} or provided in the annual compliance report under section ___ for the applicable compliance period.]

(3) *Indirect Electricity Emissions Factor:* The indirect electricity emissions factor for each facility expressed as metric tons of carbon dioxide equivalent per metric ton of cement produced shall be calculated by multiplying:

(A) The generation emissions factor for the facility, as calculated under section ___, by

(B) The electricity efficiency factor for the facility, as calculated under section ___.

(C) *Calculation of generation emissions factor*

1. Each person selling electricity to a regulated party shall provide the entity and the Executive Officer, on an annual basis, with certification of the quantity of electricity sold to that entity and the generation emissions factor.

2. The generation emissions factor for the entity, expressed in tons of carbon dioxide equivalents per kilowatt hour, is determined by dividing

a. The annual sum of the hourly product of:

i. The electricity purchased by the entity from that person in each hour (expressed in kilowatt hours per hour), multiplied by

ii. The metric tons of carbon dioxide equivalent per kilowatt hour assigned to the electricity generated in that hour, by

b. The total kilowatt hours of electricity purchased by the entity from that person during that year.

3. *Default value:* In the event that a regulated party does not provide its generation emissions factor, or the Executive Officer finds such certification to be unreliable, a default value shall be used for the generation emissions factor equal to [x percent] greater than the highest generation emissions factor value presented by any regulated party for that compliance period.

(D) *Calculation of electricity efficiency factor*

1. Each regulated party shall provide the Executive Officer, on an annual basis, with certification of the electricity efficiency factor of each facility that produced cement that was sold into the California market during the previous compliance period.

2. The electricity efficiency factor for each facility, expressed in kilowatt-hours per metric ton of cement produced, is determined by dividing

a. The total electricity consumed by the facility during that year, divided by

b. The total amount of cement produced by the facility during that year

3. *Default value:* In the event that a regulated party does not provide its electricity efficiency factor, or the Executive Officer finds such information to be unreliable, a default value shall be used for the electricity efficiency factor equal to [x percent] greater than the highest electricity efficiency factor value presented by any regulated party for that compliance period.

(E) *Self-generated electricity*

[To be added.]

(4) *Transportation Emissions Factor:* The transportation emissions factor shall be calculated by dividing

(A) The annual sum product of:

1. The total miles traveled outside California [from the foreign production facility to the point of receipt in California] by transport type for cement received by the regulated party into the California market during the compliance period
2. The emissions factor for transportation type, by

(B) The quantity of cement received by the regulated party in California during the compliance period.

(C) The emissions factors for transportation emissions are as follows:

Table 2

Transport Type	**Emissions Factor**
Ship	
- Fuel source	[X]MT CO_2E / mile per ton of cement
- Fuel source	[X]MT CO_2E / mile per ton of cement
- Fuel source	[X]MT CO_2E / mile per ton of cement
Truck	
- Conventional gasoline	[X]MT CO_2E / mile per ton of cement
- Diesel	[X]MT CO_2E / mile per ton of cement
- Fuel source	[X]MT CO_2E / mile per ton of cement
Rail	
- Fuel source	[X]MT CO_2E / mile per ton of cement
- Fuel source	[X]MT CO_2E / mile per ton of cement

(D) [Any importer that receives cement that is subject to legal requirements to reduce GHG emissions for the same transportation emissions that are governed by the TPS program may petition to CARB for an appropriate adjustment to its CIF.]

(E) [Upon the effective date of any global maritime convention regarding greenhouse gas emissions of transportation fuels, the inclusion of maritime transportation emissions in the TPS regulation will be re-evaluated in order to eliminate any overlap between the two programs.]

(d) *Default CIF*

For any regulated party that fails to cooperate or otherwise violates any provisions of this regulation, the Executive Officer may apply a default CIF. The default CIF shall be calculated using the highest direct emissions factor submitted for any regulated party during the compliance period, the highest indirect emissions factor submitted for any regulated party during the compliance period, and the highest transportation emissions factor for the known mode of transportation. If the mode of transportation is not known, the default CIF shall be calculated using the highest transportation emissions factor for all modes of transportation.

(e) *CIF Deduction for Increased Electricity Costs*

(1) Beginning in 2012, facilities that produce cement in California shall be eligible for a CIF deduction to offset incremental increases in electricity costs due to the implementation of AB 32.

(2) The CIF deduction shall be equal to the indirect electricity emissions factor for each facility producing cement for consumption in California, subject to any adjustments made by the Executive Officer under section ___.

(3) *Adjustment to the CIF deduction:* If an electricity provider received a free allocation of emission allowances or any other instrument intended to offset increased electricity prices due to the implementation of AB 32, the Executive Officer shall adjust the CIF deduction for a regulated party subject to [this subsection (e)] to account for any incremental costs that the Executive Officer determines were not incurred by the regulated party.

(4) The CIF deduction shall be applied by [subtracting the amount of the deduction for a regulated party from its CIF].

(f) *Credit for Compliance in Other Jurisdictions or Programs*

(1) *Eligibility*

Importers that [submit compliance instruments (such as allowances) or pay a tax] in another jurisdiction or into another program for the production of the same cement that is ultimately imported into California shall receive an annual credit in [the amount of CO_2E corresponding to] the compliance instruments submitted to other jurisdictions or programs, less any reduction received upon exportation.

(2) *Evidence*

[To be added]

(g) *Sale to Other Jurisdictions*

(1) *Eligibility*

Cement that is manufactured in or imported into the state of California but is consumed in another jurisdiction, shall not be subject to the cement industry performance standard. [Additional text on calculation of deduction to be determined]

(2) *Evidence*

The regulated party must present evidence of shipment to another jurisdiction and [additional evidence to be determined.]

(h) *Treatment of Clinker*

[Development of a direct emission factor applicable to production/import of clinker. Regulated entities would include those that grind clinker and then introduce cement into the California market.]

Section 6. TPS Certification

(a) A regulated party may earn "TPS Certification" by [submitting additional documentation to CARB regarding its supply chain, production process, and market sales and submitting the data required under Health & Safety Code section 38530 {mandatory reporting requirement} for all sources of cement that is received in California.] [Alternative: "enforcement protocols" under LCFS.]

(b) TPS Certification may be revoked by CARB based on [ ]. Revocation of status may be appealed under section ____.

Section 7. Reporting Requirements

(a) *Annual Compliance Report.* By June 1 of the calendar year following the effective date of this regulation, all regulated parties shall submit to the Executive Officer annual compliance reports, as specified in sections _______ and _______ , for the prior calendar year. By June 1 of each year thereafter, regulated parties shall provide an annual compliance report for the prior calendar year.

(b) *How To Report.*

(1) A regulated party must submit an annual compliance report by using an interactive, secured internet web-based form.

(2) The regulated party is solely responsible for ensuring that the Executive Officer receives its annual compliance report by the dates specified in section _____. The Executive Officer shall not be responsible for failure of electronically submitted reports to be transmitted to the Executive Officer. The report must contain a statement attesting to the report's accuracy and validity. The Executive Officer shall not deem an electronically submitted report to be valid unless the report is accompanied by a digital signature that meets the requirements of Title 2, California Code of Regulations, section 22000 et seq.]

(c) *Reporting Requirements for Annual Compliance Reports.*

(1) The annual report must meet, at minimum, the requirements set forth below.

(2) A regulated party must report the following:

(A) The regulated party's CIF for the relevant compliance period, calculated as per section ______ above;

(B) Direct emissions;

(C) Indirect emissions;

(D) Transportation emissions;

(E) Output;

(F) The total TPS permits, if any, submitted with the report for purposes of compliance with this regulation;

(G) The total TPS permits, if any, that CARB is requested to provide to the regulated party;

(H) The total TPS permits, if any, acquired from another party;

(I) The total TPS permits, if any, sold or otherwise transferred;

(J) The total of other compliance instruments, if any, imported from programs outside the TPS program;

(K) The total amount of TPS permits and other compliance instruments, if any, that are banked as of December 31 of each calendar year;

(L) The regulated party's electricity efficiency factor as provided under section ____;

(M) The regulated party's generation emissions factor; and

(N) [Other.]

(d) *Business Confidential Information*

All business confidential information submitted as part of the TPS compliance process, including information contained in the annual compliance reports under section ____, shall be labeled as such and shall be maintained as confidential. Such information shall not be provided to the public or to any entity outside of CARB.

Section 8. CARB Verifications

(a) CARB will verify the content of the annual reports submitted by each regulated party annually, except that TPS certified parties will be subject to the verification requirements under Health & Safety Code section 38530 {mandatory reporting requirement}.

(b) Any CARB representative will be given full, complete, and immediate access to conduct verifications of any regulated party and of any cement production facility that produced cement consumed in the state of California.

(c) Verifications may be either announced in advance by CARB or unannounced.

(d) Access will be provided to any location where:

(1) Cement is produced;

(2) Documents related to cement production operations are kept; and

(3) Cement is stored or transported between a production facility and California.

(e) Verifications may be by CARB employees or contractors to CARB.

(f) Any documents requested that are related to matters covered by verifications will be provided to a CARB representative on request.

(g) Verifications by CARB may include review and copying of any documents related to:

   (1) Production facility CIF, including the volume and parameters, and transfers of title or custody, of any cement, produced at the production facility and any work papers related to CIF establishment;

   (2) Transfers of title or custody of cement;

   (3) Sampling and testing of cement;

   (4) Work performed and reports prepared by independent third parties and by independent auditors under the requirements of this section, including work papers; and

   (5) Reports prepared for submission to CARB, and any work papers related to such reports.

   (6) Verifications by CARB may include taking samples of cement and [interviewing employees.]

Section 9. Commitments

Any regulated party shall commit to and comply with the provisions contained in this paragraph as a condition of submitting an individual CIF.

(a) Any company that produces cement consumed in the state of California agrees to be subject to the verification obligations under section ____ and recordkeeping obligations under section ____.

(b) Any employee of any company that produces cement sold in the state of California will be made available for interview by the CARB inspector or auditor, on request, within a reasonable time period.

(c) English language translations of any documents not in the English language will be provided to a CARB inspector or auditor, on request, within 10 working days.

(d) English language interpreters will be provided to accompany CARB inspectors and auditors, on request.

(e) An agent for service of process located in California will be named, and service on this agent constitutes service on any regulated party or any officer or employee of any regulated party for any action by CARB or otherwise by the state of California related to the requirements of section _____.

(f) The forum for any civil or criminal enforcement action related to the provisions of this section for violations of the ________ or regulations promulgated thereunder shall be governed by the ______, including the CARB administrative forum where allowed under the ______.

(g) The state of California's substantive and procedural laws shall apply to any civil or criminal enforcement action against a regulated party or any employee of a regulated party related to the provisions of this section.

(h) The regulated party, any producer of cement consumed in the state of California, or their agents, officers, or employees, will not seek to detain or to impose civil or criminal remedies against CARB inspectors or auditors, whether CARB employees or CARB contractors, for actions performed within the scope of CARB employment related to the provisions of this section.

(i) The commitment required by this paragraph shall be signed by the owner or president of the regulated party and by any producer of cement consumed in the state of California, if not the same party.

(j) The signed commitments required by this paragraph shall be included in the annual compliance reports, where applicable, for each regulated party under section ____.

Section 10. Recordkeeping

A regulated party must retain all of the following records for at least 3 years and must provide such records within 20 days of a written request received from the Executive Officer or his/her designee before expiration of the period during which the records are required to be retained:

(a) product transfer documents;

(b) copies of all data and reports submitted to the Executive Officer;

(c) records related to each cement transaction; and

(d) records used for compliance or TPS permit calculations.

[Section 11. Sovereign Immunity

By providing a signed commitment to a regulated party, a cement producer located outside California, its agents, officers, and employees, without exception, become subject to the full operation of the administrative and judicial enforcement powers and provisions of the state of California without limitation based on sovereign immunity, with respect to actions instituted against the producer, its agents, officers, and employees in any court or other tribunal in the state of California for conduct that violates the commitments applicable to the foreign producer under ________.]

[Section 12. Bond Posting

If CARB has reasonable grounds to believe that a regulated party may not comply with its compliance obligation under section ___, based on its own evidence or information or based on evidence or information submitted by another regulated party, CARB may require such regulated party to meet the requirements of this section as a condition to being granted an individual CIF.

(a) Regulated parties shall post a bond of the amount calculated using the following equation:

[to be determined]

(b) Bonds shall be posted by:

(1) Paying the amount of the bond __________;

(2) Obtaining a bond in the proper amount from a third party surety agent that is payable to satisfy United States judicial judgments against the regulated party, provided CARB agrees in advance as to the third party and the nature of the surety agreement; or

(3) An alternative commitment that results in assets of an appropriate liquidity and value being readily available to the United States, provided CARB agrees in advance as to the alternative commitment.

(c) If the bond amount for a regulated party increases, the regulated party shall increase the bond to cover the shortfall within 90 days of the date the bond amount changes. If the bond amount decreases, the regulated party may reduce the amount of the bond beginning 90 days after the date the bond amount changes.

(d) Bonds posted under this paragraph (X) shall be used to satisfy any judicial judgment that results from an administrative or judicial enforcement action for conduct in violation of ______________.

(e) On any occasion that a regulated party bond is used to satisfy any judgment, the regulated party shall increase the bond to cover the amount used within 90 days of the date the bond is used.]

[Section 13. Supplementary Cementitious Materials (SCM) Credit Program

[CSCME is still developing proposed text for the SCM program. A draft will be circulated shortly.]

(a) *Participants*

(b) *Cement*

(c) *Concrete and Concrete Products*

(d) *Trading*

(e) *Reporting and Verification Requirements*]

[Section 14. Sectoral Offsets Program

(a) *Participation*

(b) *Calculation of Offsets*

(c) *Link to TPS and Cap-and-Trade*

(d) *Audit Requirements*

(e) *CARB Inspection*]

Section 15. Certifications

All documents submitted to CARB by regulated parties, entities eligible for SCM credits, or third parties (including producers located outside California of cement consumed in the state of California) containing information relevant to compliance with this regulation shall include a certification:

(a) Submitted in accordance with procedures specified by the Executive Officer, including use of any forms that may specified by the Executive Officer.

(b) Signed by the president or owner of the submitting party, or by that person's immediate designee, and shall contain the following declaration:

> I hereby certify: (1) that I have actual authority to sign on behalf of and to bind [insert name] with regard to all statements contained herein; (2) that I am aware that the information contained herein is being certified, or submitted to the California Air Resources Board, under the requirements of ______, subparts _____ and that the information is material for determining compliance under these regulations; and (3) that I have read and understand

the information being certified or submitted, and this information is true, complete and correct to the best of my knowledge and belief after I have taken reasonable and appropriate steps to verify the accuracy thereof.

I affirm that I have read and understand that the provisions of _______, subparts ______, including __________, apply to [insert name of foreign producer or vessel owner]. Pursuant to the Global Warming Solutions Act of 2006 section _________, California Health & Safety Code, section ____, the penalty for furnishing false, incomplete or misleading information in this certification or submission is a fine of up to $10,000, and/or imprisonment for up to five years.

Section 16. Review of CARB Determinations

Any determination made by CARB in relation to compliance with the TPS program or participation in the SCM Credit Program may be appealed by a regulated party. [Procedures for appeal]

Section 17. Technical Assistance

Technical assistance for compliance with the TPS program shall be available from CARB, upon request by any regulated party.

Section 18. Regulation Review

The Executive Officer shall conduct a review of the implementation of the TPS program by January 1, 2014. The Executive Officer shall determine the scope and content of the review.

Section 19. Federal Preemption

In the event that a federal climate change program is enacted that pre-empts state market-based mechanisms to reduce GHG emissions, including the California cap-and-trade program, the TPS program will also be pre-empted.

Section 20. Prohibitions

No regulated party or other person may cause another person to commit an action prohibited in paragraph (n)(1) of this section, or that otherwise violates the requirements of this section.

Section 21. Violations and Penalties

[Cross-reference to AB 32]

EXHIBIT 12

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

May 11, 2009

Ms. Mary Nichols
Chair, California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: CSCME Comments on Minimizing Emissions Leakage

Dear Ms. Nichols,

The Coalition of Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of six cement manufacturers operating the 11 cement plants in California,[1] would like to take the opportunity to comment on the issue of emissions leakage, which was the focus of a recent California Air Resources Board ("CARB") workshop.

Simply put, emissions leakage represents a fundamental threat to both the viability of the California cement industry and the environmental effectiveness of the state's climate change policy. This notion was accurately and concisely expressed in the Draft Scoping Plan,

> *With California's continuing growth comes an increase in demand for cement. Reducing GHG emissions from this sector needs to be done in a manner that minimizes the potential for both emissions and economic leakage and maintains a strong, competitive cement industry in California.*

The important interrelationship between achieving GHG emissions reductions and preserving (and growing) the California cement industry is underpinned by several factors:

- A ton of cement produced in California generally has a lower GHG footprint than a ton of cement produced outside California, especially when transportation-related emissions are considered.
- When evaluated on a lifecycle basis, the industry's durable eco-efficient concrete end products generate significant GHG savings over alternative construction materials.
- The cement industry is uniquely positioned to utilize alternative fuels, waste otherwise destined for landfills, and cementitious waste streams to produce a less carbon-intensive product and simultaneously provide the co-benefits of reducing many problematic wastes.

Consequently, CARB is faced with a unique and beneficial set of circumstances for regulatory development – policies that contribute to a strong, competitive California cement industry are also policies that contribute to meeting the state's climate change objectives.

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[1] *The Coalition includes CalPortland Company, Cemex, Inc., Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California Inc., and Texas Industries, Inc.*

To take advantage of this unique and beneficial set of circumstances, however, it is imperative that CARB design regulations that effectively minimize the risk of emissions leakage. The foundation of any approach to minimize leakage is a system of equal rights and obligations for all competing products consumed in the California market. Without a level playing field, costs imposed solely on a subset of competing firms will lead to a shift in market share and investment to firms located in jurisdictions with few or no environmental regulations.

CSCME commends CARB's current efforts to develop methodologies that systematically and rigorously identify and quantify the risk of leakage. We believe that CARB's effort to review what others have proposed is a sensible first step, and that basic indicators, such as trade exposure and emissions intensity, offer a useful framework for conducting an initial assessment. We also believe, however, that every industry consists of a unique set of characteristics that dictate the nature of, and potential for, emissions leakage. Some of these characteristics can be accurately captured by simple frameworks and existing data, but others cannot. Consequently, CARB's efforts to minimize leakage must eventually move beyond basic indicators and focus on the unique circumstances of individual California industries and the challenges they face in adapting to a carbon-constrained world.

With this goal in mind, CSCME would like to offer the following comments on the challenges of defining, identifying, and quantifying the risk of emissions leakage, as well as potential policies for minimizing that risk within the California cement industry. CSCME looks forward to working closely with state officials on this issue in the coming months.

I. CARB Should Continue to Utilize the Definition of Leakage Provided by AB 32

As noted in CARB's presentation, AB 32 defines leakage as:

> *A reduction in emissions of greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state.*

In slide six of the presentation, however, leakage is described as:

> *When production is transferred to jurisdictions without a GHG emissions cap, leading to no (or a smaller) net decrease in global GHG emissions.*

It is unclear if CARB provided this definition as a possible alternative to the AB 32 language, or simply for the purposes of exposition. Regardless, it is important to note that there are several important inaccuracies associated with CARB's description of leakage.

First, CARB's description specifies that leakage occurs when production is transferred to jurisdictions without a GHG emissions cap. Although this addition is presumably intended to distinguish between shifts in production that occur as a result of the policy and those that occur for unrelated reasons, CSCME believes that this characterization is, at best, imprecise. For example, emissions leakage could occur when production relocates to jurisdictions with less stringent GHG caps and therefore lower compliance costs, all else being equal. Alternatively, emission leakage could occur when production relocates to jurisdictions with equally stringent GHG caps but with lower overall compliance costs because of programmatic choices or policy design features, such as fewer limitations on the use of offsets. Simply put, the potential for emissions leakage is ultimately determined by the overall compliance cost differential between jurisdictions, not simply the presence or absence of a GHG emissions cap.

Second, CARB's description specifies that leakage results in no (or a smaller) net decrease in global emissions. It is important to note, however, that leakage can potentially result in a net increase in global emissions. For instance, evidence suggests that, all else being equal, cement imports from China result in 25% more emissions than cement produced and consumed in California. Thus, severe emissions leakage that results in a significant loss of market share to imports of cement from China, for example, may in fact result in a net increase in global GHG emissions.

Given these concerns, CSCME strongly recommends that CARB develop regulations that are consistent with the carefully crafted definition of leakage in AB 32, which we believe is a sufficiently general, complete, and accurate description of this critical policy consideration.

II. CARB Should Use A Broad Set of Factors When Evaluating the Potential for Emissions Leakage

As noted by CARB, leakage arises when industries that compete in global markets are not able to pass through the costs of the GHG emissions reduction program to consumers. The ability to pass through costs is the result of a variety of factors. CSCME believes that CARB should consider at least seven factors when identifying industries at risk of leakage:

2.1 The Nature of the Product

Homogeneous products, such as cement, compete almost exclusively on the basis of price. In markets for homogeneous products, imposing a regulatory cost (*e.g.*, the cost of carbon emissions) on some products (*e.g.*, domestically produced cement) but not on others (*e.g.*, imported cement) distorts competitive conditions in the market. This regulatory asymmetry will shift market share away from the more regulated product in the short term and shift investment away from the more regulated product in the long term – resulting in both economic and emissions leakage. Thus, the degree of product homogeneity should be a primary factor for consideration.

2.2 The Capital Intensity of the Industry

A capital-intensive industry requires large upfront investments in long-lived capital equipment and requires the operation of this equipment at high levels of capacity utilization to achieve commercially sustainable returns. To finance the purchase of an expensive and long-lived productive asset, an investor must be confident that he or she will receive a fair return over the life of the asset (*i.e.*, several decades). In the absence of stable policies and predictable compliance costs, investment in long-lived capital equipment will suffer – resulting in both economic and emissions leakage. Therefore, the nature of the regulatory instrument and the extent of long-term compliance cost uncertainty can have a profound influence on the extent of leakage in capital-intensive industries.

2.3 The Geographic Scope of the Market & The Extent of International Competition

California's location on the Pacific Ocean makes it easily accessible to imports of all products and widens the geographic scope of markets, including the markets for products that are typically expensive to transport by land, such as cement. As recognized by CARB, the ability of imports to economically access the California market will limit an industry's capacity to pass through compliance costs to consumers – resulting in a loss of market share in the short run and a relocation of productive capital in the long run (*i.e.*, emission leakage). As demonstrated by a history of high import penetration, the California cement industry is a textbook example of an industry subject to intense international competition and, therefore, unable to pass through the costs associated with a California climate change policy.

2.4 Opportunities for Cost-Effective GHG Reductions: Process Emissions

As noted by CARB in its concept paper, a key consideration for identifying leakage-prone industries is the potential cost increase due to the GHG reduction policy, which is (partially) a function of an industry's capacity to achieve cost-effective GHG reductions. Common to all cement production is the chemical reaction that occurs when the calcium carbonate ($CaCO_3$) in limestone is heated and breaks down into lime (CaO) and carbon dioxide (CO_2) – a process that accounts for 57% of emissions in the California cement industry.[2] Thus, the majority of CO_2 emissions in the cement industry are a direct and unalterable consequence of the chemical reaction that is fundamental to the manufacturing process. These immutable "process emissions" distinguish the cement industry from other carbon-intensive sectors, such as electric power or transportation, and significantly reduce the opportunities for cost-effective reductions.

2.5 Energy Intensity and Opportunities for Cost-Effective GHG Reductions: Technology

Another important determinant of an industry's vulnerability to leakage is not only its energy intensity but its capacity to achieve cost-effective GHG reductions which depends to a large extent on the state of its production technology. Cement is a technologically mature industry. The last great technological advancement in cement production occurred decades ago as new manufacturing facilities shifted from the less efficient wet process to the more efficient dry process, and no major technological advancements in large-scale production technology are on the horizon. In addition, California's history of environmental leadership combined with strong competition from importers has resulted in a California cement industry that is more energy efficient than those in the vast majority of nations. Thus, as an energy-intensive but highly efficient industry that utilizes relatively mature technology, cement manufacturing is likely to suffer from the worst of all worlds: prohibitively high compliance costs coupled with limited opportunities to defray those costs through technological improvements.

2.6 Capacity to Achieve the Regulatory Objective

Even if opportunities to achieve cost-effective GHG emissions reductions exist, they are unlikely to materialize if the industry lacks the capacity to achieve the regulatory objective. Virtually

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[2] California Climate Action Team, Cement Subgroup (2008).

every aspect of the cement industry is tightly controlled by rules and regulations, from the structure of the market to the operations of plants to the nature of the end product. The manufacturing process, especially in California, is subject to stringent environmental regulations and a thorough permitting process. Even the properties of cement products are tightly controlled through technical specifications and building codes intended to ensure product performance and safety under a variety of conditions. Failure to harmonize all regulations related to the provision of cement in a eco-friendly manner will create conflicts that limit the ability to realize any opportunities for cost-effective GHG emissions reductions that may exist in the industry.

2.7 The Potential of Leakage to Other Non-Regulated Competing Products

Although the potential for emissions leakage is traditionally framed in the context of perfect substitutes (*e.g.*, domestically produced cement versus imported cement), the potential for cross-sectoral leakage can also be significant in certain industries. For instance, depending on the nature of the market, cement may compete with other products in certain downstream uses, such as wood or steel in certain construction projects or asphalt for certain road projects. These competing materials generally have a greater lifecycle GHG emissions footprint.[3] To the extent that AB 32 regulations increase the overall compliance burden on the California cement industry, even if such burden is equal to the burden on imported cement, any substantial increase in compliance costs for cement could result in significant cross-sectoral leakage that would undermine the climate change objectives of AB 32.

III. Any Framework Used to Evaluate the Potential for Emissions Leakage Should Rely on Data that Reflects Fluctuations in the Business Cycle

Recent proposals to address emissions leakage – including aspects of the EU ETS, the Australia CPRS, and the Waxman-Markey bill – typically use some measure of trade exposure as a primary indicator. For many energy-intensive, trade-exposed industries, however, such an indicator is highly sensitive to fluctuations in the business cycle and closely related economic phenomenon.

For example, the cement industry is highly depend on fluctuations in the construction cycle, and measures of import intensity can vary widely from the peak to the trough of the cycle. Although California cement imports exceeded 40% of the state's total cement consumption during the housing boom in 2006, the volume of imports has declined in the wake of a sharp housing market downturn and the current economic recession. Simply put, a methodology that relies heavily on data from 2006 is likely to result in substantially different results than a methodology that relies heavily and exclusively on more recent data.

Consequently, it is critical that any framework used to identify industries at risk of leakage or to quantify the potential extent of leakage rely on historical data that reflects these extreme fluctuations. Measures that utilize data from one particular year or a small set of years may dramatically understate the potential for emissions leakage. Rather, methodologies should employ data that reflects the industry's trade exposure throughout the entire industry cycle.

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[3] CSCME will shortly be submitting a comprehensive paper comparing the lifecycle GHG emissions for various building materials.

IV. CARB Should More Explicitly Consider the Potential for Cross-Sectoral Leakage

Efforts to address emissions leakage tend to focus on products that are perfect substitutes – for example, California cement versus imported cement. Even if this particular form of leakage is sufficiently minimized, however, other forms of leakage may persist. As previously noted, the risk of cross-sectoral leakage in the California cement industry is real and significant.

Specifically, increased compliance costs for California cement manufacturers may result in substitution away from cement toward competing materials such as wood, steel, or asphalt.[4] To the extent that a California program fails to regulate the direct and indirect GHG emissions associated with the consumption of these competing materials, increased substitution of these products would result in emissions leakage.[5] The potential for emissions leakage is compounded by the fact that cement is an eco-efficient, durable product that is environmentally superior to competing materials in many applications. Thus, cross-sectoral leakage has the potential to not only offset GHG reductions in the California cement industry, but increase GHG emissions globally.

The potential for cross-sectoral leakage has important policy design implications. Even if attempts to level the carbon playing field between California and non-California cement are successful, total compliance costs for the California cement industry must still be minimized to mitigate the risk of cross-sectoral leakage. Simply put, any program that aims to minimize the risk of leakage must level the carbon playing field between <u>all</u> major competing products, not simply between domestic and imported cement.

V. Conclusion

Although the risk of emissions leakage in the California cement industry is real and significant, it is not intractable or insurmountable. Although an ill-designed climate change policy will simultaneously threaten the viability of the state cement industry, damage the state economy, and diminish the efficacy of the state's environmental efforts, a well-designed climate change policy can overcome these challenges, enable the cement industry to contribute to meaningful reductions in global GHG emissions, and generate sustainable growth in California.

CSCME believes that effectively minimizing the risk of emissions leakage cannot be done through a "one-size-fits-all" approach. It will require sensible policies tailored to the unique characteristics and challenges of individual industries. As you know, CSCME recommends that California adopt a sector-specific approach of Tradable Performance Standards ("TPS") for the

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[4] For example, California does not have a significant steel manufacturing industry and the state does not appear to be considering regulations to account for the GHG emissions associated with the consumption of steel in California. In the absence of regulations that place concrete (and, by extension, cement) and steel on a level carbon playing field, California's climate change policy is likely to result in a shift in building materials consumption. To the extent that the <u>lifecycle</u> emissions associated with the consumption of steel is greater than that associated with the consumption of concrete, the result will be emissions leakage. A similar situation may arise with other materials that are unregulated or face a lower compliance burden, such as wood and asphalt.

[5] It is important to note that cross-sectoral leakage may arise because of either the policy's limited scope (*i.e.*, imperfect participation), the policy's failure to properly account for the full lifecycle emissions associated with the consumption of various products (*i.e.*, incomplete measurement), or both.

cement industry. Leveraging and integrating a variety of instruments tailored to the unique nature of the California cement industry, the TPS framework provides an environmentally effective solution to leakage: a "command, control, and trade" approach to reducing the GHGs associated with California cement consumption in an environmentally effective, economically efficient, and equitable manner. We have made a lot of progress to date and look forward to further meetings to fully develop the TPS framework for the cement industry.

Sincerely yours,

John T. Bloom, Jr.

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Chairman, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:

Linda Adams, California Environmental Protection Agency
Cindy Tuck, California Environmental Protection Agency
Eileen Tutt, California Environmental Protection Agency
Jeannie Blakeslee, California Air Resources Board
Mihoyo Fuji, California Air Resources Board
James Goldstene, California Air Resources Board
Kevin Kennedy, California Air Resources Board
Mary Nichols, California Air Resources Board
Victoria Bradshaw, California Governor's Office
David Crane, California Governor's Office
John Moffatt, California Governor's Office
Dan Pellissier, California Governor's Office

EXHIBIT 13

KEYBRIDGE
RESEARCH

Reconciling TPS With Cap-and-Trade: An Inside-The-Cap Approach

Prepared For:
Coalition for Sustainable Cement Manufacturing & Environment

Prepared by:
Keybridge Research LLC

November 23, 2009

KR

CSCME has proposed a tradable performance standard ("TPS") approach to regulating the CA cement industry.

(1) TPS is distinguished from other approaches to addressing the risk of emissions leakage (e.g., the EITE framework) because it imposes equal rights and obligations on both domestically produced and imported cement.

(2) The TPS system can be implemented inside the cap ("ITC") or outside the cap ("OTC").

(3) While CSCME has proposed in the past that TPS be implemented OTC, CARB has indicated a strong preference to include the cement industry inside the cap.

(4) Consistent with this preference, the following describes how the TPS system can be implemented ITC while preserving the essential benefits of the TPS approach.

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A standard cap-and-trade ("C&T") design can result in a policy-induced "externality" for unique industries.

- Cap-and-trade systems provide two basic functions:

(1) GHG Accounting: C&T provides an accounting framework that insures that overall emissions targets are met.

(2) Abatement Incentives: C&T provides a uniform price signal that results in efficient GHG emissions reductions.

- In practice, however, these two functions may be impaired by the policy-induced "externality" of emissions leakage.

(1) Leakage results in an offsetting increase in emissions outside the cap that, by definition, are not properly registered in the C&T accounting system.

(2) Leakage results in a socially sub-optimal carbon price, as the offsetting increase in emissions outside the cap is not embedded in the price signal.

- Consequently, policymakers must endeavor to find alternative policy frameworks for those industries at risk of leakage.

KR

Resolving this externality requires allocating the "accounting" and "incentives" functions across two different instruments.

- **Challenge:** Design a framework that accounts for the cement industry's emissions within the statewide cap while preserving the non-discriminatory approach of TPS.

- **Solution:** Split the "accounting" and "incentives" function into two:

(1) Account for cement industry emissions within the cap using a "set aside reserve" and a "balance clearing transaction".

(2) Incentives GHG reductions through a separate set of transactions within the TPS system.

- **Result:** The functional equivalent of combining free allocations up to an industry GHG intensity standard with a legally consistent and durable border adjustment.

APPROACH

Performance Standard	Establish a cement performance standard corresponding to the average GHG intensity of the CA industry for the prior three years.
Set Aside Reserve	Establish a "set aside reserve" for managing ITC transactions during each compliance period.
Allocations	At the beginning of compliance periods, allocate a quantity of allowances to the reserve corresponding to projected emissions (i.e., capacity x performance standard)
C&T Balance Clearing	At the end of each compliance period, "true up" actual emissions (i.e., production x performance standard) by retiring a corresponding allowances from the reserve.
Issue TPS Permits	Issue TPS permits to those domestic producers and importers whose average GHG intensity exceeds the performance standard.
Generate TPS Obligations	Generate TPS permit obligations for those domestic producers and importers whose average GHG intensity standard falls short of the performance standard.
Trade & Integrate	Enable trading of TPS permits and integrate the TPS markets with other markets, including C&T (one-way link), SCM Credit Program (one-way link), and offsets programs.

KR

EXHIBIT 14

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

December 14, 2009

Professor Larry Goulder
Chair, Economic and Allocation Advisory Committee
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: California Cement Industry's Comments on the Economic and Allocation Advisory Committee's ("EAAC") December 9, 2009 Report

Dear Professor Goulder and Members of the EAAC:

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all six cement manufacturers operating the 11 cement plants in California,[1] would like to take this opportunity to comment on EAAC's December 9, 2009 and December 14, 2009[2] draft reports entitled "Allocating Emissions Allowances Under California's Cap-and-Trade Program." The following comments represent CSCME's specific observations about certain elements of EAAC's recommendations.

- **CSCME strongly agrees with the Committee's finding that it is advisable to use allowance value to "address emissions leakage problems associated with energy-intensive, trade-exposed industries."[3]**

The Committee notes that the risk of emissions leakage is greatest for "industries where two conditions hold: they use relatively more energy in production ('energy intensive') and they are exposed to unregulated competition in their export or import markets ('trade exposed')."[4] A variety of factors indicate that California cement producers are a textbook example of an energy-intensive, trade-exposed ("EITE") industry:

- Cement production is an energy-intensive process that requires the heating of limestone at extreme temperatures of 2,700-2,800 Fahrenheit. In principle, various fuels can be used in

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[1] The Coalition includes Cemex, Inc., National Cement Company of California Inc., California Portland Cement Company, Mitsubishi Cement Corporation, Texas Industries, Inc. and Lehigh Southwest Cement Company.

[2] CSCME will be reviewing the December 14, 2009 draft report released today in greater detail and may provide additional comments on this draft.

[3] EAAC, pg. 54.

[4] EAAC, pg. 12. Although CSCME strongly agrees with the spirit of this statement, we believe that a more precise characterization is warranted. Specifically, the risk of leakage is primarily determined by an industry's *GHG intensity* (*i.e.*, GHG emissions per dollar of output or value added) rather than its energy intensity *per se*. Furthermore, the risk of leakage is a function of exposure to *less stringently regulated* competition in general rather than unregulated competition in particular.

the pyroprocessing stage, but coal and petroleum coke have been the predominant fuels due to costs, availability, and superior performance characteristics.

- Cement production is inherently an emissions-intensive process. Common to all cement manufacturing is the chemical reaction that occurs when the calcium carbonate ("$CaCO_3$") in limestone is heated and breaks down into lime ("CaO") and carbon dioxide ("CO_2") — a process known as "calcination." These irreducible process emissions are fundamental to the manufacturing process and account for approximately 57% of CO_2 emissions in the California cement industry.[5]

- Cement is a fungible commodity that is actively traded in internationally competitive markets and competes almost exclusively on the basis of price. As a result, even seemingly small cost differentials between domestically-produced and imported cement can result in a substantial loss of competitiveness, reduction in market share, and disinvestment.

- California's location on the Pacific Ocean makes it easily accessible to imports of all products, including those that are typically expensive to transport by land, such as cement. The California cement industry's extreme exposure to imports was demonstrated as recently as 2006, when imports represented approximately 40% of California's total cement consumption.

This unique combination of energy intensity, emissions intensity, product fungibility, and exposure to international competition demonstrates that the California cement industry faces an extreme risk of emissions leakage.

- **The cement industry's status as an EITE industry has received widespread confirmation in a variety of policy venues and analyses.**

As noted by the Committee, various efforts are currently underway to identify those industries at risk of emissions leakage. The EITE frameworks embedded in leading national proposals, including the Waxman-Markey and Kerry-Boxer bills being considered by the U.S. Congress, apply a logical set of objective criteria (energy intensity, emissions intensity, trade intensity) to identify "presumptively eligible" industries. Using these criteria, numerous analyses -- including a preliminary assessment conducted by the U.S. Environmental Protection Agency -- have confirmed the cement industry's EITE status.[6]

Likewise, the EU's Emissions Trading System ("ETS") included a quantitative approach to identifying those sectors at risk of emissions leakage. The ETS methodology is based on the estimated cost

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[5] Lime is the key ingredient in cement, and CO_2 is released in a fixed ratio with the production of lime. In short, the majority of CO_2 emissions are a direct and unalterable consequence of the chemical reaction that is fundamental to the cement manufacturing process. These immutable "process emissions" distinguish the cement industry from many other carbon-intensive sectors, such as electric power or transportation.

[6] *See* U.S. EPA (June 2009). Comparison of FTI and EPA Analysis of H.R. 2454 Title IV. Memorandum Prepared for the House Energy & Commerce Committee Staff.

increases and trade exposure experienced by an industry. Again, based on an objective quantitative assessment, the European Commission confirmed the cement industry's EITE status.[7]

- **In the absence of effective anti-leakage measures, implementation of AB 32 is likely to result in a substantial cost differential between domestic and imported cement.**

The California cement industry's potential cost disadvantage under AB 32 is staggering. As a general rule of thumb, the production of one ton of cement results in one ton of CO_2 emissions and sells for approximately $100. Consequently, a carbon price of $30 per ton would result in a 30% increase in the price of cement. In the absence of measures that either relieve the initial cost pressure or impose equivalent costs of imports, such a substantial price increase will render the California cement industry economically unviable, will result in a massive shift in market share toward imports in the short run, and will precipitate sustained disinvestment in the California cement industry in the long run.

- **In the absence of effective anti-leakage measures, implementation of AB 32 is likely to result in a substantial increase in the emissions associated with California cement consumption.**

The potential negative impact on the GHG emissions associated with California's cement consumption is also staggering. In addition to the inevitable shift of California's cement consumption to less stringently regulated and less carbon efficient sources, the higher emissions associated with the transportation of cement imports is particularly troublesome. For instance, even under the broad and unrealistic assumption that all other production emissions are equal to those of highly-regulated California producers, imports of cement from China still result in 25% more emissions than cement produced and consumed in California due to the transportation of the product across the Pacific Ocean.[8] Thus, any shift in the sourcing of California's cement consumption to China is virtually certain to result in a net <u>increase</u> in global GHG emissions.

- **In the absence of effective anti-leakage measures, implementation of AB 32 is likely to result in environmentally inefficient substitution in downstream product markets.**

Even if the differential in compliance costs between domestically-produced and imported cement is equalized through the use of a border adjustment mechanism, the California cement industry is likely to remain at risk of "cross-sectoral" leakage. To the extent that cost equalization allows all cement suppliers to pass through the cost of regulation, consumers in downstream markets (*i.e.*, concrete batch plants and concrete product manufacturers) will be placed at a cost disadvantage to alternative construction materials, such as asphalt, steel, and lumber, especially if the carbon content of these materials escapes regulation.

Moreover, even if competing construction materials (*i.e.*, concrete, asphalt, steel, and lumber) are subject to a uniform carbon price, the outcome is likely to be both economically and environmentally

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[7] European Commission, Draft Commission Decision of determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage, approved September 18, 2009, available at

http://ec.europa.eu/environment/climat/emission/pdf/draft_dec_carbon_leakage_list16sep.pdf.

[8] ENVIRON International Corporation, Greenhouse Gas Emissions from Cement Importing, prepared for certain California cement producers, October 23, 2007. *See also* CARB, Draft Scoping Plan (June 2008) at C-106.

inefficient. This perverse result arises because the cap-and-trade system imposes a carbon price at the point of production, which does not take into account the higher lifecycle emission savings of concrete (including its production, use, and disposal) relative to competing construction materials (asphalt, steel, lumber). As a result, the price signal for those who select construction materials will be distorted -- erroneously incentivizing them to use products with a higher lifecycle emissions profile.

- **CSCME shares the Committee's view that border adjustments can be an effective method for reducing the risk of emissions leakage.**

CSCME strongly believes that border adjustments would be an effective tool for reducing emissions leakage caused by increased regulatory costs within the state of California. By including products originating outside California that are sold in the California market, border adjustments are a necessary part of a comprehensive policy to target emissions associated with the consumption of products in California. Moreover, a border adjustment is particularly effective in relation to cement, because the unique attributes described above make cement especially susceptible to leakage to imports and because the emissions associated with imports can be effectively identified, unlike products with more complex supply chains.[9]

- **CSCME disagrees, however, with the Committee's implied view that the use of allowance value and the implementation of a border adjustment are supplementary approaches.**

The EAAC report describes border adjustments as an "alternative" to allowance allocation.[10] CSCME would like to emphasize that these two approaches should not be considered mutually exclusive. The use of allowance value is an important component of a comprehensive policy because it lowers compliance costs within the state of California, minimizing the risk of cross-sectoral leakage. Industries may still face incremental compliance costs over and above the allowance value received, however, and a well-designed and targeted border adjustment can impose an equivalent incremental cost on imported cement that has a similar GHG profile -- providing more robust and effective leakage prevention than allowance allocation alone.

- **CSCME also disagrees that a regional and/or national cap-and-trade system would absolve the need for anti-leakage measures.**

In its report, the EAAC notes that "the extent of emissions leakage depends directly on the presence or absence of a regional or national cap-and-trade program" and that leakage would be "substantially reduced with the arrival of a regional or national-level cap-and-trade policy."[11] Although CSCME agrees that the implementation of a regional and/or national cap-and-trade (or equivalent) program would help to reduce emissions leakage caused by imports into California of goods from other U.S. states, such programs would not address leakage caused by imports from other countries (unless these programs contained a border adjustment covering foreign products). As noted above, the

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[9] Implementation and enforcement of a border adjustment for imports of cement is less complex than for other products. Cement is a fungible, commodity-type product without "a supply chain that involves many inputs from various sources." EAAC, pg. 13. Moreover, unlike other energy-intensive sectors (steel, chemical, aluminum, glass, etc.), the downstream products of cement (*i.e.*, concrete products) are normally not imported or otherwise traded across borders.

[10] EAAC, pg. 12.

[11] EAAC, pg. 6, 55.

California cement industry faces significant competition from overseas, especially cement producers in Asia, and very few imports originate from other U.S. states. Thus, the implementation of a regional and/or national cap-and-trade system is unlikely to significantly reduce the risk of leakage in the California cement industry.

- **CSCME strongly objects to EAAC's proposal that "border adjustments or other leakage-oriented measures should be of short duration (though renewable)" because such an approach would severely undermine any new investments to meet California's future cement demand.**

In addition to the points discussed above about the adoption of a regional or national policy removing the need for anti-leakage measures, the December 14, 2009 EAAC draft report introduces a new recommendation that border adjustments or other leakage-oriented measures should be of short duration in order to facilitate "adaptability," although with the possibility that such measures could be renewed.[12] CSCME strongly opposes this recommendation because it intentionally and necessarily introduces uncertainty into the regulatory regime. Cement is a capital intensive industry in which investment decisions require certainty and predictability over the long-term. The introduction of leakage-oriented measures that require periodic "renewal" undermines the ability to make sound investment decisions in the California cement industry.

It is important to keep in mind that you cannot achieve growth and development objectives in California without cement. It takes concrete to build and repair schools, roads, and bridges, construct new buildings and factories, and improve transportation infrastructure. Importantly, you also cannot implement effective climate change solutions without cement. Concrete is critical for adaptation strategies (such as flood controls and irrigation systems) and for mitigation strategies (such as wind farms). Because climate change is a global problem, it is simply not realistic (or equitable) to expect that California's cement consumption, and the emissions associated with it, should be out-sourced to developing countries. Thus, we have the unusual situation where the preservation and growth of a healthy and secure California cement industry is both in the economic and climate change interests of California.

Accordingly, California's climate change regime must establish sufficient long-term certainty and predictability in the operation and effectiveness of measures to address the significant risk of leakage in the California cement industry. Without such a regime, California's cement consumption will not be met by new investments in California but by increased imports with a higher GHG emissions footprint, undermining both California's economic development and climate change objectives.

- **CSCME believes that it is both possible and desirable to design a policy framework that leverages the benefits of both allowance allocation and border adjustment mechanisms in a manner that minimizes the risk of leakage in a WTO consistent manner.**

As the EAAC report notes, both the allocation of allowance values and the implementation of a border adjustment may be subject to challenge under the U.S. Constitution and the World Trade Organization ("WTO") agreements, which set rules for the trading of goods between U.S. states and Member countries of the WTO, respectively. CSCME believes that the design of these programs should take

[12] EAAC (December 14, 2009), pg. 58.

into account potential challenges under these legal regimes in an effort to minimize the risk of an unfavorable finding by a U.S. court or WTO dispute settlement panel. Importantly, CSCME considers that with the proper policy design these measures can indeed survive any future judicial or WTO challenge. For example, a successful policy design would not discriminate between in-state and out-of-state (including foreign-made) products or between one foreign country and another (*i.e.*, such design should generally apply the same requirements to products from all sources). It would also be tailored to problems that are specific to California's environment and population, rather than trying to regulate the effects of climate change outside of the state. CSCME has specific design proposals that would meet these criteria and looks forward to sharing these ideas with the EAAC in the near future.

CSCME appreciates the continuing work of the Committee in drafting its recommendations and looks forward to maintaining an open dialogue regarding how to achieve California's climate change goals through carefully designed policy measures that minimize the potential for emissions leakage.

Sincerely yours,

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
Linda Adams, California Environmental Protection Agency
Andrew Altevogt, California Environmental Protection Agency
Victoria Bradshaw, California Governor's Office
Steven Cliff, California Air Resources Board
David Crane, California Governor's Office
James Goldstene, California Air Resources Board
Kevin Kennedy, California Air Resources Board
John Moffatt, California Governor's Office
Mary Nichols, California Air Resources Board
Dan Pellissier, California Governor's Office
Michael Prosio, California Governor's Office
Cindy Tuck, California Environmental Protection Agency

EXHIBIT 15

From: Michael Stevens [MStevens@natcem.com]
Sent: Tuesday, December 15, 2009 5:48 PM
To: 'John Bloom'; Orava, Steve; McNulty, Mark (mmcnulty@keybridgeresearch.com); Bruce A. Magnani; Bleimund, Emily
Subject: FW: Economic and Allocation Advisory Committee

Just sent.

From: Michael Stevens
Sent: Tuesday, December 15, 2009 2:47 PM
To: 'eaac@calepa.ca.gov'
Subject: Economic and Allocation Advisory Committee

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all six cement manufacturers operating the 11 cement plants in California, would like to take this opportunity to comment on the EAAC draft report.

Yesterday, CSCME submitted detailed comments to EAAC. Today, we would like to reinforce the following four principle points.

- First, CSCME strongly agrees with the Committee's finding that it is advisable to use allowance value to "address emissions leakage problems associated with energy-intensive, trade-exposed industries", and we would note that the cement industry's EITE status has been repeatedly confirmed in various policy venues. As noted in our comment letter, several factors indicate that the risk of emissions leakage is likely to be particularly severe in the California cement industry.

- Second, CSCME also shares the Committee's view that border adjustments can be an effective method for reducing the risk of emissions leakage. By including products originating outside California that are sold in the California market, border adjustments are a necessary part of a comprehensive policy to target emissions associated with the consumption of products in California.

- Third, CSCME disagrees, however, with the Committee's implied view that the use of allowance value and the implementation of a border adjustment are mutually exclusive approaches. The use of allowance value is an important component of a comprehensive policy because it lowers compliance costs within the state of California. Depending on the design of the allocation mechanism (e.g., benchmarking), however, some domestic producers may still face incremental compliance costs over and above the allowance value received, and a well-designed and targeted border adjustment can impose an equivalent incremental cost on imported cement that has a similar GHG profile -- providing more robust and effective leakage prevention than allowance allocation alone.

- Finally, CSCME believes that it is possible and desirable to design a policy framework that leverages the benefits of both allowance allocation and border adjustment mechanisms in a manner that maintains incentives to abate in the California cement industry while minimizing the risk of leakage in a WTO consistent manner. CSCME has specific design proposals that would meet these criteria and looks forward to sharing these ideas with the EAAC in the near future.

As the EAAC recognizes, the nature and potential extent of emissions leakage can vary significantly across industries. Consequently, "one-size-fits-all" approaches are unlikely to effectively and efficiently resolve the leakage challenge. We encourage the EAAC to more closely consider the specific circumstances of the California cement industry and endeavor to develop a targeted, customized approach that has the greatest potential to minimize emissions leakage in this uniquely challenged industry.

Questions

(1) The EAAC states in its draft report that, "border adjustments or other leakage-oriented measures should be of short duration (though renewable)". We would submit that such a "renewable" border adjustment creates an unpredictable policy environment that, in and of itself, can impair investment and exacerbate emissions leakage. Can you please elaborate on the EAAC's views regarding the prioritization of the regulator's desire for "adaptability" over private industry's need for predictability, and the appropriate balance between these two objectives as it relates to minimizing emissions leakage?

(2) In its report, the EAAC notes that "the extent of emissions leakage depends directly on the presence or absence of a regional or national cap-and-trade program" and that leakage would be "substantially reduced with the arrival of a regional or national-level cap-and-trade policy." We would note, however, that the vast majority of California cement imports originate from jurisdictions that are unlikely to be covered by either the WCI or a federal climate policy. We would also note that in 2006, a year in which cement imports reached 40% of total California cement consumption, the vast majority of imports originated from China and other Asian nations that are unlikely to adopt similarly stringent, binding, and verifiable emissions targets for the foreseeable future. Can you comment on the EAAC's views regarding the extent to which a regional or national cap-and-trade program is likely to substantially reduce leakage for the California cement industry, and the extent to which this thinking is or is not currently incorporated into the current draft report?

(3) The EAAC report describes border adjustments as an "alternative" to allowance allocation. CSCME would like to emphasize that these two approaches should not be considered mutually exclusive. Can you comment on the EAAC's general views regarding how these two approaches might be used in a complementary manner and, more specifically, the extent to which it has considered options that have the potential to leverage the unique advantages of both approaches?

Michael D. Stevens, Esq.
V.P. Government Affairs
National Cement Company of California, Inc.
15821 Ventura Blvd., Suite 475
Encino, CA 91436-4778
818-728-5200
mstevens@natcem.com

EXHIBIT 16

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

January 9, 2010

Professor Larry Goulder
Chair, Economic and Allocation Advisory Committee
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: California Cement Industry's Comments on the Economic and Allocation Advisory Committee's ("EAAC") January 2 and 7, 2010 Draft Reports

Dear Professor Goulder and Members of the EAAC:

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all six cement manufacturers operating the 10 cement plants in California,[1] would like to take this opportunity to comment on EAAC's January 2 and 7, 2010 draft reports entitled "Allocating Emissions Allowances Under California's Cap-and-Trade Program." CSCME is pleased to find that the prior versions of the report were amended to better characterize the risk of leakage in energy-intensive, trade-exposed ("EITE") industries, the policy options for minimizing that risk, and the important role that leakage minimization plays in achieving AB 32's environmental objectives.

Despite these revisions, CSCME still has several significant concerns regarding the report. In particular, we note that much of the analysis and many of the recommendations are general in nature. In contrast, the challenges associated with minimizing emissions leakage in the California cement industry are unique, especially in comparison to the electric power and transportation fuel sectors, which appear to be the primary reference point of the report. Consequently, we believe it is appropriate for the EAAC to acknowledge both the generality of its recommendations and areas in which more detailed industry-specific analysis is still required to confidently make conclusions about the optimal approach for minimizing leakage in specific industries.

The following comments represent CSCME's specific observations and suggested revisions.

- **CSCME disagrees with the Committee's view that the use of allowance value and the implementation of a border adjustment are "alternative" approaches.**

In section 6(2) of its report, the Committee recommends that CARB use free allocation to address leakage "only in circumstances where the alternative of some form of border adjustment is not practical." As stated in previous submissions, CSCME would like to emphasize that these two approaches should not be considered mutually exclusive and, within certain policy design parameters, are complementary. In the unique circumstances of the California cement industry, both types of measures are critical to address the significant risk of leakage. The use of allowance value is necessary to lower compliance costs within the state of California in order to reduce leakage to cement imports

[1] The Coalition includes Cemex, Inc., National Cement Company of California Inc., California Portland Cement Company, Mitsubishi Cement Corporation, Texas Industries, Inc. and Lehigh Southwest Cement Company.

and minimize the risk of cross-sectoral leakage. However, the use of allowance value alone may not be sufficient to create a level playing field with imports. Consequently, an effective border adjustment measure is a critical complementary measure to minimizing the risk of leakage to imported cement that does not face an equivalent incremental cost burden. The Committee's recommendations should not preclude the use of both measures where necessary to address the unique circumstances of the cement industry.

CSCME suggests the following minor revision to ensure that the EAAC's recommendations do not pre-judge the most appropriate regulatory approach for the California cement industry:

> 2. The EAAC [sic] recommends that the ARB employ free allocation only for the purpose of addressing emissions leakage associated with energy-intensive trade-exposed industries, and only in circumstances where the alternative of some form of border adjustment is not practical **<u>or is insufficient alone to address emissions leakage for a particular industry</u>**.

- **CSCME reiterates its strong objection to EAAC's proposal that "border adjustments or other leakage-oriented measures should be of short duration (though renewable)" because such an approach would result in disinvestment and leakage.**

In section 6(3) of its recommendations, the Committee states that any leakage-oriented measures should be "of short duration (though renewable), thereby allowing more adaptability." CSCME strongly opposes this recommendation because it intentionally and necessarily introduces uncertainty and unpredictability into the regulatory regime. Like other energy-intensive industries, the cement industry is highly capital intense with long-lived assets, and investment decisions require certainty and predictability over the long-term. The introduction of leakage-oriented measures that require periodic "renewal" undermines the ability to make sound present and future investment decisions in the California cement industry, including high cost facility alterations as well as the development and implementation of major new technologies such as carbon capture and sequestration ("CCS").

In fact, absent predictability in the duration of leakage-oriented measures and in the conditions for renewal, adoption of the Committee's approach would result in substantial disinvestment in the California cement industry. Investment will shift to other jurisdictions where there is greater regulatory certainty and where production (and associated transportation) may generate higher GHG emissions, thus generating the leakage that the relevant measures were intended to address.

The Committee does not provide a rationale to support its implied view that the significant risk of leakage, particularly in the cement industry, will decrease over an unspecified "short duration" or the circumstances that would lead to such reduction. The EAAC does not suggest logical and transparent criteria to govern the decision to renew such a policy. In the absence of logical and transparent criteria, decisions to renew the policy are likely to be arbitrary and subject to political manipulation. This would result in a substantially less predictable investment environment -- thereby increasing rather than decreasing the risk of leakage.

Moreover, although referencing the issue of international leakage -- the major concern for the California cement industry -- the Committee only refers to leakage-oriented measures being "conditional on the absence of regional or national climate change efforts." The Committee's only justification for short duration is to allow for more adaptability but the Committee does not explain what such adaptability would consist of. One would have to understand the unique circumstances of an industry to determine if measures can be taken to effectively adapt to climate change regulations and remain competitive with imports. California cement producers compete in a globally competitive commodity industry and can not pass thru higher climate change compliance costs without losing sales to foreign cement producers that do not have such costs. California cement producers are already highly energy efficient compared to foreign cement producers and approximately half of the emissions are process emissions which are unavoidable until an economically feasible CCS technology becomes available. And, even if such a CCS technology becomes available, leakage protections will be necessary to insure its deployment since it will be a cost that foreign cement producers without comparable climate change regulations would not have.

Prematurely phasing out leakage protections before equally stringent climate change regulations are adopted throughout the world will result in leakage and would likely result in an increase in global emissions due to the high transportation related emissions associated with imports. The California Air Resources Board (CARB) is the entity that should determine what is the most environmentally effective framework to minimize leakage based on each industry's unique circumstances and the Committee should appropriately qualify its recommendation in deference to CARB.

CSCME suggests the following minor revision to address its concerns:

> 3. The EAAC advises the ARB to adopt policy instruments that can be substantially modified or eliminated as leakage problems change with the emergence of regional, ~~or~~ federal**, or international** policies. The ARB should avoid policies that create property rights or other entitlements that cannot be changed should regional, ~~or~~ federal**, or international** policies be adopted. The ARB's commitments to border adjustments or other leakage-oriented measures should be **based on the unique circumstances of each industry and should generally be** of short duration (though renewable), thereby allowing more adaptability, **with the duration and applicable conditions for renewal set forth clearly to maximize predictability for future investment decisions**.
>
> > The prospect of these changing circumstances implies that the ARB's commitments should be easily adaptable to changing circumstances and conditional on the absence of regional, ~~or~~ national**, or international** climate efforts.

- **The Committee's comments do not reflect a sufficiently detailed analysis of the relative competitive advantage of domestic versus imported products, particularly in relation to the unique circumstances facing the cement industry.**

In footnote 22 and section 5.1.4 of the January 7, 2010 draft report, EAAC states that local producers can have a cost advantage over imports "due to transportation or other costs" and that, as a result, increased costs of climate change regulation may only lower profits and not result in a shift in consumption to imports. CSCME has several concerns about this statement.

First, the statement certainly does not reflect conditions within the California cement industry, and it is doubtful that it reflects conditions for in California manufacturing industries in general. California producers face enormous federal and state regulatory compliance costs, energy, labor, materials, insurance, and other costs and conditions that not only may equalize, but in most instances exceed any absolute competitive advantage based solely on transportation costs borne by imports. Furthermore, as explained in earlier comments, the California cement industry's potential cost disadvantage under AB 32 is staggering, with a carbon price of $30 per ton, for example, resulting in excess of a 30% increase in the price of cement. Thus, even with a price of carbon at the low end of current estimates, the impact on the price of cement is likely to be significant, will substantially outweigh any absolute advantage associated with the avoidance of transportation costs faced by imports, and will adversely affect the relative competitive conditions between California-produced cement and imported cement.[2] Accordingly, the Committee should avoid such general, hypothetical, and undocumented statements in the absence of detailed industry analysis that supports these claims.

Second, the statement implies that leakage is not a concern unless the absolute costs of domestic products exceed that of imports. It ignores the fact that export decisions are driven by marginal costs and an asymmetric increase in marginal costs for California cement producers would put them at a competitive disadvantage. This would reduce or potentially eliminate profits, which would precipitate plant closures and a shift in capital investment toward less stringently regulated jurisdictions -- thereby increasing leakage.

Accordingly, CSCME strongly recommends that the following two portions of the text be deleted.

Footnote 22:

> 22 In a market that imports products, local producers can enjoy a cost advantage due to transportation or other costs. In these circumstances, increasing CO2 regulation may raise local costs, but not enough to make imports cheaper than local production. In this case, local producers will experience lower profits but still maintain their local production as imports would still be a more expensive source.

Section 5.1.4:

> For several of the remaining industries, the additional cost of putting a price on CO2 emissions may not exceed the additional cost of importing competing products.

- **The Committee's comments should more explicitly recognize that increased electricity costs for EITE industries can substantially increase the risk of leakage, and that any anti-leakage measures for such industries should offset these indirect emissions costs through the administrative allocation of allowance value.**

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[2] Depending on the country, foreign producers may also benefit from substantial subsidies or other state intervention that significantly distorts the conditions of competition in favor of imports.

Electricity costs can represent as much as 25-30% of total manufacturing costs for a cement producer, and the adoption of a cap-and-trade program has the potential to increase these costs substantially. Furthermore, due to the existing high electric power costs within the state, California cement producers have already invested heavily in measures to improve electricity efficiency -- making it one of the most electricity efficient cement industries in the world. To the extent that electric power cost increases are not offset upstream, any anti-leakage measure for the cement industry (or other EITE industries) should offset these indirect emissions costs through the administrative allocation of allowance value.

CSCME appreciates the Committee's efforts in drafting its recommendations and looks forward to maintaining an open dialogue regarding how to achieve California's climate change goals through carefully designed policy measures that minimize the potential for emissions leakage.

Sincerely yours,

John T. Bloom, Jr.

Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:

Linda Adams, California Environmental Protection Agency

Andrew Altevogt , California Environmental Protection Agency

Victoria Bradshaw, California Governor's Office

Steven Cliff, California Air Resources Board

David Crane, California Governor's Office

James Goldstene , California Air Resources Board

Kevin Kennedy , California Air Resources Board

John Moffatt , California Governor's Office

Mary Nichols, California Air Resources Board

Dan Pellissier, California Governor's Office

Michael Prosio, California Governor's Office

Cindy Tuck, California Environmental Protection Agency

EXHIBIT 17

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

January 11, 2009

Ms. Mary Nichols
Chair, California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: California Cement Industry's Comments on the Preliminary Draft Regulation for a California Cap-and-Trade Program

Dear Ms. Nichols,

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all of the six cement manufacturers operating the 10 cement plants in California,[1] hereby submits the following comments to the California Air Resources Board ("CARB") November 24, 2009 Preliminary Draft Regulation for a California Cap-and-Trade Program ("PDR") for the implementation of the Global Warming Solutions Act of 2006 ("AB 32").

(1) In order to provide meaningful comments, CSCME requires additional details about how CARB plans to address the significant risk of leakage in the cement industry.

CSCME's prior submissions to CARB present the unique position of the California cement industry and its significant exposure to leakage. The PDR at page 9 expressly states that CARB staff is continuing to evaluate the treatment of the cement industry and "will provide more detail in the Spring 2010 draft regulation." As of this date, CSCME's ability to provide substantive comments on specific provisions of the PDR that will directly impact the cement industry, including key definitions (*e.g.*, "cement"), the appropriate point of regulation, the surrender requirements for covered entities, the distribution of allowance value, and changes that may be needed to the mandatory reporting requirements is limited due to the status of the PDR.

CSCME looks forward to working closely with CARB in the coming months to ensure that its views are fully considered in this phase of the rulemaking. CSCME intends to continue to work with CARB to identify and develop details well in advance of the April draft regulation about how the cement industry will be regulated under AB 32.

While CSCME has submitted a proposed regulatory framework for the industry and is actively engaged in discussions with CARB, we are concerned that we are getting very close to the Spring 2010 release date for detailed regulations without knowing how the cement industry will be regulated.

(2) A "one-size-fits all" approach is insufficient to address the unique situation of the cement industry.

As CARB awaits the final recommendations from the Economic and Allocation Advisory Committee ("EAAC"), we would like to emphasize that the threat of leakage faced by the California cement industry cannot be addressed by a "one-size-fits all" regulatory approach. The California cement industry faces

[1] The Coalition includes CalPortland Company, Cemex, Inc., Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California Inc., and Texas Industries, Inc.

significant competition from both cement producers in unregulated jurisdictions outside of the United States and from producers of other substitutable products with higher lifecycle greenhouse gas ("GHG") emissions. Because cement is a fungible commodity and cost increases cannot be passed through to end users, failure to address the significant risk of cross-border leakage through an effective border measure and failure to address the significant risk of cross-sectoral leakage through cost mitigation measures will lead to detrimental consequences for both the California cement industry and the state's climate change objectives (all of which have been addressed in previous submissions to CARB as part of the public record in the development of the Scoping Plan and following its adoption). CSCME is concerned that the EAAC's recommendations with respect to reducing leakage in energy-intensive and trade-exposed industries in general, such as the use of allowance value and the application of a border adjustment mechanism, may not adequately reflect the specific challenges and unique circumstances of the California cement industry in particular.

(3) Allowance value should be used to reduce the risk of emissions leakage in energy-intensive and trade-exposed industries.

In the PDR, CARB discusses the auctioning of allowances, noting that it is awaiting final recommendations from the EAAC on this subject.[2] In its December 14, 2009 draft report, the EAAC found that the allocation of allowance value was advisable for energy-intensive, trade-exposed industries that face a threat of emissions leakage.[3] CSCME agrees with this assessment and believes that the administrative allocation of allowance value to energy-intensive, trade-exposed industries is a critical component of an effective and robust leakage prevention policy.

The EAAC report also notes the potential value of applying a border adjustment to imports of products in these sensitive sectors. CSCME supports such an approach, but does not agree with the Committee's draft recommendations that border adjustments are a mutually-exclusive "alternative" to the administrative allocation of allowance value, that emissions leakage would be substantially reduced by the enactment of regional or national emissions reduction programs, or that border adjustments should be "of short duration."[4] Attached are the detailed comments that CSCME has submitted to EAAC on these issues.

(4) The PDR's 4 percent limit on offsets does not sufficiently mitigate compliance costs and will lead to additional carbon leakage.

CSCME believes that the use of offsets as a compliance mechanism for a climate change regulatory program is essential to adapting to the new regulations in an economically-sustainable manner. AB 32 requires that CARB design regulations in a manner that "seeks to minimize costs."[5] Offsets not only lower compliance costs, but they also provide California industries with additional time to invest in new research and to develop cleaner technologies, while simultaneously spurring immediate innovation and technology development by offset suppliers.

For the cement industry in particular, the use of offsets will help to minimize the threat of leakage. Although a robust offset program is not a substitute for other effective anti-leakage measures (such as the administrative allocation of allowance value and the application of compliance requirements to imported products), offset programs that reduce the cement industry's compliance costs could play an important role in an effective and robust approach to minimizing leakage in the California cement sector.

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[2] PDR at 8, 34, 47.
[3] EAAC report at 57.
[4] EAAC report at 57-58.
[5] AB 32 at § 38562(b)(1).

For instance, by partially mitigating compliance costs and, therefore, the competitive cost disadvantage experienced by California cement producers as a result of the policy, offsets will reduce shifts in demand from California-made cement to foreign cement, which typically has a higher emissions profile due to both higher-emission production processes as well as the additional emissions associated with the transportation of the product to the California market.

The PDR includes strict requirements for the qualification of offset programs to ensure that they are associated with real, verifiable, and permanent reductions in GHG emissions. CSCME believes that such requirements are essential to ensuring the quality of offsets. With these strict requirements in place, however, there is no compelling environmental or economic rationale for imposing quantitative or geographic restrictions on the use of offsets. Indeed, California's proposed limit on the use of offsets is substantially more restrictive than those proposed in leading federal legislative proposals. CSCME recommends that CARB reevaluate the proposed limit on the use of offsets and the extent to which a more robust approach would advance the objectives of AB 32, including cost effectiveness and leakage minimization.

(5) Appropriately designed sector-based crediting systems can play an important role in reducing the risk of emissions leakage in the California cement industry.

In the PDR, CARB discussed the possible use of a sector-based crediting mechanism to achieve emissions reductions in the developing world.[6] CARB notes that the international community is currently discussing such programs, which would increase participation in international efforts to address climate change. CSCME appreciates the role that sector-based initiatives can play in reducing global GHGs, as different sectors face distinct challenges and specific considerations in adapting to emissions reduction requirements. CSCME cautions, however, that the integration of such sector-based crediting programs into a California regulatory program must be designed carefully to avoid unintended economic and environmental impacts, including significant leakage, distortions to the global cement market, and disguised subsidization of foreign cement producers. CSCME generally supports the development of international sector-based crediting systems and looks forward to more detailed discussions with CARB on the most appropriate design for such systems and on how the California cement industry can play a productive role in their successful implementation.

(6) The definition of "lifecycle greenhouse gas emissions" should be broadened to reflect its potential application in other contexts.

The concept of lifecycle GHG emissions is critical to the proper functioning of a cap-and-trade system. To the extent that a product's embodied emissions differ significantly from its lifecycle emissions, carbon prices may result in distorted market signals and perverse environmental outcomes. Thus, CARB should expand its definition of lifecycle emissions, improve its consideration of products other than transportation fuels, and enhance its applicability to other products in which embodied emissions may not accurately reflect true environmental costs.

CSCME recognizes that CARB is awaiting the EAAC final report before completing its proposal for inclusion of the cement industry under the final regulation. We hope that EAAC takes our comments into account in their final report and look forward to working with CARB in designing a regulation that is most appropriate to address the unique characteristics of the California cement industry.

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[6] PDR at 77-80.

Sincerely yours,

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

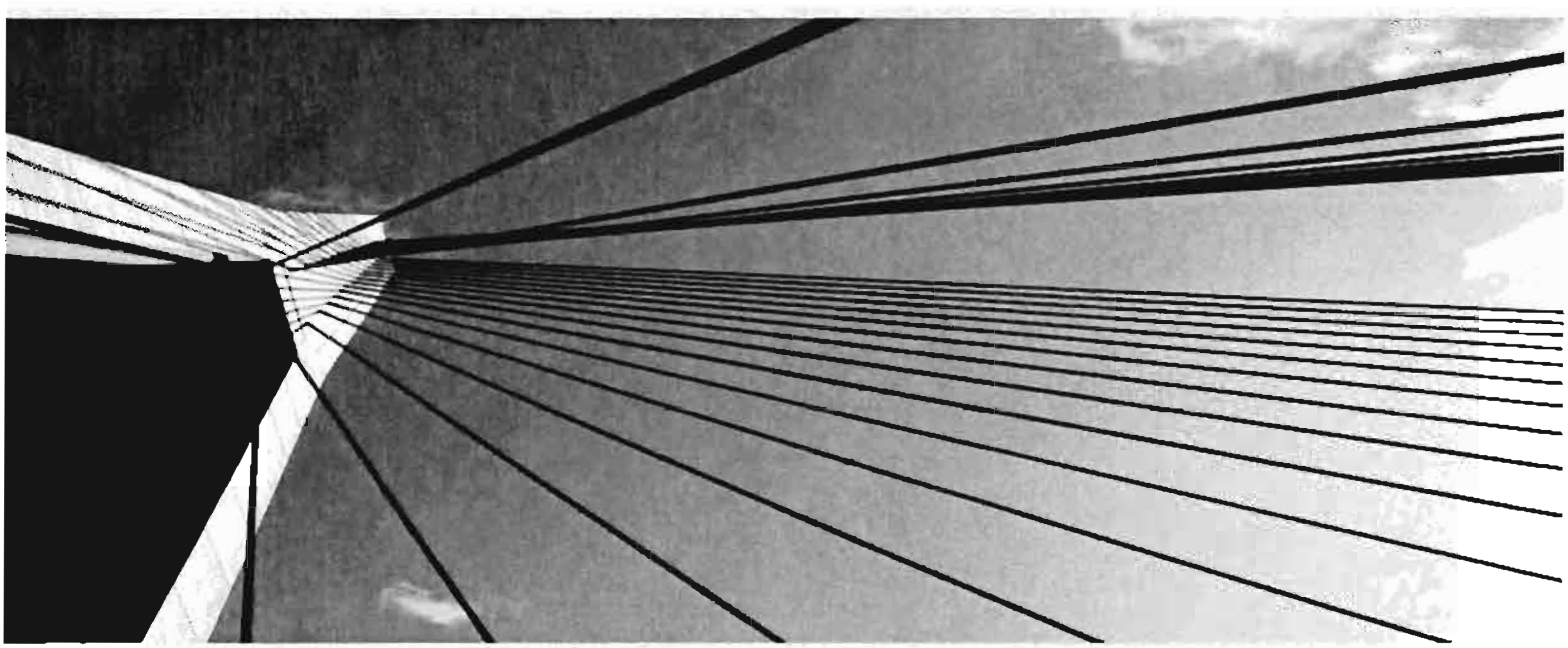
CC:
Linda Adams, California Environmental Protection Agency
Andrew Altevogt, California Environmental Protection Agency
Victoria Bradshaw, California Governor's Office
David Crane, California Governor's Office
James Goldstene, California Air Resources Board
Kevin Kennedy, California Air Resources Board
John Moffatt, California Governor's Office
Dan Pellissier, California Governor's Office
Michael Prosio, California Governor's Office
Cindy Tuck, California Environmental Protection Agency

EXHIBIT 18

KEYBRIDGE RESEARCH

CTL GROUP
Building Knowledge Delivering Results

Prospects for Expanding the Use of Supplementary Cementitious Materials in California



Prepared For:
Coalition for Sustainable Cement Manufacturing & Environment

Dr. Robert F. Wescott
Mark W. McNulty
Martha G. VanGeem
John Gajda

February 16, 2010

The Coalition for Sustainable Cement Manufacturing & Environment is a coalition of all six cement manufacturers operating the 10 cement plants in the state of California. The Coalition includes California Portland Cement Company, Cemex, Inc., Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California Inc., and Texas Industries, Inc.

EXECUTIVE SUMMARY

With the assistance of effective public policies, the cement industry can play a multi-faceted role in California's efforts to build an environmentally and economically sustainable future. Although cement manufacturing is an energy-intensive process that accounts for approximately 2.5% of California's greenhouse gas ("GHG") emissions, it is also an essential ingredient in concrete – a durable, indispensible building block of modern economies with many "green qualities" that directly contribute to reducing California's carbon footprint. Consequently, any successful program to regulate GHG emissions must not only incentivize cost-effective emissions reductions throughout the cement-concrete supply chain, but must also incentivize those reductions that result from the increased use of concrete products in California's buildings, roads, bridges, and other infrastructure.

The expanded use of supplementary cementitious materials ("SCMs") represents one pathway for achieving the twin objectives of reducing the GHG footprint associated with cement production while expanding the deployment of concrete products in California. SCMs include a wide range of industrial byproducts and mined materials (e.g., coal fly ash, steel blast furnace slag, silica fume, and pozzolonic materials), all of which have inherent cementitious properties or develop cementitious properties when hydrated in the presence of portland cement. When blended with cement in concrete, SCMs contribute important environmental, economic, and performance benefits.

Despite these potential benefits, however, a variety of technical, market, regulatory, legal, and policy barriers continue to limit the deployment of SCMs in the California marketplace beyond existing levels. In the short and medium terms, some of these barriers can be addressed through regulatory modifications and policy instruments that encourage all stakeholders within the cement-concrete supply chain – including environmental regulators, SCM suppliers, cement manufacturers, concrete manufacturers, architects, engineers, specifiers, and owners of the constructed environment – to optimize SCM usage.

In the long term, however, fundamental economic and policy trends are likely to create an environment of extreme uncertainty in SCM markets. For instance,

- The adoption of federal climate change policy is likely to simultaneously decrease the supply and increase the demand for fly ash and slag – resulting in exceedingly tight market conditions for the two most commonly used SCMs. Supplies would be particularly tight in the California market, given its distance from sources of key SCM supplies.
- Increasingly stringent mercury emissions controls at coal-fired power plants are likely to reduce the quantity of fly ash suitable for use in concrete.
- The development and deployment of cost-effective beneficiation technologies may provide an "upside surprise" for fly ash supplies in the long term, though beneficiation also requires greater costs and environmental burdens due to processing.

This environment of uncertainty has recently been compounded by a large-scale coal ash spill in Tennessee, which has prompted the U.S. EPA to consider labeling fly ash as a hazardous waste. Even if such a ruling does not legally, technically, or economically preclude the use of fly ash in concrete, the public stigma alone could effectively compromise the viability of fly ash substitution strategies.

Within this backdrop of uncertainty, California regulators must endeavor to design policies that remove impediments to increased SCM consumption and optimize SCM utilization in a manner that is equitable and consistent with evolving market conditions in the short, medium, and long terms. In the absence of a deliberate and coordinated effort to align policy instruments throughout the cement-concrete supply chain – including carbon price incentives, codes, standards, procurement guidelines, and consumer education – SCM utilization in California is likely to fall short of its full potential, regardless of prevailing market conditions. In the presence of supportive policies that remove barriers to deployment and leverage flexible market-based mechanisms to provide incentives throughout the cement-concrete supply chain, however, the environmentally and economically efficient use of SCMs in California is likely to be optimized in a manner consistent within highly dynamic, uncertain, and evolving market conditions.

TABLE OF CONTENTS

I. INTRODUCTION

With the assistance of effective public policies, the cement industry can play a multi-faceted role in California's efforts to build an environmentally and economically sustainable future. Although cement manufacturing is an energy-intensive process that accounts for approximately 2.5% of California's greenhouse gas ("GHG") emissions[1], it is also an essential ingredient in concrete – a durable, indispensible building block of modern economies with many "green qualities" that directly contribute to lowering California's GHG emissions through:

- **Enhanced Building Energy Efficiency:** Concrete's high thermal mass allows it to store heat better than other building materials, resulting in enhanced energy efficiency for buildings constructed with concrete walls.[2] As such, concrete structures require less energy to heat and cool than other building types with similar insulation levels, thus lowering energy-related CO_2 emissions.
- **Improved Fuel Efficiency:** Due to its rigidity, concrete pavement enhances fuel efficiency of vehicles when compared to more flexible and rough surface alternative pavement materials.[3] Improved vehicle highway mileage directly reduces CO_2 emissions.
- **Reduced Road Maintenance:** Concrete pavements are more durable than asphalt pavements, and require less energy intensive repair, maintenance, and refurbishment. Additional CO_2 emissions are reduced from a lower incidence of construction-related congestion and bottlenecks.
- **Reduced Electricity Demand:** Light-colored concrete reflects light better than dark materials, and evidence suggests that concrete sidewalks, parking lots, and streets need 36% less lighting at night than asphalt equivalents.[4]
- **Mitigated Urban Heat Island Effect:** Improved reflectivity also means that concrete reduces the absorption of solar energy and lowers ambient temperatures, particularly in urban environments.[5] According to the U.S. Environmental Protection Agency ("EPA"), concrete exhibits significantly more favorable "cooling" characteristics than any other material examined, including asphalt.[6]
- **GHG Absorption Upon Recycling:** Several studies indicate that 28%-39% of the volume of CO_2 emitted during the cement calcination process is reabsorbed by concrete during its service life, with this percentage increasing significantly if concrete is crushed prior to recycling.[7]

In short, environmental assessments that focus exclusively on the cement production process are likely to significantly overestimate the net GHG emissions associated with the full cement product lifecycle, including its use in concrete and its ultimate removal from service. Policy frameworks that fail to accurately account for these "cradle-to-grave" impacts are likely to incentivize the consumption of environmentally inferior alternatives to concrete. Simply put, an effective regulatory program must not only incentivize GHG reductions throughout the cement-concrete supply chain in a manner that is technically feasible, cost effective, and minimizes the risk of leakage, but must also incentivize reductions that result from the increased use of concrete products in California's buildings, roads, bridges, and other infrastructure.

The expanded use of supplementary cementitious materials ("SCMs") represents one pathway for achieving the twin objectives of reducing the GHG footprint associated with cement while expanding the deployment of concrete products in California. SCMs include a wide range of industrial byproducts and mined materials (e.g., coal fly ash, steel blast furnace slag, silica fume, and pozzolonic materials), all of which have inherent cementitious properties or develop cementitious properties when hydrated in the presence of portland cement. When blended with cement for use in concrete, SCMs contribute several important environmental, economic, and performance benefits, including:

- **Environmental Benefits:** SCMs can reduce requirements for cement clinker, the principle binding agent in concrete and the primary source of GHG emissions in the cement-concrete supply chain. Furthermore, SCMs can increase the quantity of cementitious material in the marketplace, which expands the potential supply chain for concrete. Finally, given that many SCMs are waste byproducts, SCM usage can reduce landfill requirements and the associated environmental impacts.[8]
- **Economic Benefits:** SCMs serve as "extenders" for locally produced cement, enabling cement manufacturers to cost-effectively meet consumers' needs during construction booms without undertaking expensive investments in new production facilities that may prove uneconomic as demand decreases.
- **Performance Benefits:** When used properly, SCMs can significantly augment concrete performance, improving finishability, workability, and pumpability of unhardened concrete, as well as enhancing the strength and durability of hardened concrete. Although not a "one-size-fits-all" solution, the performance benefits of SCM substitution are recognized within certain construction parameters.

The California cement industry is acutely aware of these benefits, and continues to be a proponent of the use of SCMs in concrete.

Despite its benefits, however, a variety of factors continue to limit the deployment of SCMs in the California marketplace beyond existing levels, including technical, market, regulatory, legal, and policy barriers. In the short and medium terms, many of these barriers can be addressed through regulatory modifications and policy instruments that encourage all stakeholders within the cement-concrete supply chain – including environmental regulators, SCM suppliers, cement manufacturers, concrete manufacturers, architects, engineers, specifiers, and owners of the constructed environment – to optimize SCM usage.

In the long term, however, fundamental economic and policy trends are likely to create new challenges that will strain SCM markets. For instance,

- Federal climate change legislation is likely to reduce conventional coal-fired electric power generation and integrated steel manufacturing – the two principal sources of commonly utilized SCMs, namely coal fly ash and blast furnace slag.
- Federal climate change legislation is also likely to increase the demand for SCMs due to their capacity to decrease GHG emissions and, therefore, reduce compliance costs.

- Similar supply and demand conditions are likely to materialize globally as the international community endeavors to stabilize GHG concentrations in the atmosphere.

The cumulative impact of these trends on the California cement and concrete industries will only be compounded by the state's distance from key sources of fly ash and slag, making the state a marginal consumer in both the domestic and international markets for SCMs.

With these issues and complexities in mind, the purpose of this study is to provide policymakers with information and analysis necessary to develop regulations and design instruments that have the greatest potential to remove impediments to increased SCM consumption in California and optimize SCM utilization in a manner that is consistent with evolving market conditions in the short, medium, and long terms. The study is organized as follows. Section II provides background information on the role of SCMs in the cement-concrete supply chain. Section III identifies key barriers to increased SCM utilization in California. Section IV examines the implications of environmental policy trends on the future supply of fly ash in the California market. Section V concludes with a discussion of the implications for designing policy instruments intended to increase SCM usage in California.

II. BACKGROUND: THE CEMENT-CONCRETE SUPPLY CHAIN

2.1 Cement

Cement manufacturing is a mature, complex, and highly refined technical process. Some 80 separate and continuous operations are required to generate complex chemical reactions of a closely controlled combination of multiple ingredients, including calcium, silicon, aluminum, iron, and gypsum. Such precision requires that each stage in the cement manufacturing process be closely monitored and frequently inspected, and that the finished product be routinely tested to ensure that it meets technical specifications.

In the most elementary sense, cement manufacturing involves a four-stage process:

- **Quarrying & Crushing:** Limestone (*i.e.*, calcium carbonate) and other raw materials are extracted from a quarry, crushed to more manageable sizes, and stockpiled for eventual use.
- **Raw Material Preparation:** Crushed limestone and other raw materials are recovered from stockpiles, ground into a fine powder, proportioned to achieve the correct chemical composition, and blended in a homogenization process to form a consistent raw meal.
- **Pyroprocessing:** The raw meal is heated at extreme temperatures -- separating limestone into calcium oxide and carbon dioxide, with the calcium oxide reacting with other components to form cement clinker and the carbon dioxide being emitted.
- **Finish Grinding:** The raw cement clinker is subjected to mechanical processes that grind it with a small proportion of limestone and gypsum, which controls the rate of hydration, to produce an ultra-fine powder known as portland cement (referred to hereafter as "cement").

The heart of the cement manufacturing process is the kiln – a slightly inclined, slowly rotating brick lined steel tube where the pyroprocessing stage takes place. Raw materials are fed into the upper end of the kiln and heated to temperatures of 2,700-2,800 degrees Fahrenheit. Fuel is supplied at the lower end of the kiln and the heated raw materials are transported downhill as the kiln rotates. Many fuels can be used in the pyroprocessing stage, but coal and petroleum coke (a byproduct of the petroleum refining process) have been the predominant fuels due to costs, availability, and superior performance characteristics in kiln operations.

Although this basic four-stage process is common to all cement production, critical differences in manufacturing technology exist. In the U.S., two distinct types of process technologies are used: (1) the "wet process" and (2) the "dry process."[9] The wet process consists of suspending raw materials in water to form slurry, which is then fed into the kiln. In contrast, the dry process consists of grinding dry raw materials into a manageable powder before being fed into the kiln.

The basic dry process technology, known as "long dry," is significantly more energy efficient than wet process technology. Moreover, a dry process plant can further improve efficiency by installing a series of preheaters, which recover thermal waste gases to heat the raw materials before entering the kiln, or diverting fuel to a calciner vessel at the base of the preheater tower. Some cement plants also use excess waste heat to generate electricity, which further improves plant efficiencies. Although the wet process is still used in the U.S. and throughout the world, all cement plants in California utilize dry process technology.

Cement production results in GHG emissions through three basic activities. Common to all cement production is the chemical reaction that occurs when the calcium carbonate ("$CaCO_3$") in limestone is heated and breaks down into lime ("CaO") and carbon dioxide ("CO_2") — a process known as "calcination." Calcination accounts for approximately 57% of CO_2 emissions in the California cement industry.[10] Emissions from non-calcination activities, which primarily result from the combustion of coal and other fuels in the pyroprocessing stage, account for 37% of CO_2 emissions in the California cement industry. Indirect emissions from the consumption of electricity, which are heavily dependent on the GHG emissions profile of the electric power generator, account for the remaining balance (6%) of CO_2 emissions.

The cement industry is well aware of the energy intensity of its manufacturing processes, and has worked diligently to innovate, invest in cutting edge technologies, and consume energy as efficiently and responsibly as possible. Between 1974 and 2008, the U.S. cement industry increased its use of dry process technology from 42% of total capacity to 84% of total capacity.[11] As a result of these capital investments and improved operational practices, average CO_2 emissions per ton of cement decreased by approximately 33% during the same period.[12] In 2006, the average U.S. cement plant emitted 0.89 metric tons of CO_2 per metric ton of cement produced, while the average California cement plant emitted 0.86 metric tons of CO_2 per metric ton of cement produced — making the California cement industry one of the most energy and environmentally efficient cement industries in the nation.[13]

2.2 Concrete

Concrete is the most widely used building material and the second most consumed substance on earth, after water.[14] In fact, global concrete consumption is estimated to be nearly twice that of all other building materials combined, including wood, steel, plastic, and aluminum.[15] The extensive use of concrete stems from its availability, versatility, effectiveness, performance, and economy as compared to alternative building materials.

Concrete is typically made up of 10-20% cement by weight, which functions primarily as the "glue" that binds the remaining aggregate materials together.[16] The remainder of concrete's content by weight consists of water, coarse and fine aggregates (e.g., sand), and air. Importantly, there is no "standard" concrete mix. Depending on a variety of constraints, such as the type of structure, soil conditions, weather, and material reactivity, concrete suppliers and mix designers use materials from numerous sources and in varying proportions. As a result, concrete mixes are not identical in composition, but are designed to meet certain regulatory and engineering specifications.

The GHG emissions embodied in concrete are primarily a function of its cement content, and the proportion of cement to aggregates in a particular concrete mix varies according to its intended use and performance needs, including strength and durability requirements.[17] As a result of such a highly prescriptive market, there are a wide variety of concrete mixes and there is significant variation in the emissions embodied in different concrete products. A given concrete manufacturer's ability to produce relatively low-carbon concrete is heavily dependent upon the technical specifications and performance needs of the end user. In this sense, concrete manufacturers do not directly control the GHG emissions of concrete products, but effectively serve as intermediaries between cement producers and end users.

2.3 Supplementary Cementitious Materials

Supplementary cementitious materials are used widely throughout the U.S. as additives to concrete, although regional discrepancies in utilization occur based on the availability and affordability of materials. SCMs can be introduced upstream at the cement facility to produce "blended cement" or downstream at the concrete manufacturer to produce concrete products. However, the point at which SCMs are introduced into the supply chain can vary substantially based on economics and market conditions.

In many parts of the U.S., including California, virtually all SCM blending occurs at the concrete facility. This practice provides California concrete suppliers with a high degree of flexibility in meeting the diverse needs of their customer base – enabling them to produce a variety of concrete designs, from the 16,000 psi concrete used in high-rise buildings to 4,000 psi concrete used for water treatment plants, and from high early strength concretes used for road repairs to very lean large aggregate concretes used in dams.

There are four primary types of SCMs: (1) coal fly ash, (2) blast furnace slag, (3) silica fume, and (4) natural pozzolans, such as metakaolin. For a variety of reasons, including availability and affordability of supply, SCM utilization varies greatly across material type. In a 1998 survey conducted by the National Ready Mixed Concrete Association ("NRMCA"), respondents reported using fly ash in a majority of the concrete produced (54%), with significantly less utilization of slag (9%), natural pozzolans (0.4%), and blended cement (0.3%).[18] The NRMCA study also showed that 94% of respondents used fly ash in at least some of their concrete and, on average, 15% of concrete consumed in the U.S. is comprised of SCMs.

The following sections provide an overview of the four primary types of SCMs used in concrete, including the unique benefits, challenges, and limitations associated with each.

2.3.1 Fly Ash

Fly ash, the most widely-used SCM in the U.S., is a fine mineral ash that is produced as a byproduct of coal-fired electric power generation. There are two main types of fly ash:

- "Class C" fly ash, which hardens when hydrated, typically consists of 10%-30% calcium oxide by content.
- "Class F" fly ash, which hardens only when hydrated in the presence of cement or lime, typically consists of less than 10% calcium oxide by content.[19]

When mixed with concrete, fly ash can actually improve the performance of the finished product – such as enhanced workability, strength, and durability – although characteristics may vary significantly depending on the coal source. Under certain conditions, however, fly ash may result in diminished performance, particularly when the replacement rate for cement exceeds the standard practice of 20–30%.[20] Furthermore, the addition of fly ash prolongs both the setting time of concrete and the rate at which it initially gains strength, although long-term strength gains can be greater. As a result, fast-track construction projects, which typically require greater levels of strength in the early stages of construction, use concretes with little or no fly ash.

The amount of fly ash produced as a byproduct of electric power generation depends heavily on the ash content of the coal combusted, which typically varies between 5-10%.[21] Generally speaking, approximately 80% of the ash content of coal is expelled in the exhaust gasses in the form of fly ash. In 2008, U.S. power plants generated approximately 65.7 MMT of fly ash.[22] Of this amount, approximately 17% (11.4 MMT) was used as an additive in concrete, roughly 24% (15.9 MMT) was beneficially used in other applications, and 58% (38.4 MMT) was disposed of in landfills.[23] In light of this high disposal rate, however, it must be noted that most fly ash deposited in landfills would not otherwise have been suitable for use in concrete.

Coal-fired electric power generation and, thus, supplies of fly ash are highly concentrated in regions east of the Mississippi River, including states such as Georgia, Illinois, Indiana, Ohio, North Carolina, and West Virginia. West of the Mississippi River, significant fly ash production occurs in Texas and New Mexico. Virtually no fly ash is produced in California, as there is no coal-fired electricity produced in California.

2.3.2 Slag Cement

Slag cement, also known as ground granulated blast furnace slag ("GGBFS"), is a byproduct of the steel refining process. As iron ore is melted in a blast furnace, molten slag rises to the top. The molten slag is then skimmed off and quenched with water to produce granulated blast furnace slag, which is finally ground into slag cement. Slag cement is classified by its reactivity, which is mainly a function of its fineness.

Slag is usually mixed with cement in larger amounts than fly ash, comprising 25-50% of concrete's cementitious material by weight, although in special limited cases (such as mass concrete manufacture) it can account for up to 70%.[24] Slag contributes additional beneficial properties to concrete in the form of enhanced workability and reduced permeability, which also slows the corrosive process on steel in reinforced concrete. Additionally, slag lightens the color of cement, which improves its light reflectivity and enhances energy efficiency. At elevated dosages, however, slag can retard the setting time of concrete and lessen its early strength, although slag-blended concretes typically gain greater strength over the long run than concretes containing only cement.[25]

Although approximately 16.5 MMT of slag are produced in the U.S. annually, only 15% of the blast furnaces possess the refining equipment necessary to generate the properties required for use in concrete.[26] It is estimated that approximately 4.0 MMT of slag cement was used in concrete in the U.S. in 2007, with 2.4 MMT originating from domestic blast furnaces and 1.6 MMT originating from foreign sources.[27]

Supplies of slag are concentrated in the eastern portion of the US, consistent with the location of the nation's remaining blast furnace steel mills. Due to prohibitively high costs of transporting slag cross-country, the majority of slag available on the West Coast must be imported from Asia, ground into slag cement in Seattle, then shipped to ready-mix concrete plants. Although there is no readily available data for slag use in California, based on the state's relatively low number of slag cement supply terminals and the high cost and regulatory burden to develop slag processing facilities in California, it does not appear to be a commonly used SCM.[28]

According to the Portland Cement Association ("PCA"), domestic slag supply conditions are likely to constrain its expanded use in the U.S. in the context of aging blast furnace facilities and disincentives to modernize or invest in refining equipment.[29] This suggests that an expansion of slag as a cement substitute will depend on imported slag. State, regional, or federal climate change legislation that results in the loss of domestic blast-furnace steel production is only likely to compound this trend.

2.3.3 Silica Fume

Silica fume, which consists of exceptionally fine silicon dioxide particles, is a byproduct of silicon metal manufacture. Silica fume typically comprises between 5-12% of cementitious materials in concrete by mass.[30] Approximately 50-60% of the silica fume produced in the U.S. in 2004 (100,000-120,000 MT) was used as an SCM additive in concrete.[31]

Silica fume's properties make it uniquely suited for creating high strength, high performance concrete for very specialized applications.[32] It strengthens finished concrete against compression, reduces permeability, and enhances durability.[33] It is occasionally used for construction projects exposed to seawater and high levels of deicing chemicals, such as bridge decks. Generally speaking, however, silica fume is rarely used in concrete due to its extremely high cost relative to portland cement and other available SCMs, and extremely limited market quantities. There are no known sources of silica fume in California.

2.3.4 Natural Pozzolans

Natural pozzolans are naturally-occurring SCMs, typically of volcanic origin. Commercially available pozzolans in the U.S. include calcined shale or clay and metakaolin, a popular variety of natural pozzolan. Metakaolin is produced by the low temperature calcination of high purity kaolin clay. Like silica fume, metakaolin is relatively expensive and used only for special applications where very low permeability or very high strength concretes are required. In such concretes, metakaolin typically makes up 5-15% by mass of total cementitious materials.[34] Metakaolin is used more as an additive to concrete rather than as a replacement of cement.[35]

To varying degrees, natural pozzolans require more mining and processing than alternative SCMs, and most currently available sources of commercial levels of natural pozzolans entail high energy consumption and CO_2 emissions from processing, relative to other SCMs. Also unlike other SCMs, natural pozzolans increase water demand in concrete processing, rendering the majority of pozzolans impractical for use in most general-use concretes. New products under development, however, are seeking to reduce the energy intensity and high water demand of natural pozzolans, which could potentially improve their performance and desirability as an alternative SCM.

Natural pozzolans are not as widely used as other SCMs. There are no current production sources of metakaolin in California, though there are over 900 known sources of mineral deposits in the state. To date, commercial production of natural pozzolans in the U.S. has been limited to less than ten locations.[36]

III. BARRIERS TO THE EXPANDED USE OF SCMS IN CALIFORNIA

As previously noted, the blending of SCMs in concrete can result in a varied and significant set of benefits, including improved performance, decreased energy consumption, and lower GHG emissions. Furthermore, some SCMs, such as fly ash, may cost less than cement – providing a financial incentive for concrete manufacturers to increase usage, especially during periods of high demand. Despite these advantages, evidence suggests that California's SCM utilization rate remains below national averages. For instance, in a 2007 survey, the California Construction and Industrial Minerals Association ("CalCIMA") found that SCMs represented approximately 9% of the cementitious material used in concrete produced in California, nearly all of which was fly ash (for a summary of the survey results, see Appendix A).[37]

Although just slightly lower than the U.S. average, California's SCM utilization rate is surprising given that CalTrans, which represents just over one-third of the state's concrete consumption[38], has mandated a minimum SCM content of 25% of cementitious material used in concretes. Given the apparent performance and economic advantages of SCMs, such data suggests that other factors may be inhibiting the deployment of SCMs in the California marketplace. The following section reviews several of the most significant barriers to more widespread SCM usage in California.

3.1 Technical Barriers: Consistency

A key barrier to expanding the use of SCMs in concrete is the intermittent availability of consistent materials that meet rigorous technical specifications for use. In particular, the properties of fly ash supplies are heavily influenced by a variety of factors that make it difficult to maintain consistency. The quality of fly ash product typically varies from one electric power plant to another, as power generators adjust plant operations (*e.g.*, the type of coal combusted) in order to achieve primary objectives (*e.g.*, generating electricity at appropriate times, minimizing fuel prices or meeting emissions standards), which are often met at the expense of producing a consistent quality and steady supply of fly ash.[39] Fly ash quality can also vary within a single plant, as plant operators adjust the configuration of burners and the source of the plant's coal, sometimes on an hourly or daily basis.

In the post-production phase, limited capacity at storage silos can require that fly ash be stored in less than ideal conditions, where it comingles with other materials and particles.[40] Recognizing the difficulty that suppliers have in maintaining fly ash in completely separate silos and also the potential physical implications of mixing intermingled fly ash with concrete, Caltrans permits intermingling but places significant restrictions on the practice.

The EPA has also acknowledged the difficulties inherent in maintaining a consistent supply of fly ash, as posed by storage capacity constraints. Citing Texas Department of Transportation as an example, an EPA review of coal combustion products ("CCPs") notes:

> *"The Texas CCP review notes that CCP generators and ash marketers each have stringent quality assurance/quality control (QA/QC) protocols, yet the Texas Department of Transportation (TX DOT) and ready-mix producers indicated that coal fly ash storage capacity is limited, affecting users' ability to store consistent supplies, and the quality of coal fly ash on a truck-by-truck basis is not consistent. If there is a change in combustion operations, there is a resulting change in ash quality, making it difficult to produce a consistent product."*[41]

The availability of consistent fly ash supplies is likely to become more challenging in future years, as suppliers face increasingly stringent environmental regulations on coal-fired power plants.

3.2 Market Barriers

3.2.1 Widespread Market Acceptance

A critical barrier to increased SCM utilization in concrete is market acceptance. Despite the many beneficial properties of SCMs, many specifiers commissioning or monitoring construction projects are still largely unfamiliar with or unwilling to use the many varieties. There is consistent bias in favor of using only well known SCMs, such as fly ash or slag, as well as for holding SCM substitution at low rates in concrete mixtures and limiting the number of different SCMs blended into a given batch of concrete.

In fact, some SCMs impart more beneficial properties to concrete when blended at higher rates than others. Slag cement, for example, achieves maximum performance levels when blended at rates of up to 50-80%, significantly higher than typical fly ash substitution rates. There is also evidence that ternary mixtures of SCMs (*i.e.*, mixtures comprised of three different cementitious materials) perform at a higher level than a single SCM blended with concrete, although specifiers are relatively unfamiliar with ternary mixtures and therefore reluctant to adopt them.

Although concretes with high SCM content have been used on many projects, convincing specifiers of the advantages of their use on each particular project typically involves a search for fully compatible materials, large amounts of pre-testing, and close oversight and attention by mix design experts and engineers. While such activities may be feasible for unique and larger scale undertakings, they are more likely to impose prohibitive costs and delays for the more standard and smaller scale projects.

3.2.2 Availability of Supply

In the long-term, the availability of supply is perhaps the greatest concern for increased SCM utilization in California. A significant number of new coal-fired power plants have already faced opposition and permitting difficulties, as local and state NIMBY ("not-in-my-back-yard") concerns have grown in recent years. This foreshadows a challenging environment for new plant construction even under business-as-usual conditions and existing environmental policies.

Furthermore, federal climate change legislation, if adopted, is almost certain to hinder the growth of conventional coal-fired power generation in the coming decades, precipitating a sharp decrease in fly ash production – the most widely used SCM in California.[42] At the same time, a federal carbon constraint is likely to increase the demand for fly ash and other SCMs in other regions of the nation, which may crowd out demand in incremental and relatively distant markets, such as California. A similar tightening of supply and demand conditions for blast furnace slag might be expected under a federal climate change program given existing slag supply limitations, the carbon intensity of the steel production process, and the distance between the California market and concentrations of slag supply.

Increasingly stringent regulation of mercury emissions from coal-fired power plants at both the state and federal level is likely to exacerbate supply conditions for fly ash in the medium and long terms. In October 2009, the U.S. EPA signed a settlement agreement that requires it to propose Maximum Achievable Control Technology ("MACT") emissions standards by March 2011, due to be finalized by November 2011.[43] Although there are a variety of mercury control technologies under development, the most advanced and commercially proven control technology is activated carbon injection ("ACI"), which involves the direct injection of carbon into the flue gas. The use of ACI can increase the carbon content and the air-entrainment agents in fly ash to levels that render it unsuitable for use in concrete.

Ultimately, existing supply constraints have led to shortages of fly ash in California. Furthermore, the state's dependence on fly ash imports tends to result in inconsistent fly ash qualities that, when coupled with the long transportation distances required to reach the California market, has lead to supply disruptions. Existing supply constraints in the fly ash market are likely to be compounded by environmental policy trends at the federal level, including the adoption of a national climate change policy, more stringent regulation of mercury emissions at coal-fired power plants, and (as discussed in Section 3.3.1) the potential regulation of fly ash as a hazardous waste.

3.2.3 Affordability of Supply

Even if the conventional coal-fired power plant industry continues to expand and manages to produce high-quality and consistent fly ash supplies, the extreme regional mismatch between fly ash production and consumption remains a concern. Geographic misalignment and consequential transportation costs can render SCMs uncompetitive and unattractive for concrete mixers in certain regions, such as California.

Given that most coal-fired generation and integrated steel manufacturing is located east of the Mississippi river, California concrete producers must typically bear relatively high transportation costs and price premiums in order to divert supplies away from consumers that are located closer to centers of SCM production.[44] For example, assuming an average rail shipping cost of 5 cents per ton-mile, the transportation of fly ash from Cincinnati to Los Angeles is estimated to exceed $100 per ton – that is, roughly the cost of a ton of portland cement.[45] In California, such cost differentials tend to advantage foreign imports, as it can be significantly less expensive to transport materials over water than land. However, foreign imports from emerging countries most likely have a GHG burden at least several times that of domestic SCMs. Although large-scale, high-volume construction projects may find it possible to overcome these affordability barriers to increased SCM usage, small-scale projects may find the incremental costs insurmountable.

3.3 Governmental Barriers

3.3.1 Regulatory Barriers

One of the most concerning government barriers to achieving increased SCM usage is inconsistent regulation at various government levels. National regulation lacks uniformity on the use of recovered supplementary materials in concrete, leaving states with no underlying framework by which to standardize their own regulation. The result is a disharmony between states on SCM and concrete standards, which is problematic for a market in which materials are often produced and stored across state lines from where they will ultimately be used.

Furthermore, many regulatory guidelines for power plants and other manufacturing processes, which routinely produce SCMs as a byproduct, may inhibit increased SCM production and use. Some states maintain stringent controls on power plant mercury and nitrogen oxide ("NO_X") emissions, which decrease the quality and usability of fly ash.[46] Renewable portfolio standards, such as that being developed in California, are likely to incentivize the use of biomass co-firing at coal-fired power plants, which will further decrease the quantity of usable fly ash available to the California cement industry.[47] Regulatory mandates such as these not only adversely affect the availability of high quality SCMs for concrete manufacturers, they also impose an economic cost. High carbon fly ash is more difficult to sell than lower carbon fly ash, and power plant operators are forced to forgo revenue as larger proportions of their fly ash production become unmarketable.

While the future production of fly ash is uncertain, so is the future of its use in concrete. In recent months, public concerns regarding the safe handling, disposal, and beneficial use of fly ash, including its use in concrete, have emerged in the aftermath of a large-scale coal ash spill at the Tennessee Valley Authority's Kingston power plant. As a result of this event and long-standing concerns about the fate of the mercury contained in coal ash, the EPA is actively considering labeling coal ash as a hazardous waste, with a decision expected to be announced in the first half of 2010. Although studies suggest that the leaching of mercury and other heavy metals from fly ash used in concrete does not occur at levels that pose environmental concern,[48] an EPA ruling that designates such ash as a hazardous waste is likely to substantially impair the continued use of fly ash in concrete, either directly through restrictions on use, indirectly through increased costs, or implicitly through adverse public perceptions.

As previously mentioned, recent environmental restrictions in some states, which are now being considered on the national level, mandate reduced mercury emissions from the electric power sector. Planned control technologies would use the same equipment to capture both mercury emissions and fly ash, intermingling the captured mercury with the fly ash, and green building advocates are increasingly calling for no mercury in building materials.[49] For instance, the U.S. Green Building Council's proposed *LEED for Healthcare* and California's *Collaborative for High-Performance Schools*, are setting limits on the mercury content of fly ash. Furthermore, the *Green Guide for Healthcare* allows credit only for fly ash usage with documentation proving that the coal plant was not co-fired with hazardous waste, medical waste, or tire-derived fuel.

3.3.2 Legal Barriers

Legal barriers in the form of contract rigidity effectively constrain the increased use of SCMs, as well as hinder the adoption of best practices and performance optimization. Typical construction contracts act to limit mid-project changes in cement-mix composition, which guarantees a consistent, but not necessarily more efficient or effective product. Due to general unfamiliarity with SCM usage, contractors commonly opt for portland-only concrete mixes or those with minimal SCM content to ensure that products maintain contractually required consistency.

3.3.3 Policy Barriers

Comprehensive procurement guidelines ("CPGs") determined by federal agencies outline preferential procurement standards for the use of recycled materials and SCMs in concretes, although in practice the implementation of these standards and guidelines is weak.

A flexible set of qualifications for SCM use allows agencies and contractors to opt out of more extensive SCM incorporation in concrete mixes for a variety of reasons, including:

- If SCMs are not made available in a timely manner (a requirement adversely affected by previously discussed geographic distributional disparities);
- If SCM blended concretes fail to meet performance standards set by procuring agencies (which are frequently affected by poor knowledge of SCM properties and best practices); or
- If SCMs are made available only at "unreasonable" prices, which may well continue to be the case if the distributional issues resulting in high transportation costs remain unresolved.

Although these exceptions have been built into pro-SCM policies to increase flexibility, they are often used inappropriately to enable avoidance of increased SCM usage.

IV. QUANTIFYING LONG-TERM PROSPECTS & RISKS FOR FLY ASH UTILIZATION

Policies that seek to effectively and efficiently increase the use of SCMs should be rooted in a firm understanding of both the SCM market's current status and its potential evolution. Despite significant barriers, SCM substitution generally remains an environmentally and economically attractive strategy today. There are no assurances, however, that it will remain an attractive strategy in the longer term. It is critical that policymakers endeavor to identify, evaluate, and anticipate key long-term drivers in the SCM market with the goal of understanding the extent to which these drivers are likely to impact the prospects and risks associated with continued SCM substitution.

The challenges associated with expanding SCM utilization in the long term are perhaps best illustrated by the uncertainties that surround the U.S. fly ash market. As noted in previous sections, an array of environmental policy trends suggests that the long-term availability and affordability of concrete-quality fly ash supplies are likely to deteriorate, including:

- Policies that impose a price on GHG emissions (e.g., a federal cap-and-trade program) are likely to discourage coal-fired electric power generation and, consequently, result in a sustained reduction in the supply of concrete-quality fly ash.
- Policies that impose a price on GHG emissions (e.g., a federal cap-and-trade program) are likely to encourage widespread clinker substitution and, consequently, result in a sustained surge in the demand for concrete-quality fly ash.
- Policies that require coal-fired power plants to limit mercury emissions are likely to result in the adoption of ACI technologies, which tend to increase the carbon content of fly ash and decrease its suitability for use in concrete. Concerns about the mercury content of fly ash may result in environmental regulations or public perceptions that further impair or altogether eliminate its use in concrete.

Seven Study Regions

With these challenges in mind, a set of plausible policy scenarios were developed to evaluate and illustrate the potential impact of environmental regulations on the supply of fly ash in the U.S. market. Utilizing both public and proprietary data, total production of concrete-quality fly ash is projected across seven U.S. regions under various policy assumptions. These fly ash supply forecasts are then integrated with long-term cement consumption forecasts to estimate the "sustainable substitution rate" for each U.S. region – that is, the level of substitution that could be achieved in a given region through the use of locally sourced fly ash. The results are interpreted and conclusions are drawn about the long-term prospects and risks associated with expanding fly ash substitution in the national market and the potential impact on geographically isolated markets, particularly California.

The objective of the exercise is not to predict the likely evolution of the U.S. fly ash market, which is currently beset with profound policy unknowns and market complexities. Rather, the objective is to develop a range of plausible scenarios that illustrate the significant uncertainty associated with supply-demand balances of concrete-quality fly ash in the U.S. market in the long term. It is this uncertainty that holds the key insights for policymakers interested in developing and implementing instruments best suited to encourage optimal fly ash utilization in the long term.

4.1 Analytical Framework

The modeling framework utilizes two key variables, which are derived from a variety of data sources, to drive the forecast throughout the 2010-2030 timeframe:

(1) Total Fly Ash Production by Region: Fly ash production by region is estimated using projections of coal consumption for coal-fired electric power generation. Energy quantities of coal consumption (*i.e.*, quadrillion Btu) for each region were converted into physical quantities (*i.e.*, tons of coal) using EIA historical data on the energy content of coal consumed by region (*i.e.*, quadrillion Btu per ton of coal consumed).[50] Physical quantities of coal consumption were then converted into estimates of total coal ash production using EIA historical data on the ash content of coal consumed by region.[51] Finally, total coal ash production is converted into estimates of fly ash production under the assumption that 80% of total coal ash is discharged as fly ash and 20% is discharged as bottom ash.

(2) Concrete-Quality Fly Ash Ratios by Region: Given that only a proportion of fly ash is suitable for use in concrete and considering that suitability can vary significantly across regions, estimates of concrete-quality fly ash ratios ("spec ash") were developed for each region. Estimates regarding the ratio of spec ash production to total fly ash production are based on proprietary data supplied by Minerals Resource Technologies ("MRT"), a wholly-owned subsidiary of CEMEX and a major supplier of fly ash in North America. Plant-level estimates of spec ash ratios were aggregated and applied to regional estimates of total fly ash production to calculate the annual quantity of spec ash generated in each region.

These two variables are forecasted under various assumptions to produce a range of plausible fly ash supply scenarios. In this analysis, four discrete scenarios are presented:

- **The "Business-as-Usual" scenario ("BAU")** reflects a world in which existing environmental policies and prevailing conditions in the fly ash market persist. It is based on detailed projections of coal-fired power generation as presented in the EIA's Reference Case scenario in the Annual Energy Outlook 2009. Given the direction of environmental policy at both the federal and state levels, the BAU scenario is not presented as a most likely scenario. Rather, it is presented as a useful benchmark by which to evaluate the direction and magnitude of impacts associated with more realistic policy and technology pathways.

- **The "Federal Climate Change Policy" scenario** assumes that federal climate change legislation is adopted, which is likely to reduce annual coal-fired electric power generation and, therefore, annual fly ash production. It is based on the Base Case scenario of the EIA's analysis of the American Clean Energy and Security Act of 2009 ("Waxman-Markey"), which includes projections of coal-fired electric power generation by region.

- **The "State Mercury Emissions Controls" scenario** assumes that more stringent mercury emissions standards for coal-fired generation plants are adopted in certain states, which is likely to increase the use of ACI technologies and reduce the supply of spec ash.[52] Assumptions about which states would adopt more stringent regulation and estimates regarding the impact of such regulation were based on an analysis performed by MRT. Specifically, MRT provided estimates of the spec ash to fly ash ratios for each region in the

2009-2013 timeframe, and these ratios were assumed to remain constant throughout the remainder of the forecast period.

- **The "Beneficiation Technology Deployment" scenario** assumes that technologies that enable the cost-effective beneficiation of impaired fly ash supplies are developed and deployed. Specifically, it assumes that the ratio of spec ash production to total fly ash production in each region increases to 60% by 2030. Given that the existing spec ash to fly ash ratio is estimated to be between 35-40%, such a scenario is considered optimistic but plausible. However, beneficiation has an associated GHG burden due to processing.

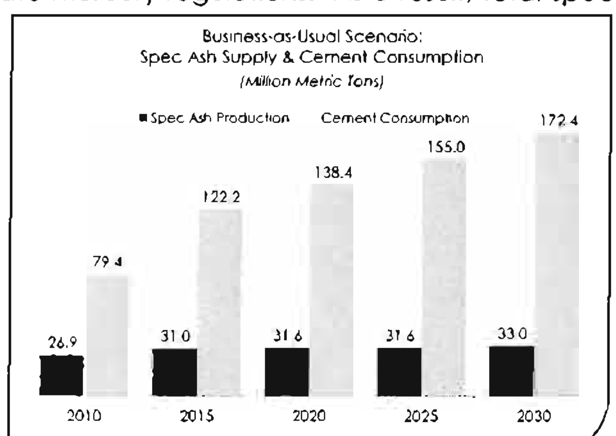
To isolate the impacts associated with each scenario, a consistent cement consumption forecast was used in all scenarios. The PCA produces state-by-state short-term forecasts (*i.e.*, five-year time horizon) on a quarterly basis and long-term forecasts (*i.e.*, 25-year time horizon) on an annual basis.[53] Keybridge blended PCA's latest short-term and long-term forecasts to construct consistent state-by-state projections.[54] State estimates were aggregated to produce regional estimates of total cement consumption during the 2010-2030 timeframe.

For each scenario, fly ash supply and cement consumption estimates are combined to estimate the "sustainable blending ratio" ("SBR") for each region, as calculated by dividing the total quantity of spec fly ash produced in a region by that region's cement consumption. Simply put, an SBR indicates a given region's maximum potential capacity to blend locally sourced fly ash to reduce its cement consumption requirements.[55] Regional data was also aggregated to calculate national SBRs.

4.2 Results

4.2.1 Business-as-Usual Scenario

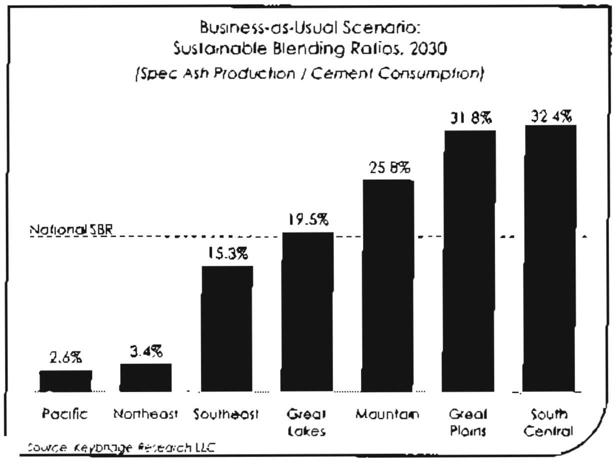
Under BAU assumptions, coal-fired electric power generation expands modestly in the absence of federal climate legislation or more stringent state mercury regulations. As a result, total spec ash supply increases from 27 MMT in 2010 to 33 MMT in 2030 – an increase of roughly 22%. However, cement consumption increases by more than 117% during the same period. Consistent with this backdrop of modest spec ash supply growth and robust cement consumption growth, the national SBR declines from 34% in 2010 to 19% in 2030.



Source: Keybridge Research LLC

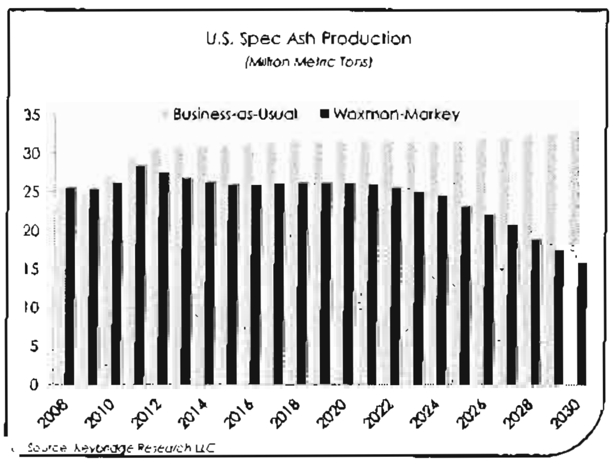
Reflecting severe geographical mismatches between centers of fly ash supply and cement demand, regional SBRs vary greatly around this national average. Assuming that each region achieves the national SBR of 19% in 2030, significant excess supplies of fly ash are likely to materialize in the South Central region (4.6 MMT), with more modest surpluses accumulating in the Great Plains (1.7 MMT) and Mountain (1.5 MMT) regions. These would be offset by a severe deficit in the Pacific region (-4.0 MMT), with more modest deficits in the Northeast (-2.1 MMT) and Southeast (-1.8 MMT) regions.

Thus, even under BAU assumptions, the results suggest that SCM supply conditions are likely to tighten rapidly throughout the forecast period and place downward pressure on sustainable blending ratios across every region. Furthermore, the reconciliation of vast regional discrepancies in spec ash supply and cement consumption would likely require significant long-distance transfers of SCM supplies across the country, which is likely to substantially increase acquisition costs and partially offset the GHG benefits of SCM utilization.

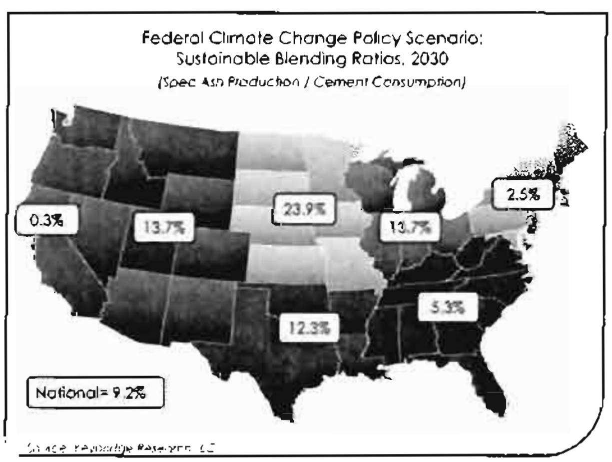


4.2.2 Federal Climate Change Policy Scenario

In the Federal Climate Change Policy scenario, the imposition of a federal cap-and-trade system decreases coal consumption for coal-fired generation by 47%, resulting in a similar decline in fly ash production. As a result, spec ash production is projected to decline from approximately 26 MMT in 2010 to less than 16 MMT in 2030 – resulting in a spec ash supply that is approximately half that observed in the BAU scenario. The precipitous decline in spec ash production coupled with increasing cement consumption results in a decline in the national SBR from 25% in 2007 to 9% in 2030.



Federal climate change policy is projected to have the greatest impact on spec ash supplies in the South Central and Southeast regions, both of which experience declines of more than 60% as compared to the BAU scenario. The reduction in spec ash supply between 2010-2030 in these two regions alone total more than 9 MMT – more than 50% of the quantity of all fly ash used in concrete in 2007.

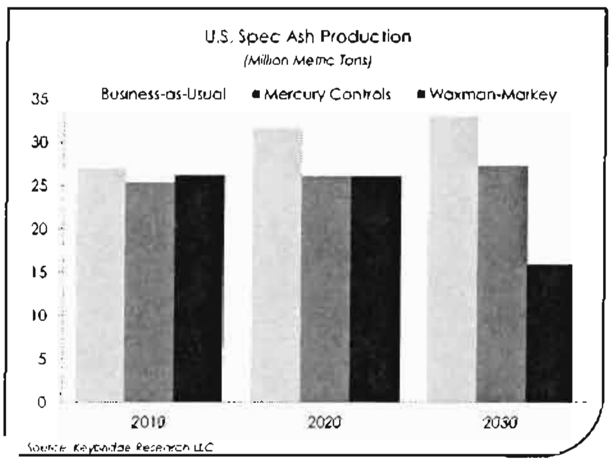


Assuming each region blends fly ash up to the national SBR, regional disparities are likely to persist as in the BAU scenario, though the absolute quantities of surpluses and deficits are reduced as the national SBR sharply declines. Modest surpluses are likely to materialize in the Great Plains (2.0 MMT), South Central (1.1 MMT), Mountain (1.0), and Great Lakes (0.8 MMT) regions, which are offset by similar deficits in the Pacific (-2.1 MMT), Southeast (-1.8 MMT), and Northeast (-0.9 MMT) regions.

Importantly, the SBR in the Pacific region is projected to decline from 5% in 2010 to 0% in 2030 – suggesting that the region will be fully dependent on imports to meet its fly ash needs. Fly ash demand in the region is likely to be highest in California, where PCA estimates that cement consumption will reach 19 MMT in 2030. Attaining the national SBR of 9%, which is generally consistent with the state's existing fly ash blending rate, would therefore require the importation of 1.7 MMT of fly ash. Given a sharp decline in national spec ash production and a likely increase in national spec ash consumption due to the imposition of a carbon price, chronic shortages of domestic supplies are likely to materialize throughout the nation. Consequently, California cement and concrete manufacturers will likely be forced to turn to foreign sources of supply, which may entail significant transportation emissions, especially if sourced from distant Asian nations.

4.2.3 State Mercury Emissions Controls Scenario

In the Mercury Controls scenario, the implementation of mercury emissions controls at the state level for coal-fired electric power generation results in a decrease in the ratio of spec ash to fly ash production. As a result, national spec ash supply is estimated to decline by 5.7 MMT, or 17% as compared to a BAU scenario. Specifically, spec ash production is projected to be 27.26 MMT in 2030 – roughly equal to the estimated supply in 2007. Due to relatively stagnant spec ash supply coupled with increasing cement consumption, the national SBR is expected to decline to 16% by 2030, as compared to 19% in the BAU scenario and 9% in the Federal Climate Change Policy scenario.

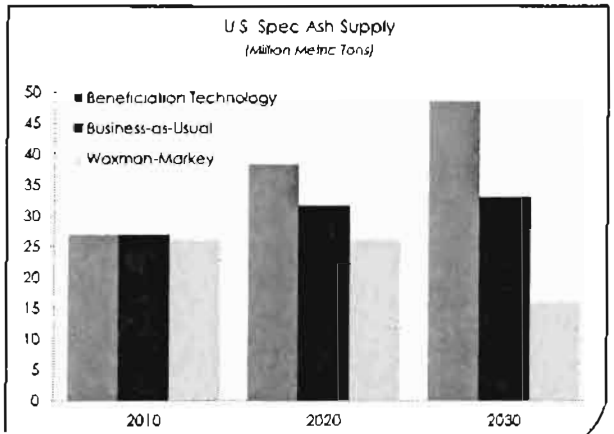


The state mercury emissions regulations are projected to have the greatest impact on spec ash in the South Central region, which experiences a decrease in supply from 9.49 MMT in 2010 to 7.30 MMT in 2030. All other regions are projected to experience minimal or modest increases in the absolute supply of spec ash compared to 2010 levels.

Assuming each region achieves the national SBR of 16%, a significant annual deficit of approximately 3 MMT of spec ash is expected to materialize in the Pacific region throughout the entire forecast period. By 2030, reconciling supply and demand in the Pacific region would likely require significant imports from the Mountain, Great Plains, and South Central regions, all three of which experience surpluses between 1.6-1.8 MMT.

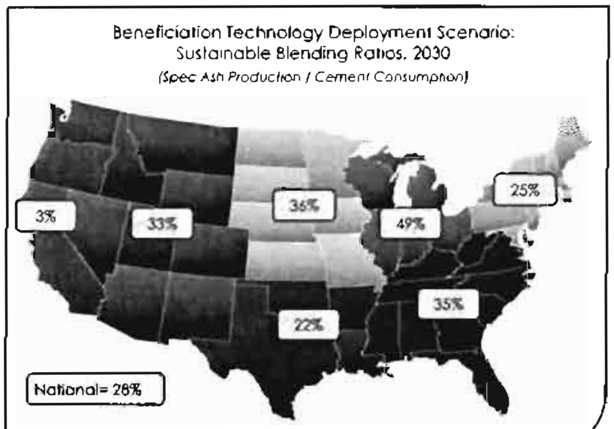
4.2.4 Beneficiation Technology Deployment Scenario

The third discrete scenario envisions that spec ash supplies experience an "upside surprise" in the form of the rapid development and widespread deployment of cost-effective beneficiation technologies. While estimating the expansion in SCM supplies due to the deployment of beneficiation technologies is difficult calculation, this scenario assumes the ratio of spec ash to fly ash production could increase by 50% during the forecast period, from slightly less than 40% today to approximately 60% in 2030.



Source: Keybridge Research LLC

Under these assumptions, the total supply of spec ash is projected to increase to 49 MMT by 2030, as compared to 33 MMT under the BAU scenario. This increase in spec ash supply increases the national SBR to 28%. The impact of beneficiation technology is likely to be greatest in the Southeast region, which currently has the highest amount of coal-fired power generation but one of the lowest spec ash to fly ash ratios.



Source: Keybridge Research LLC

Assuming all regions attain the national SBR of 28%, spec ash supply surpluses are likely to materialize in all except the Pacific and Northeast regions, with the Pacific experiencing a particularly severe shortfall (-6.1 MMT) in the context of a high national average. Generally speaking, the results suggest that rapid development and widespread deployment of beneficiation technologies could effectively allow spec ash supply growth to keep pace with cement consumption – thereby maintaining the viability of existing substitution rates.

4.3 Qualifications, Limitations, & Uncertainties

4.3.1 Integrated Scenarios

The preceding analysis is intended to illustrate the likely direction and magnitude of discrete policy and technological events, and it does not consider the combined impacts associated with the realization of multiple pathways. In reality, however, multiple events are likely to occur simultaneously, and the general direction of environmental policy at both the state and national levels suggest that the balance of risks to supply is likely to be on the downside.

Consequently, a series of "integrated scenarios" were simulated in which two or more events occur simultaneously. Although a small set of scenarios (*e.g.*, federal climate change policy with low international offsets availability or 100% beneficiation of all fly ash production) produced relatively extreme results, the vast majority of scenarios produced results that were generally consistent with those presented in the discrete scenarios. Consequently, the direction and magnitudes of the impacts illustrated by the discrete scenarios are believed to be a reasonable representation of the range of plausible scenarios that might materialize as existing policy and technological uncertainties are resolved.

Sample of Alternative Fly Ash Supply Simulations
Sustainable Blending Ratios, 2030

		Alternative Scenario			
Region	BAU	(A)	(B)	(C)	(D)
Great Plains	31.8%	20.9%	9.7%	27.1%	12.6%
Mountain	25.8%	12.6%	1.2%	17.3%	1.6%
Great Lakes	19.5%	11.1%	5.8%	34.7%	18.0%
Northeast	3.4%	2.5%	1.7%	18.4%	12.7%
Pacific	2.6%	0.3%	0.3%	0.4%	0.4%
South Central	32.4%	8.0%	1.8%	8.3%	1.9%
Southeast	15.3%	5.2%	1.1%	12.1%	2.6%
National	19.4%	7.7%	2.3%	14.4%	5.2%

Scenario A = W-M Base Case + State Mercury Regulations
Scenario B = W-M Base Case with Low Offsets Availability + State Mercury Regulations
Scenario C = W-M Base Case + Beneficiation Technology
Scenario D = W-M Base Case with Low Offsets Availability + Beneficiation Technology

4.3.2 Increases in Fly Ash Demand

The discrete scenarios primarily focus on how the supply of concrete-quality fly ash is likely to evolve over the coming decades. Importantly, it does not explicitly consider the potential for increased demand for fly ash. Although the impetus for increased demand under the Mercury Controls scenario is unclear, it is much more salient in the Federal Climate Change Policy scenario. To the extent that the imposition of a national carbon price increases the need to offset the costs of carbon-intensive clinker, overall demand for fly ash and regional substitution rates are likely to increase relative to what they would be in the absence of the policy.

Simply put, under a Federal Climate Change Policy Scenario, structural forces of supply and demand are working against SCM consumers. Although SCM supply is likely to fall in tandem with the decline of conventional coal-fired generation, SCM demand is likely to increase in response to the rise in carbon prices. As a result, SCM prices are likely to rise sharply in comparison to historical norms – presumably increasing to the point where they equalize with cement clinker costs on a carbon-adjusted basis. This is likely to enhance the competitive impacts of transportation cost differentials and intensify regional disparities.

4.3.3 Other Potential Sources of Fly Ash

The current analysis is principally concerned with the potential impact of changes in the ongoing flow of spec fly ash production within the U.S. market. It does not consider the potential impact of reclaiming fly ash supplies currently disposed in landfills. Although the existing stock of landfill fly ash is likely to be significant, it appears unlikely that such supplies could be cost-effectively extracted, sorted, processed, and beneficiated for use in concrete on a large-scale during the timeframe under consideration.[1]

[1] Given that the majority of landfill fly ash was likely unsuitable for use in concrete at the time of disposal, the large-scale recovery of these supplies for use in concrete would be highly dependent on the emergence of cost-effective beneficiation technology which currently does not exist.

The current analysis also does not explicitly consider the potential impact of fly ash and slag imports. Federal climate change policy is likely to be implemented in the context of GHG reduction commitments by other nations, which would result in higher local use of fly ash and slag in concrete by other nations. Furthermore, the objective of the current analysis is to inform sound policy design, and policies that rely on the large-scale importation of fly ash supplies at the expense of local use are unlikely to generate the intended GHG reduction benefits.

V. CONCLUSIONS FOR POLICYMAKERS

The preceding sections offer illustrative scenarios about the potential evolution of fly ash supplies over the coming decades. Although the analysis focuses on three of the most consequential drivers of future fly ash supplies (*i.e.*, federal climate legislation, mercury emissions controls, and beneficiation technologies), it is not exhaustive or definitive. Indeed, there are likely to be a wide variety of factors that influence fly ash demand and supply over the coming decades, some of which may be overwhelmingly positive and some of which will be overwhelmingly negative from the perspective of SCM consumers. Forthcoming rulings by the U.S. EPA regarding coal ash's status as a hazardous waste, in particular, could have profoundly negative consequences for future SCM substitution.

While reasonable people may disagree about the balance of these countervailing forces, the above scenarios reveal a central and consistent conclusion: the future domestic, and potentially global, supply of fly ash is highly uncertain. Similar supply-side challenges exist for other key SCMs, especially slag. This high degree of uncertainty has important implications for policymakers interested in designing instruments to maximize SCM usage in a responsible manner. Rigid instruments, such as technology or performance mandates, are unlikely to be successful in such an environment. By their very nature, such instruments have high information and foresight requirements that are unlikely to be met in a marketplace beset by an extreme degree of uncertainty.

Rather, flexible instruments that leverage market incentives and price signals, such as emissions trading and credit programs, are likely to prove more effective in responding to rapidly evolving and unpredictable conditions. Indeed, the imposition of a carbon price will significantly increase the costs of cement and, under ideal conditions, this cost increase would be passed through to concrete manufacturers – thereby increasing the value of SCMs relative to cement and providing a consistent incentive to increase SCM substitution.

Unfortunately, the economics of the cement-concrete supply chain do not conform to these ideal conditions, especially in California. As a highly energy-intensive and trade-exposed industry, the California cement industry is unable to pass through the costs associated with an asymmetric carbon constraint, such as a state, regional, or federal cap-and-trade system. In the absence of a truly global system that places equivalent carbon costs on all cement, regardless of origin, regulated cement manufacturers are likely to lose market share to their unregulated competitors – thereby resulting in emissions leakage.

Targeted policy measures, such as the provision of output-based rebates or free allowance allocations, can be effective in preventing leakage. However, their effectiveness in preventing leakage is derived from their capacity to offset carbon cost increase, thereby also muting the price signal to downstream consumers. Consequently, any effective policy is likely to require the application of two different policy instruments – one that provides a carbon price signal to cement producers while mitigating the risk of leakage, and one that reestablishes a price signal for downstream consumers. In particular, a robust configuration of anti-leakage instruments combined with a credit program for SCM blenders has the potential to maximize SCM utilization in a manner that is consistent with environmental objectives, prevailing carbon prices, and rapidly evolving SCM market conditions.

Given the existing barriers to SCM utilization, however, other policies must underpin the goal of increasing SCM utilization in order to enhance the efficacy of carbon price incentives. This is likely to include initiatives to increase awareness and education among concrete manufacturers and end users regarding SCM utilization, as well as initiatives to update and harmonize codes, standards, and government procurement guidelines to reflect the latest science about both the benefits that SCMs hold for concrete and the positive contributions that concrete can make to building a more sustainable future.

Ultimately, in the absence of a deliberate and coordinated effort to remove barriers and leverage market-based mechanisms to provide incentives throughout the cement-concrete supply chain – including carbon price incentives, codes, standards, procurement guidelines, and consumer education – SCM utilization in California is likely to fall short of its full potential, regardless of prevailing market conditions. In the presence of such an effort, however, the environmentally and economically efficient use of SCMs in California is likely to be optimized in a manner consistent with highly dynamic, uncertain, and evolving market conditions.

APPENDIX A: CALCIMA SURVEY

CalCIMA
Summary of Ready-Mix Concrete, Cement Survey
July 9, 2008

CalCIMA conducted a survey of its ready-mix producers to assess current practices regarding the use of cement and supplemental cementitious materials (SCMs) in the production of concrete.

- Data was requested for statewide operations for the 2007 production year.
- 19 producers responded to the survey, representing 5.7 million metric tonnes (MMT) of cement usage and 0.5 MMT of SCM usage. (6.3 and 0.6 million short tons)
- The combined production of the survey respondents is estimated to represent 50% of the total cement usage by ready-mix producers in the state.
- Total cement consumption in California was estimated to be 15.5 MMT for 2007, per the October 23, 2007 report, titled "Minimizing Leakage Under Climate Change Proposals Affecting the Cement Industry", with approximately 30% coming from imports.
- The Portland Cement Association reports that approximately 73% of cement is shipped to ready-mix facilities for concrete production. This results in approximately 11.3 MMT of cement consumption for ready-mix concrete in 2007
- The average SCM usage based on the total response quantities is 8.8%. The highest and lowest usage rates were 23% and 2% respectively, while the typical usage ranged from 7% to 17%.

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[1] Pyle, T. (March 2009).

[2] Marceau, M. L., & M.G. VanGeem (2006) and Marceau, M. L., & M.G. VanGeem (2008) .

[3] Recent studies show that concrete roads increase truck fuel efficiency by 1%-6% as compared to asphalt, with faster moving and heavier trucks benefiting most. See: National Research Council of Canada, Centre for Surface Transportation Technology (2005).

[4] Adrian, W., and R, Jobanputra.

[5] As noted in a study co-authored by Arthur Rosenfeld of the California Energy Commission, "increasing the urban albedo can result in less absorption of incoming solar radiation by the surface-troposphere system, countering to some extent the global scale effects of increasing greenhouse gas emissions."

[6] Cambridge Systematics, Inc. (June 2005).

[7] See: Pade, C. *et. a* (September 2007); Gajda, J. (2001); Engelsen, C.J., *et. al* (2005).

[8] Note that fly ash, slag cement, and silica fume require minimal processing and therefore are a source of minimal GHG emissions. However, some other pozzolans are more intensely processed and have significant GHG emissions.

[9] We do not address vertical kilns which are not used in the U.S., a highly inefficient and polluting outdated manufacturing process, but which is still heavily relied upon in other countries, such as China.

[10] Lime is the key ingredient in cement, and CO_2 is released in a fixed ratio with the production of lime. In short, the majority of CO_2 emissions are a direct and unalterable consequence of the chemical reaction that is fundamental to the cement manufacturing process. These immutable "process emissions" distinguish the cement industry from many other carbon-intensive sectors, such as electric power or transportation.

[11] Portland Cement Association (December 2008).

[12] Portland Cement Association (July 2009).

[13] Portland Cement Association (April 2008 & May 2009). To standardize metrics and insure comparability, estimates of CO_2 emissions per ton of clinker were scaled to account for differences in mineral components usage in the California and national markets.

[14] Ashley, E. & L. Lemay (2008).

[15] World Business Council for Sustainable Development.

[16] Admixtures are also often added to enhance concrete's constructability or performance, but their content by weight or volume measures is not significant.

[17] Concrete manufacturing is a relatively low-emissions process, particularly when compared to the production of cement. The process of mining sand and gravel, crushing stone, manufacturing concrete, and transporting it to construction sites requires relatively little energy consumption and result in relatively few GHG emissions. Simply put, the manufacturing of concrete is only responsible for a small fraction of the GHG emissions released throughout the cement-concrete supply chain.

[18] Portland Cement Association (1998).

[19] The California Department of Transportation ("Caltrans") currently prohibits the use of Class C fly ash.

[20] Design and Control of Concrete Mixtures, Portland Cement Association.

[21] Calculations by Keybridge Research LLC based on plant-specific data for U.S. coal-fired electric power plants, as supplied by EIA Form 767.

[22] American Coal Ash Association (2008).

[23] *Ibid*.

[24] Design and Control of Concrete Mixtures, Portland Cement Association.

[25] To the extent that slag retards the setting time and early age strength of concrete, special extra consideration is needed to prevent shrinkage cracking in concrete for slabs and other flatwork. For this reason, contractors tend to use lower slag cement dosages unless the construction schedule allows for longer curing times or a high dosage of slag is specifically requested.

[26] Portland Cement Association (October 2009).

[27] *Ibid.*

[28] One likely explanation for California's low incorporation of slag SCM is that the majority of Asian slag, the variety most readily available to the California concrete market, has a particularly high alumina content. Alumina is known to lower concrete's resistance to sulfates, which are prevalent in certain California soils.

[29] Portland Cement Association (October 2009).

[30] National Ready Mix Concrete Association (2000).

[31] The Silica Fume Association, www.silicafume.org

[32] Industry experts estimate that the cost of silica fume is approximately five times that of portland cement.

[33] Silica fume concrete can undergo single-pass finishing, where other concretes require a multi-step finishing process.

[34] National Ready Mix Concrete Association (2000).

[35] Portland Cement Association (2002), p. 61.

[36] Some of these are discussed in American Concrete Institute 232.1 R-00 (Reapproved 2006).

[37] CalCIMA (July 2008).

[38] Portland Cement Association (Fall 2008).

[39] Emission regulation requirements often change the daily, weekly, or monthly consistency and properties of fly ash. For example, Illinois coal-fired power plants' experience suggests that the carbon content of fly ash varies from the low single digits to as high as 15%, depending on how the boilers are run to comply with evolving environmental and emission regulation.

[40] At 15%-25% SCM replacement levels, intermingling does not pose a significant threat to the quality of the concrete, but intermingling at higher replacement levels is likely to have negative consequences. In addition, when the total amount of SCMs in concrete exceeds 25%, including that in blended cements and concrete, the interaction of the specific SCMs and cements must be considered to ensure durable concrete.

[41] U.S. EPA (2008).

[42] Although federal climate change legislation is likely to reduce conventional coal-fired power generation, the long-term impact on total coal-fired power generation is less certain. In particular, conventional coal-fired plants may be largely replaced by integrated gasification combined cycle ("IGCC") plants. IGCC coal plants do not produce a traditional coal ash byproduct, but a slag-like material that is not suitable for use in concrete.

[43] Talley, Ian (2009).

[44] California has no coal-fired power plants or blast furnaces in the state.

[45] Calculation also assumes a "straight-line" distance of 1900 miles from Cincinnati to Los Angeles and a circuity factor (which adjusts the straight-line distance for the curvature of the U.S. rail system) of 1.2 rail miles per straight-line mile – resulting in a transportation cost estimate of $114 per ton-mile.

[46] Additional activated carbon is added to the emissions capture process to trap more mercury, and low temperature boilers to mitigate NO_X emissions result in larger amounts of unburned carbon ash at power plants. Both measures increase the carbon content of fly ash, with the ultimate negative effect of decreasing its suitability as an SCM.

[47] RPS standards typically accelerate the practice of cofiring biomass with coal, which produces fly ash that does not meet specifications for use in cement. See: ASTM C618.

[48] For a comprehensive review of such studies, see: The Loreti Group (2009).

[49] McLennan, J.F. *et. al* (August 2008).

[50] EIA Form-767. The energy content of coal consumed by region is assumed to remain constant throughout the forecast period.

[51] EIA Form-767. The ash content of coal consumed by region is assumed to remain constant throughout the forecast period.

[52] It is important to note that this scenario considers the implementation of state-by-state regulation of mercury emissions, which was assessed by experts at MRT. It does <u>not</u> consider the potential impact of planed federal mercury control regulations that require the use of "maximum achievable control technology" at all U.S. coal-fired power plants, as announced by the U.S. EPA in October of 2009.

[53] Portland Cement Association (October 2009) & Portland Cement Association (Summer 2009).

[54] Specifically, state cement consumption between 2009-2013 was assumed to equal the quantities specified in the PCA short-term forecast, while cement consumption between 2015-2030 was assumed to equal the quantities specified in the PCA's long-term forecast. Estimates for 2014 were assumed to equal the mid-point between 2013 and 2015 estimates. The blending of forecasts is necessary to reflect both the highly volatile short-term dynamics and the more structural long-term trends that are likely to drive cement consumption during the forecast period.

[55] There is reasonable evidence to suggest that actual SBRs may be lower than SBRs projected by this study. For example, concrete and SCM demand tends to weaken substantially during winter months, which results in prohibitively expensive storage costs for SCMs produced during this time. However, insufficient data makes seasonality and other factors affecting the economically efficient blending ratio difficult to estimate. Therefore, the calculated SBR is intended to signify a region's technical potential blending ratio, which is likely to exceed the economically efficient ratio.

ABOUT THE AUTHORS

Dr. Robert F. Wescott is President of Keybridge Research LLC. Dr. Wescott has nearly 30 years of professional experience working on macroeconomic and public policy issues. Dr. Wescott served for four years as Special Assistant to the President for Economic Policy at the White House and as Chief Economist at the President's Council of Economic Advisers. From 1982-93, he was Senior Vice President and Chief Economist at Wharton Econometrics (today IHS Global Insight), where he oversaw a staff of 60 and was responsible for all economic modeling, forecasting, and consulting operations. Dr. Wescott also was Deputy Division Chief in the Research Department of the International Monetary Fund, where he did research on global economic risks and policy challenges. In 1989-90 he was Research Director at the International Center for the Study of East Asian Development in Kitakyushu, Japan. He holds a Ph.D. in Economics from the University of Pennsylvania.

Mark W. McNulty is Director of Economic & Policy Analysis at Keybridge Research LLC. Mr. McNulty heads Keybridge's energy and environment practice. Before joining Keybridge, Mr. McNulty served as a consultant for U.S. financial institutions and rural development organizations, where he designed and implemented financial products tailored to the needs of low-income consumers. From 2000-2001, he served as the Staff Assistant for International Economics at the White House's National Economic Council, where he was responsible for research and analysis on global economic and financial risks. Mr. McNulty holds a B.A. in Business Administration & Economics from Rhodes College and a Masters in Public Policy from Harvard's Kennedy School of Government.

Martha G. VanGeem, PE, is a principal engineer and group manager of CTLGroup's Building Science and Sustainability Group. She serves as a project principal investigator and specialized in-house consultant in the areas of sustainability, energy conservation, energy codes, thermal mass, mass concrete, and moisture migration. Since joining CTLGroup in 1982, her experience has included over 500 large and small consulting, testing, and research projects. Ms. VanGeem has investigated moisture problems and performed energy analyses for numerous concrete and wood frame buildings. In the area of sustainability, Ms. VanGeem serves as principal investigator on LEED™ projects and others to develop environmental life-cycle inventories (LCIs) and life-cycle assessments (LCAs) of cement, concrete, and other construction products. Ms. VanGeem is a LEED™ Accredited Professional, and a Registered Energy Professional for the city of Chicago. She received her bachelor's degree of civil engineering from the University of Illinois – Urbana and her MBA from the University of Chicago. She is a member of many energy and green building standards committees including ASHRAE energy standards (SSPC 90.1 and 90.2), ASHRAE/USGBC High Performance Green Building Standard (SPC 189.1), the GBI Green Building Standards Energy and Resources Subcommittees, ACI, and ASTM.

John Gajda, PE, is a Principal Engineer at CTLGroup in Skokie, IL and is licensed professional engineer in 19 states. Over the past 18 years, John has worked on more than 250 mass concrete projects across North America. On these projects, John works to reduce the cost of construction, optimize placement procedures, and manage concrete temperatures and temperature differences. Much of this work involves designing concrete mixes that contain significant quantities of fly ash and slag cement, and optimizing these concretes for purposes of durability and economy. John is a voting member and subcommittee chair of ACI 301 "Specifications for Structural Concrete", and was named by Concrete Construction Magazine as one of five individuals who "significantly influenced the concrete industry in 2008".

Keybridge Research LLC is a Washington DC based international economics and public policy consulting firm. Keybridge provides analytical support and strategic advice to a select clientele that includes Fortune 500 companies, global financial firms, G-7 governments, and premier industry associations. Keybridge's experience and expertise make it uniquely suited to assist organizations that operate at the interface of business, economics, and public policy. For more information, please see: keybridgeresearch.com.

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EXHIBIT 19

<u>DISCUSSION DRAFT</u>

BRIEFING PAPER:

MEASURES UNDER AB32 TO PREVENT LEAKAGE ARE CONSISTENT WITH THE U.S. CONSTITUTION AND WTO OBLIGATIONS

I. BACKGROUND

AB32 expressly provides that the California Air Resources Board ("CARB") is required to "minimize leakage" when adopting GHG emission limits and emission reduction measures. "Leakage" is defined as "a reduction in emissions of greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state." If measures are not put in place to ensure that cement produced in California and imported cement fact a similar cost burden under AB32, California customers will simply shift their increasing consumption to imported cement, resulting in substantial leakage and unsustainable economic harm to the California cement industry. We believe that a border adjustment measure ("BAM") is critical in order to minimize the risk of leakage and ensure that the environmental goals behind California's climate change policies are not compromised. Indeed, because AB32 requires CARB to take meaningful steps to reduce GHG emissions, unless CARB addresses the problem of leakage, its efforts to implement AB32 cannot possibly satisfy the legislative mandate. It would be arbitrary and capricious for CARB to adopt regulations that, by failing to address leakage, do nothing to combat the problem of climate change, while imposing significant burdens on California businesses.

This briefing paper provides a summary of key points demonstrating that CARB can readily design a BAM under AB32 to be consistent with U.S. obligations under applicable World Trade Organization ("WTO") agreements and the U.S. Constitution. Importantly, it is critical that measures addressing imports are applied immediately and are effective in preventing the leakage and economic damage caused by a shift to lower cost imports. Subsequent findings that a particular measure is unconstitutional or WTO-inconsistent would not mean that no measures to address imports are possible. Rather, such findings would provide greater clarity about how CARB can structure such measures consistent with the U.S. Constitution and WTO obligations. Fear of adverse constitutional or WTO findings therefore should not result in the failure to adopt effective measures now or in delaying such measures to a future date when critical California industries have already been made extinct.

II. WTO OBLIGATIONS

A. Relevant Provisions

- The General Agreement on Tariffs and Trade 1994 ("GATT"), one of many WTO agreements governing trade in goods, contains obligations that are relevant to the analysis of a BAM under AB32.
  - GATT Article I (Most Favored Nation) – prohibits a WTO Member from imposing a measure that accords less favorable treatment to imports originating from one Member compared to imports of the like product originating from another Member;
  - GATT Article II (Tariff Concessions) – prohibits a WTO Member from imposing import tariffs above the level "bound" under GATT;
  - GATT Article III (National Treatment) – prohibits a WTO Member from imposing a measure that accords less favorable treatment to imports compared to like domestic products;
  - GATT Article XI (Quantitative Restrictions) – prohibits restrictions on imports, other than duties, taxes, or other charges;
  - GATT Article XX (Exceptions) – provides exceptions to violations of the GATT, if proper justification can be demonstrated, including for public health and environmental reasons.

B. GATT Provisions

1. "Internal measure" or "border measure"

- A threshold question in the analysis of any BAM is whether it constitutes a "border measure" or an "internal measure" under the GATT. If the BAM is considered a "border measure," it would be subject to Article II of GATT (applicable to border duties, taxes, and other charges) or Article XI of GATT (applicable to quantitative restrictions). If the BAM is regarded as part and parcel of an "internal" carbon tax or regulation that is imposed on domestic products and enforced at the border with respect to imports, it would be considered an "internal measure" subject to non-discrimination obligations (pursuant to national treatment under GATT Article III, discussed below). This is generally referred to as permissible "border adjustment" of internal taxes or regulations.

a) Internal measure

- A requirement that California cement producers submit allowances corresponding to emissions for cement sold in California is likely to be seen as an internal measure that can be adjusted at the border through a BAM. The overall objective of climate change measures is to make carbon-intensive products more expensive. Because the "allowance" cost should be shifted forward to California consumers, it can be adjustable at the border, in order to cover all products (including imports) that are consumed within the state. The BAM should therefore be considered a border adjustment of an "internal" measure.

b) Border measure

- One could argue that a BAM on imports is nothing more than a variable import tax or charge applied at the border and that the only link to domestic climate change regulation is for establishing the level of the charge. However, if appropriately designed, the BAM would be interpreted as part and parcel of the overall AB32 regulatory program that is enforced with respect to imports at the border. In other words, in the same way that California producers must submit allowances for emissions associated with products sold in California, importers would similarly be required to submit allowances for emissions associated with products sold in California. Thus, a BAM would not constitute a "border measure" subject to the requirements of Articles II and XI of GATT.

2. National treatment

- "Internal" measures are generally evaluated under the national treatment principle of GATT Article III, which specifies that imported products should be treated no less favorably than a Member's domestically-produced "like" products. Article III:2 applies to internal taxes or charges, while Article III:4 applies to internal regulations.

a) Like products

- A threshold question in analyzing discrimination is whether the products for which treatment is being compared are "like" products. If the domestic and imported products governed by the measure are not "like" then no discrimination can be found, and Articles I and III of GATT are not violated.

- The Appellate Body has stated that the general test for determining "like products" consists of employing four general criteria in analyzing "likeness": (i) the properties, nature and quality of the products; (ii) the end-uses of the products; (iii) consumers' tastes and habits – more comprehensively termed consumers' perceptions and behaviour – in respect of the products; and (iv) the tariff classification of the products. We note that these four criteria comprise four categories of "characteristics" that the products involved might share: (i) the physical properties of the products; (ii) the extent to which the products are capable of serving the same or similar end-uses; (iii) the extent to which consumers perceive and treat the products as alternative means of performing particular functions in order to satisfy a particular want or demand; and (iv) the international classification of the products for tariff purposes.[1]

    - o While an argument could be made that a product with higher CO_2 emissions is *unlike* a product with lower emissions, such an interpretation is unlikely when

[1] Appellate Body Report, *European Communities – Measures Affecting Asbestos and Asbestos-Containing Products*, WT/DS135/AB/R, (adopted 5 April 2001) at para. 101.

applying all of the factors considered under *current* WTO jurisprudence, which focus on the economic question of competition between products in the marketplace (not, for example, likeness of products on scientific, environmental grounds). For example, a gallon of gasoline that was produced with a higher GHG footprint does not generally differ from a gallon of gasoline that was produced with a lower GHG footprint in terms of physical properties, end uses, or tariff classification.

b) Internal regulation

- Assuming a finding that cement produced with higher emissions is "like" cement produced with lower emissions, a WTO panel would then need to determine if the internal measure constitutes a "regulation" or a "tax," in order to determine which provisions of GATT Article III apply. If the measure is an internal regulation, Article III:4 applies:

> The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use.

- An analysis of Article III:4 requires a WTO panel to examine whether the treatment applied to imported products is "less favourable" than that applied to the like domestic products. In other words, it will determine whether the measure "modifies the conditions of competition in the relevant market to the detriment of imported products," which gives domestic products a "competitive edge" in the market over imported products.[2]

- Importantly, the Appellate Body has found that a negative impact on imported products that is unrelated to the foreign origin of the product does not constitute less favorable treatment. According to the Appellate Body,

> imported products are treated less favourably than like products if a measure modifies the conditions of competition in the relevant market to the detriment of imported products. {footnote omitted} However, the existence of a detrimental effect on a given imported product resulting from a measure does not necessarily imply that this measure accords less favourable treatment to imports if the detrimental effect is explained by factors or circumstances

[2] Appellate Body Report, *Dominican Republic – Measures Affecting the Importation and Internal Sale of Cigarettes*, WT/DS302/AB/R (adopted 19 May 2005) at para. 93.

> unrelated to the foreign origin of the product, such as the market share of the importer in this case.[3]

- A BAM would not give any competitive advantage to domestic products over imports. The intent, rather, is to simply ensure that imported products face the *same* requirements that domestic products do, so as to minimize any advantage that *imports* will acquire. While imports may *de facto* face higher compliance costs, due to the fact that their products have higher carbon emissions, this "negative impact" is not the result of their foreign origin, but merely the result of their higher carbon footprint. There is, therefore, a strong argument that a BAM would not violate Article III:4.

c) Internal tax

- If the BAM is considered a internal "tax," GATT Article III:2 applies:

> The products of the territory of any contracting party imported into the territory of any other contracting party shall not be subject, directly or indirectly, to internal taxes or other internal charges of any kind in excess of those applied, directly or indirectly, to like domestic products.

- A WTO panel will therefore determine whether the BAM imposes a burden on the imported products that is directly or indirectly "in excess of" that imposed on the like domestic products. The WTO Appellate Body has stated that "{e}ven the smallest amount of 'excess' is too much."[4]

- As stated above, imports may *de facto* pay a higher "tax" because of their higher carbon footprint. This should not be a reason, however, for a panel to conclude that the tax is "in excess of" that applied to domestic products. Any higher tax paid is not the result of the products' foreign origin, but is merely the result of applying a standard formula to determine the products' allowance requirement. The BAM applies the same requirements to both domestic and imported goods and, therefore, does not impose a tax on imports that is in excess of that imposed on domestic products.

3. Most favored nation

- The most favored nation ("MFN") principle prohibits WTO Members from discriminating in law or in fact against imports originating from different WTO

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[3] *Id.* at para. 96 (emphasis removed). In the case before the Appellate Body, imports were liable for a higher per-unit bond requirement because imports held a smaller market share than domestic producers (the fixed bond amount was spread over a larger quantity of domestic sales). As a result, the difference in the amounts did "not depend on the foreign origin" of the relevant products.

[4] Appellate Body Report, *Japan – Taxes on Alcoholic Beverages*, WT/DS8/AB/R (adopted 1 November 1996) at para. H.1.b.

Members, even for social or other policy reasons.[5] GATT Article I:1 specifically applies to "products" from Member countries, rather than just to a Member country's entire industry. Therefore, evidence that a measure is granting an "advantage, favour, privilege or immunity" to a specific "product" from one Member country that it is not granting to the like product from another Member country would violate GATT Article I:1.

- An allowance requirement or other BAM on imports that applies the same "advantage, favour, privilege or immunity" regardless of origin would not violate the MFN obligation. Because all "like products" are subject to the same rights and obligations based on carbon footprint and without any reference to origin, the BAM would not be discriminatory in violation of the MFN obligation under GATT Article I:1.

4. Article XX exceptions

- This part addresses "exceptions" available under GATT Article XX for violations of the various WTO provisions discussed above. These exceptions would apply if a WTO panel finds that the BAM violates GATT Article I (most favored nation), is a "border measure" that violates GATT Article II or XI, or is a discriminatory "internal measure" that violates GATT III (national treatment).

- Analysis under the GATT Article XX exceptions involves the following steps:

  1. Is the measure provisionally justified under one of the exceptions in GATT Article XX(a)-(j)?

  2. If so, is the measure consistent with the introductory clauses (or "chapeau") of GATT Article XX?[6]

- GATT Articles XX(b) and XX(g) are the most relevant to climate change measures. Article XX(g) is often referred to as the "environmental exception" and covers measures "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption." Article XX(b) is often referred to as the "health exception" and covers measures "necessary to protect human, animal or plant life or health." Because Article XX(g) applies a lower standard of "related to" and because justification is required under only one exception, the analysis below is limited to the environmental exception.

a) Conservation of exhaustible natural resources

- GATT Article XX(g) provides an exception for measures "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with

[5] Appellate Body Report, *Canada – Certain Measures Affecting The Automotive Industry*, WT/DS129/AB/R (adopted 19 June 2000) ("*Canada – Autos (AB)*") at para. 78.

[6] Appellate Body Report, *United States – Standards for Reformulated and Conventional Gasoline*, WT/DS2/AB/R (adopted 20 May 1996) ("*US – Gasoline (AB)*") at p. 22.

restrictions on domestic production or consumption." In order to satisfy this exception, therefore, a Member must demonstrate that (1) the subject of the measure is an "exhaustible natural resource;" (2) the measure is "related to the conservation of" such resource; and (3) the measure is "made effective in conjunction with restrictions on domestic production and consumption."

- First, in previous cases, the WTO has identified certain "exhaustible natural resources," such as clean air[7] and sea turtles.[8]
  - Given these precedents, and the growing literature on climate change issues, the chemical composition of the Earth's atmosphere (protected by measures to reduce GHG emissions) should easily qualify as an "exhaustible natural resource."
- Second, in determining whether the measure is "relating to" the conservation of these resources, a WTO panel "essentially looks into the relationship between the measure at stake and the legitimate policy of conserving exhaustible natural resources."[9] The "related to" test requires that there be a "substantial relationship" between the measure and the conservation of the planet's atmosphere. The Appellate Body has also considered whether the measure was "primarily aimed at" the conservation of natural resources[10] or will look for a "close and genuine relationship between ends and means."[11] In instances in which the "related to" test was applied (*e.g.*, *U.S. - Gasoline* and *U.S. - Shrimp*), it was easily satisfied.
  - AB32 has a substantial relationship to conservation of the planet's atmosphere. Because carbon emissions have a global impact, the imposition of a burden on emissions created by goods consumed in California, whether produced in California or abroad, minimizes leakage and relates to the conservation of the planet's atmosphere.
  - In addition, the objectives of AB32 establish a close and genuine relationship of ends and means between the BAM at issue and climate change, both in the sense of (i) imposing a cost on carbon emissions associated with imports so as to reduce leakage and (ii) providing an incentive for foreign countries to enter into a global climate change deal (if they do so, they may avoid having to buy allowances for their imports into California under an appropriate policy design).
- Third, the contested measure must be made "in conjunction with restrictions on domestic production or consumption." This is a requirement for "*even-handedness* in the

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[7] *Id.* at p. 14-19.

[8] Appellate Body Report, *United States – Import Prohibition of Certain Shrimp and Shrimp Products*, WT/DS54/AB/R (adopted 6 November 1998) ("*US – Shrimp (AB)*") at para. 125-145.

[9] *Id.* at para. 135.

[10] *US – Gasoline (AB)* at p. 19.

[11] *US – Shrimp (AB)* at para. 136-141.

imposition of restrictions, in the name of conservation, upon the production or consumption of exhaustible natural resources."[12]

- o AB 32 and a relevant BAM would apply equally to imported and domestic cement, and, therefore, the requirements would be even-handed in their application.

b) Chapeau

- If a measure provisionally satisfies one of the Article XX exceptions, it must then meet the standards set out in the "chapeau" (introductory paragraph) of the article:

> Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures

(i) Arbitrary or unjustifiable discrimination

- The Appellate Body has found that "the analysis of whether the application of a measure results in arbitrary or unjustifiable discrimination should focus on the cause of the discrimination, or the rationale put forward to explain its existence." If the rationale for the discrimination between countries bears no rational connection to the objective under one of the Article XX exceptions, or would go against that objective, the application of the measure would result in arbitrary or unjustifiable discrimination.[13]

- Under AB32, measures to address imports are needed in order to prevent leakage that would undermine AB32's objective of lowering GHG emissions and conserving the planet's atmosphere, as justified under paragraph (g) of Article XX. Any measure that CARB adopts to address imports should be designed and justified to highlight a direct relationship to the objectives of AB32 and an intent to further such objectives. Under these circumstances, the BAM would not constitute "arbitrary or unjustifiable discrimination."

- The rationale for any discrimination, whether between like products from different WTO Members (MFN) or between imports and domestic like products (national treatment), is directly related to achieving a climate change objective. Such "discrimination" is only based on the level of GHG emissions and the intent to address a significant risk of leakage. Notably, the BAM would not impose a ban on imports that fail to meet any particular requirement and imposes no obligation on products not imported for sale in

[12] *US – Gasoline (AB)* at pp. 20-21.

[13] *See* Appellate Body Report, *Brazil – Measures Affecting Imports of Retreaded Tyres*, (adopted 17 December 2007) ("*Brazil – Tyres (AB)*") at para. 227.

California. Other WTO Members and their exporters are free to adopt any approach considered appropriate to reduce the GHG emissions intensity of exports destined for the California market.

- Additional elements may be relevant to the evaluation of whether a measure amounts to "arbitrary or unjustifiable discrimination between countries where the same conditions prevail" under the chapeau of Article XX.

  - *Does the measure take account of local conditions in foreign countries or does it essentially require that foreign countries adopt California's policies?* In *U.S. - Shrimp*, the original ban was faulted because it required all other countries to "adopt essentially the same policy" as the United States. When the United States conditioned market access on "the adoption of a program comparable in effectiveness," the Appellate Body found it allowed flexibility and avoided arbitrary or unjustified discrimination. The BAM would not require foreign countries to adopt any sort of policy. It would simply require the purchase of sufficient allowances to cover a product's carbon emissions.

  - *Did the United States engage in "serious, across-the-board negotiations with the objective of concluding bilateral or multilateral agreements" to address climate change?* It is questionable whether this element, which was considered important in the context of an import ban in *U.S.-Shrimp*, has equal force for a measure that simply requires imports to bear the same social cost of carbon as domestic products. In any event, in *U.S.-Shrimp*, the Appellate Body did not require the conclusion of bilateral or multilateral agreements, but simply good faith efforts to negotiate. Moreover, the Appellate Body has not said that a Member must endanger the health and safety of its citizens by sacrificing its environmental protection objectives in order to engage in these negotiations. In the climate change area, a delay of 5 or 10 years between the imposition of GHG controls and import measures in order to allow for bilateral or multilateral negotiations could result in such extensive leakage that GHG emissions actually increase, fundamentally undermining the objectives of climate change legislation. In any event, California and the United States are actively engaged in bilateral, regional, and multilateral climate change negotiations, so the application of a BAM to imports immediately is fully justified.

  - *Does the implementation and administration of the measure respect "basic fairness and due process"?* There is no reason to believe that CARB would not implement or administer a BAM in a manner that respects basic fairness and due process.

(ii) "Disguised restriction on international trade"

- The second part of the test under the Article XX chapeau looks to whether the WTO Member imposing the measure is doing so as a "disguised restriction on international trade," rather than a good faith attempt to address a particular policy objective under one of the Article XX exceptions. According to the Appellate Body,

> We consider that "disguised restriction", whatever else it covers, may properly be read as embracing restrictions amounting to arbitrary or unjustifiable discrimination in international trade taken under the guise of a measure formally within the terms of an exception listed in Article XX. Put in a somewhat different manner, the kinds of considerations pertinent in deciding whether the application of a particular measure amounts to "arbitrary or unjustifiable discrimination", may also be taken into account in determining the presence of a "disguised restriction" on international trade.[14]

- For purposes of this paper and in light of this statement by the Appellate Body, the analysis under the chapeau of GATT Article XX is limited to the factors discussed above associated with demonstrating "arbitrary or unjustifiable discrimination."

III. U.S. CONSTITUTIONAL OBLIGATIONS

A. Relevant Provisions

- Interstate Commerce Clause – Congress shall have the power to "regulate Commerce … among the several States …" (Article I, Section 8, clause 3)
- Foreign Commerce Clause – Congress shall have the power to "regulate Commerce with foreign Nations …" (Article I, Section 8, clause 3)
- Import-Export Clause – "No state shall, without the consent of Congress, lay any imposts or duties on imports or exports…" (Article I, Section 10, clause 2)
- Supremacy Clause – "The Laws of the United States ... shall be the supreme Law of the Land" (Article VI, clause 2)

B. Interstate Commerce Clause

- Perhaps the most relevant constitutional hurdle related to the constitutionality of a BAM is that imposed by the so-called "dormant" Commerce Clause of the U.S. Constitution. The dormant Commerce Clause is so named because it does not appear in the text of the Constitution itself. Instead, it has been inferred from the Interstate Commerce Clause, which gives Congress the power to regulate "commerce among the several states."[15] The Supreme Court has found that this mandate, by extension, also stands for the proposition that state and local laws are unconstitutional if they unduly burden interstate commerce.
- To survive a dormant Commerce Clause challenge, a state regulatory measure must not discriminate against out-of-state entities; the burden on interstate commerce must not be

[14] *US – Gasoline (AB)* at p. 25.

[15] U.S. Const. art. I, § 8.

clearly excessive compared to the local benefit obtained; and the law must be the least restrictive means of achieving that local objective.

1. Discrimination

- The first determination made by a reviewing court when presented with a challenge to a state regulation based on the dormant Commerce Clause is whether the regulation discriminates against out-of-state entities. If a regulation is found to discriminate against those outside of the regulating state, courts will review it according to a strict scrutiny standard. As a practical matter, a court's decision to review under strict scrutiny means that the measure will likely be struck down. State measures rarely survive strict scrutiny.

- A regulation is *facially discriminatory* if it expressly draws a distinction between in-staters and out-of-staters. These distinctions are usually easy to recognize.

    - For example, a series of Supreme Court cases have struck down state regulatory measures that have attempted to restrict the flow of garbage over state borders. These cases are exemplified by the Court's decision in *Philadelphia v. New Jersey*, which involved a New Jersey statute that restricted the import of waste that originated outside of the state.[16] In that case, the Court said that "whatever New Jersey's ultimate purpose, it may not be accomplished by discriminating against articles of commerce coming from outside the State unless there is some reason, *apart from their origin*, to treat them differently."

    - A BAM is not discriminatory on its face because it does not treat out-of-state producers any differently than in-state producers based on origin. The requirements for all producers would be similar and any difference in treatment is based on the carbon footprint associated with the relevant products being sold in California.

- Even if regulations are *facially neutral* with regard to in-staters and out-of-staters, courts must still examine the regulations to determine whether their effect or purpose is nonetheless discriminatory.

    - For example, in *Hunt v. Washington State Apple Advertising Commission*, the Court struck down a North Carolina law requiring that all apples imported into the state must be those that meet the "applicable U.S. grade or standard."[17] The State of Washington maintained its own grading system that was actually more stringent than the North Carolina standard, but Washington apples were effectively prohibited from entering North Carolina's market because they did not meet the applicable U.S. standards. Even though this law was neutral with regard to in-staters and out-of-staters on its face, the law effectively prohibited Washington apples from entering the North Carolina market. The Supreme Court

[16] *Philadelphia v. New Jersey*, 437 U.S. 617 (1978).

[17] *Hunt v. Washington State Apple Advertising Commission*, 432 U.S. 333, 339 (1977).

found the law to be discriminatory in its effect, inviting strict scrutiny and resulting in the law's invalidation.[18]

- o The effect or purpose of a BAM is not discriminatory. While it is possible that out-of-state producers may *de facto* be required to submit more allowances than in-state producers, this is a function of the carbon footprint associated with their products, not of the law itself. It is their choice whether to modify these processes in order to submit fewer allowances. The purpose of a BAM is to minimize leakage by ensuring that all cement sold in California is subject to the same requirements.

2. Extraterritoriality

- State action will also invoke strict scrutiny, and likely be struck down, if it is found to regulate the out-of-state conduct of businesses. California thus must be careful to craft regulations that do not directly regulate "extraterritorial" conduct.

  - o In *Healy v. The Beer Institute*, for example, the Court struck down a Connecticut law requiring beer companies to attest that their prices in Connecticut were lower than their prices in the surrounding states.[19] Because this law could be seen as directly affecting the companies' prices outside of Connecticut, the Court stated that "the Connecticut statute has the undeniable effect of controlling commercial activity occurring wholly outside the boundary of the State."[20]

  - o In *PhRMA v. Walsh*, by contrast, the Court upheld a Maine Medicaid law that attempted to encourage non-resident drug companies to negotiate rebate programs with the state.[21] If a company refused to negotiate a rebate, its Medicaid sales in the state would be subject to a prior authorization and approval. Unlike the statute in *Healy*, the Court ruled that "the Maine Act does not regulate the price of any out-of-state transaction, either by its express terms or by its inevitable effect."[22] Accordingly, the statute avoided strict scrutiny and was subsequently upheld by the Court.

- As in *PhRMA v. Walsh*, a BAM does not regulate the activities of out-of-state producers. It leaves their business decisions completely within their control. AB32 and any corresponding BAM should be interpreted as regulating the character of goods sold in California. For example, if California were to adopt a regulation that prohibited the sale of any consumer goods in California manufactured with child labor, it could presumably do so (just like it can require that products meet certain manufacturing standards).

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[18] *Id.*

[19] *Healy v. Beer Institute*, 491 U.S. 324 (1989).

[20] *Id.* at 337.

[21] *Pharm. Research & Mfrs. of Am. v. Walsh*, 538 U.S. 644 (2003).

[22] *Id.* at 669.

Although this regulation could arguably be considered to have extraterritorial effects (by forcing companies wishing to sell in California to discontinue using under-age workers), these would not be impermissible extraterritorial effects. The same reasoning would apply to a BAM. Importers may either certify that their products are meeting acceptable standards or they can purchase allowances to satisfy the standards. The regulation is not impermissibly extraterritorial because it is only imposing burdens on parties wishing to sell product in California, and it is applied even handedly to both California and out-of-state companies.

3. *Pike v. Bruce Church* balancing test for regulations

- If CARB can frame its regulations to avoid discriminating or regulating extraterritorially, the BAM will not be subject to strict scrutiny and will instead be reviewed under a much more forgiving balancing test.[23] That test, first set forth in *Pike v. Bruce Church, Inc.*,[24] essentially weighs the regulation's burden on interstate commerce against its benefits to the state by looking at three factors. First, the state's interest must be legitimate. Second, the regulatory scheme must be the least restrictive means of accomplishing the state's goal. Finally, the benefits accrued to the state must outweigh any burdens on interstate commerce.

- Under the appropriate design, each of the three factors under the *Pike* test would be satisfied. In fact, absent a BAM to address leakage effectively, California cannot meet its climate change objectives under AB32 and would impose significant economic harm on the state.

C. Foreign Commerce Clause

- The Constitution also delegates to Congress the power to "regulate commerce with foreign nations." As with interstate commerce, this positive grant of power to Congress introduces a parallel negative restriction on the power of states. While this clause appears in the same sentence of the Constitution as the domestic Commerce Clause, the Supreme Court has historically applied a tougher standard to state regulations reviewed under its foreign counterpart. In recent years, however, the Court has moved away from this stricter standard, and review under the foreign Commerce Clause is now much closer to traditional Commerce Clause analysis.

- In *Japan Line, Ltd. v. County of Los Angeles*, the Court focused on two elements for judging the validity of a state tax measure with international reach. First, a reviewing court must inquire "whether the tax...creates a substantial risk of international multiple taxation, and second, whether the tax prevents the Federal Government from 'speaking with one voice when regulating commercial relations with foreign governments.'"[25]

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[23] *See Department of Revenue of Ky. v. Davis*, 553 U.S. 328, 339 (2008) (noting that state laws "frequently survive" scrutiny under *Pike*).

[24] *Pike v. Bruce Church, Inc.*, 397 U.S. 137 (1970).

[25] *Japan Line, Ltd. v. County of Los Angeles*, 441 U.S. 434, 451 (1979).

- More recent case law, however, has reduced the force of the holding in *Japan Lines*.[26] Moreover, California cases have suggested that an intermediate level of scrutiny applies to challenges under the Foreign Commerce Clause.[27]

- Accordingly, if California carefully tailors its measure to avoid multiple taxation by including a credit mechanism that would refund foreign businesses if they have already been taxed on a certain item, it should survive review under the first element of the *Japan Line* test. Furthermore, if the tax is structured so that it is levied on the actual sale of the product within California's borders, as opposed to a tax on importation, it should survive the test's second prong. The federal government has not explicitly forbidden such a tax, and it should not hinder its ability to speak with one voice.

C. Import-Export Clause

- Another area raising potential constitutional issues in relation to any potential CARB regulations that would impose a BAM on imports is the so-called "Import-Export" Clause of the Constitution, which declares that a state may not "lay any imposts or duties on imports or exports...."[28] The Import-Export Clause is rarely invoked and should not present significant obstacles to CARB regulations that would not already be addressed under the dormant foreign Commerce Clause and domestic Commerce Clause.

- To survive an Import-Export Clause challenge, a state measure on imported products must preserve the original intentions of the Clause.[29] The measure must not hinder interstate commerce by using the state's strategic coastal geographic position, must not affect the federal government's ability to speak with one voice, and must not divert the federal government's revenues from other import duties on that same product.[30] In fact, two of the three components of the modern Import-Export Clause test are already addressed in the foreign and domestic Commerce Clause tests. The "one voice" requirement is virtually identical to that contained in the dormant foreign Commerce Clause test, and the element concerning interstate harmony is contained in the test used to review state tax measures under the dormant Commerce Clause.[31]

- If CARB's regulations are interpreted to include some form of taxation, they will likely be upheld if they are found acceptable under the more significant – and more rigorous – foreign and domestic Commerce Clause analysis. California must only avoid the one

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[26] *Container Corporation of Am. v. Franchise Tax Bod*, 463 U.S. 159 (1983).

[27] *See Zee Toys v. County of LA*, 85 Cal. App. 3d 763 (2d Dist. 1978).

[28] U.S. Const. art I, § 10, cl.2.

[29] *See Woodruff v. Parnham* (1878) (holding that the Clause applies only to foreign commerce).

[30] *See Michelin Tire Corp. v. Wages*, 423 U.S. 276 (1976) (establishing the three-part balancing test).

[31] *See Department of Revenue of State of Washington v. Association of Washington Stevedoring Cos.*, 435 U.S. 734, 754-55 (1978).

additional element, that the tax not be taken on the act of importation itself. This will be easily avoided if any tax is crafted in such a way that it does not discriminate against foreign entities, as already required under Commerce Clause analysis.

D. Supremacy Clause

- The Constitution's Supremacy Clause dictates that all federal laws shall be the supreme law of the land.[32] Historically, the Supreme Court has framed this supremacy in terms of federal "preemption." This preemption may be either express or implied.

- Express preemption is easy to identify, as it pertains to federal laws that explicitly forbid state regulation in a particular area. California climate change measures that are designed to reduce the leakage of GHG emissions in the California cement industry to protect public health and the environment are not currently expressly preempted, because no federal law currently prohibits states from regulating.

- The Court has found implied preemption of state laws or regulations in three distinct situations. In so-called "field preemption," the Court will invalidate state action if it finds that it encroaches upon a subject area for which Congress clearly meant to "occupy the field." Immigration and foreign policy are prime examples of such areas, in which Congress's intent to supersede state law altogether may be found from a scheme of federal regulation so pervasive as to make reasonable the inference that Congress left no room for the States to supplement it. State laws will also be struck down if there is a conflict between the state measure and a federal law, constituting so-called "conflict preemption." Finally, preemption will be found if a state law is deemed to impede or stand as an obstacle to the achievement of federal objectives.

- Traditionally, the Supremacy Clause has been found to preempt state action in areas in which the federal government has already acted in some respect. But in recent years, some have noted a "heightened legislative preemption doctrine for matters affecting foreign relations."[33] For example, in the 2000 Supreme Court decision of *Crosby v. National Foreign Trade Council,* the state of Massachusetts in effect enacted its own embargo against Burma by forbidding its state agencies from transacting any business with the nation.[34] While the federal government's own Burma sanctions policy did not expressly prohibit states from imposing their own sanctions, the Court nonetheless found that Massachusetts had overstepped its bounds because Congress had already "occupied the field" with its own actions in that arena.[35]

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[32] U.S. Const., Art. VI, cl. 2.

[33] Nick Robinson, *Citizens Not Subjects: U.S. Foreign Relations Law and the Decentralization of Foreign Policy*, 40 Akron L. Rev. 647, 658 (2007).

[34] *Crosby v. National Foreign Trade Council*, 530 U.S. 363 (2000).

[35] *Id.*

- The Supreme Court has recently taken an even more expansive view of federal supremacy in foreign affairs, going one step further than implied preemption by reviving the so-called dormant foreign relations power. In 2003, the Court invalidated a California statute in *American Insurance Association v. Garamendi* in an area for which there was neither express nor implied preemption.[36] That case involved a California statute which required any insurer doing business in the state to disclose certain information about Holocaust-era insurance policies that had been sold in Europe. While no federal laws expressly preempted the California law, or conflicted directly with it, the Court found that the California statute would interfere with U.S. diplomatic efforts in that field, in the form of several executive agreements between the United States and France, Germany, and Austria.

- Protecting the environment and health of its citizens is a traditional state interest and area of state competence. Any legitimate program seeking to regulate climate change on a state-by-state basis has to address the problem of leakage in order to achieve the relevant objectives. Thus, if California considers that it is not constitutionally barred from enacting climate change measures, it must likewise consider that it has the authority to prevent leakage.

IV. CONCLUSION

- Based on the above, neither the U.S. Constitution nor applicable WTO obligations would prevent CARB from developing appropriate and effective measures for addressing imports in the context of its implementation of AB32, including the implementation of an effective BAM. By adopting such measures, CARB can achieve its objectives of minimizing leakage, can prevent the extinction of the California cement industry, and can ensure that California's GHG footprint does not expand even further beyond California's border by shifting more and more GHG emissions associated with products critical to California's economy to other countries.

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[36] *American Insurance Association v. Garamendi*, 539 U.S. 396 (2003).

EXHIBIT 20

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

June 7, 2010

Ms. Mary Nichols
Chair
California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: Comments on CARB's May 17 Public Meeting on Allowance Allocation

Dear Ms. Nichols,

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all six cement manufacturers operating the 10 cement plants in California,[1] hereby submits the following comments on the presentation by the California Air Resources Board ("CARB") at its May 17, 2010 public meeting to discuss allowance allocation and next steps for the cap-and-trade program.

In short,

- The characteristics of the cement industry, the weight of existing research, and the findings of international trade cases all suggest that the cement industry is highly exposed to the risk of leakage in comparison to other emissions-intensive and trade-exposed ("EITE") industries.
- CARB should reevaluate and revise several aspects of its industry identification methodology, especially the use of producer price indices as an indicator of trade exposure.
- CARB should be commended for its proposed "tiered approach" and its recognition that the minimization of emissions leakage is a top priority in the use of allowance value.
- Benchmarks for EITE industries should include both direct and indirect emissions, and any allowance value intended to offset the impact of GHG-related electricity cost increases should be allocated directly to EITE industries rather than to the electric power sector.
- The most appropriate benchmark for the California cement industry is "cement" — defined as all ASTM cement that does not contain any supplementary cementitious materials ("SCMs") and the cement portion of any such cement containing SCMs.
- CARB should either eliminate or revise the concept of a uniform "cap adjustment factor" in the proposed allocation formula, as it is a direct contradiction to the "tiered approach" and the principle that the minimization of leakage is a priority that justifies and necessitates differentiated levels of policy assistance.

[1] The Coalition includes CalPortland Company, Cemex, Inc., Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California Inc., and Texas Industries, Inc.

- Even under a benchmarking approach that fully offsets compliance costs up to an industry average, the risk of leakage will still exist for certain entities within the industry. Consequently, a partial border adjustment is required to level the competitive playing field between imported and domestic cement. To the extent that allowance distributions are insufficient to offset 100 percent of the industry's compliance costs or are prematurely phased out, the importance of a partial border adjustment in reducing the risk of leakage will increase substantially.
- The cement industry is uniquely suited to the adoption of a partial border adjustment, which can be designed to be both World Trade Organization ("WTO") consistent and constitutional.

CSCME will submit additional comments upon CARB's release of additional details of its regulatory approach, including the specific methodologies underlying a number of critical points in CARB's presentation.

I. The Risk of Leakage in the California Cement Industry

1.1 The California cement industry is at a severe risk of economic and emissions leakage

As explained in detail in our prior comments,[2] the California cement industry is uniquely vulnerable to emissions leakage resulting from increased compliance costs associated with the implementation of AB 32. The specific characteristics of the cement industry in California, namely its high emissions intensity and its high exposure to competition from imports, creates a situation where the industry is exposed to high compliance costs that cannot be passed through to customers without a substantial loss of market share to imports and eventual disinvestment. A shift in demand from California cement to imported cement will not only lead to emissions leakage (due to the fact that most imported cement has a higher carbon footprint than California cement, especially when transportation emissions are considered), but also will lead to the loss of jobs and eventual deterioration of local communities in California that are directly and indirectly supported by cement manufacturing.

The California cement industry is particularly susceptible to emissions leakage for the following reasons:

- **Cement is a homogenous commodity:** Cement, which is sold in bulk, is identical in its use, regardless of the manufacturer, and it cannot be differentiated through labeling or advertising. The identity of the manufacturer therefore makes little difference to the consumer, and these goods compete almost exclusively on the basis of price.
- **Cement manufacturing is a highly GHG-intensive process:** In addition to having an energy-intensive production process, cement also has "process emissions," which are an unalterable consequence of the production process required to convert limestone into cement clinker. With process emissions that are over 50 percent higher than its combustion emissions, the cement industry has among the

[2] *See* CSCME October 23, 2007 paper *"Minimizing 'Leakage' Under Climate Change Proposals Affecting The California Cement Industry"* and June 9, 2008 paper *"Building a Sustainable Future: Economic Growth, Climate Change, & The California Cement Industry"*.

highest emission intensities among energy-intensive manufacturing industries. As a result, the California cement industry is likely to face extremely high compliance cost per dollar of output, which it will be unable to pass through due to the presence of international competition.

- **California is an internationally-competitive market:** Generally speaking, cement markets have limited geographic scope because of the high cost of overland transportation. California, however, faces significant international competition due to its coastal location with multiple deep water ports in all of its major metropolitan markets. Maritime transportation of cement is significantly less expensive than overland transportation. Therefore, cement produced in Asia can reach the California market at a relatively low cost.
- **Cement is a capital-intensive industry:** Cement manufacturing requires large upfront investments in capital equipment that is employed for decades. As a result, the profitability of cement manufacturers is highly sensitive to sales volume – even small reductions in volume can substantially reduce profits and returns on investment. In addition, small increases in regulatory compliance costs can result in large impacts on overall competitive conditions and investment decisions.
- **Cement is a technologically mature industry:** No major technological shifts in large-scale pyro-processing production technology are expected in the foreseeable future in the cement industry, and the potential for significant reductions beyond those derived from persistent marginal improvements in indirect (*i.e.*, electrical) energy efficiency is limited. In addition, California's history of environmental leadership has resulted in an industrial base that is more efficient and cleaner than those within other U.S. states or the vast majority of nations. Also, high energy prices and strong import competition has forced domestic manufacturers to remain on the leading edge of technology to improve energy efficiency, contain production costs, and thereby remain price competitive in the California cement market. Consequently, with very limited low-cost GHG abatement opportunities within the industry's control, the industry does not have the opportunity to mitigate its GHG compliance cost — thereby increasing its exposure to leakage.

1.2 Research has repeatedly confirmed that the cement industry is at a high risk of leakage

A survey of the literature on cement manufacturing, leakage, and carbon pricing mechanisms confirms the cement industry's susceptibility to emissions leakage. In his analyses of the industry under the EU Emissions Trading System ("ETS"), Ponssard (2009) points out that the costs associated with adding capacity in a capital-intensive industry, augmented by the imposition of a carbon price, are likely to disincentivize domestic capacity expansion to meet demand growth.[3] Instead, it is likely that importing cement to meet demand will be more cost-effective than investing in new capacity. According to Demailly & Quirion (2005), Grubb et al. (2009), Ponssard, and Hourcade et al. (2007), incentives to increase imports to meet demand are amplified in coastal markets, such as California. These studies

[3] Meunier, Guy and Jean Pierre Ponssard (December 2008). "Capacity Decisions with Demand Fluctuations and Carbon Leakage." Ecole Polytechnique.

find that the relative affordability of transporting cement overseas shields inland markets from import competition, but that import and leakage exposure increase significantly for plants located near coastlines.[4]

Furthermore, as noted above, there is a consensus that cement production stands out as a technologically mature process in the manufacturing industry. Cook (2009) and Demailly & Quirion note that there has been a convergence toward the most mature technology available, most notably in U.S. cement markets.[5] They suggest that in the absence of "breakthrough technologies", such as CCS, the cement industry has very few places to look for efficiency savings, particularly given that approximately 40 percent of cement's direct emissions come from fuel combustion, while the remaining 60 percent is from the calcination of limestone. Simply put, the cement industry's technological maturity and limited scope for emissions reductions is likely to exacerbate the impact of carbon prices on the domestic producer's ability to compete with unregulated imports.

1.3 A history of antidumping cases confirms that the industry is highly trade-exposed

A series of trade cases provide direct evidence that the California cement industry is highly vulnerable to imports and thus is highly "trade-exposed". For almost 20 years, imports of cement from Mexico, Japan, and Venezuela were subject to additional "antidumping" duties to remedy unfair trade practices in relation to injurious, low-priced imports. In numerous investigations, the U.S. International Trade Commission ("ITC") found that the dumping of low-priced imports was causing material injury to the U.S. domestic cement industry and, in particular, to the California cement industry. These findings confirm that the California cement industry is highly vulnerable to imports and thus is highly "trade-exposed."

The analysis of material injury in an antidumping proceeding has significant parallels to the analysis necessary to evaluate the impact of increased compliance costs associated with AB 32. In its injury analysis, the ITC examines the impact of dumped imports on the domestic industry, including whether such imports are causing adverse price effects through underselling and price depression/suppression. In the antidumping context, imports are being sold at unfairly low or "dumped" prices and are causing adverse effects in the domestic market. In the context of AB 32, the increased compliance costs faced by California producers would have the same effect -- imports would be able to sell into California at lower prices in the absence of a similar cost burden.

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[4] Demailly, Damien and Philippe Quirion (November 2005). "The Competitiveness Impact of CO2 Emissions Reduction in the Cement Sector." Organization for Economic Cooperation and Development; Grubb, Michael et al. (August 2009). "Climate Policy and Industrial Competitiveness: Ten Insights from Europe on the EU Emissions Trading System." The German Marshall Fund; Meunier & Ponssard (2008); Hourcade, Jean-Charles et al. (December 2007). "Differentiation and Dynamics of EU ETS Industrial Competitiveness Impacts." Climate Strategies.

[5] Cook, Gregory (September 2009). "Climate Change and the Cement Industry: Assessing Emissions and Policy Response to Carbon Prices." Climate Strategies; Demailly, Damien and Philippe Quirion (February 2006). "Leakage from Climate Policies and Border Tax Adjustment: Lessons from a Geographic Model of the Cement Industry."

In its antidumping analysis, the ITC conducted its injury analysis on the basis of "regional" industries within the United States. In the most recent review in May 2006, the ITC found that the State of California constituted a "regional market" for cement because (1) the domestic producers within the regional market sell "all or almost all " of their production of the product within the region; and (2) the demand within the region is not supplied, "to any substantial degree," by domestic producers located elsewhere in the United States.[6]

In the original investigation involving imports of cement from Japan, the ITC findings highlight the extent of the industry's trade exposure and the adverse impact of low-priced imports:

> The adverse effects of import volumes and prices on the domestic producers' financial condition is reflected in their inability to invest. The record of this investigation reflects that domestic producers have curtailed planned investments, and that the risk of investment in the Southern California cement industry has increased. Domestic producers, faced with price competition from [dumped] imports, have reduced prices in an effort to maintain production volumes and capacity utilization levels, so as to minimize the effect on profits. While this effort keeps production and shipments at higher levels, it adversely affects the producers' financial indicators. On the other hand, maintaining prices in the face of [dumped] import price competition would result in even greater declines in market share, and a resulting drop in contribution profits.[7]

Accordingly, consistent with the above comments, CARB should consider the extensive and objective findings and evidence already available from multiple U.S. antidumping investigations and reviews highlighting the significant vulnerability of the California cement industry to imports.

II. Allowance Allocation

CARB's proposed approach to allowance allocation consists of a three-step process: (1) identify industries at risk of leakage, (2) allocate a portion of cap allowances to provide transition and potentially leakage-prevention assistance to certain industries, and (3) distribute those allocated allowances using an updating output-based benchmarking approach. The following sections comment on each individual element.

2.1 Industry Identification

2.1.1 GHG Intensity

- *CARB should estimate GHG intensity using data that are consistent across timeframes*

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[6] *Gray Portland Cement and Cement Clinker from Japan*, ITC Publication 3856 (May 2006), at 10.
[7] *Gray Portland Cement and Cement Clinker from Japan*, ITC Publication 2376 (April 1991), at 44.

In estimating GHG intensity, CARB is utilizing industry GHG emissions data from the 2008 mandatory reporting inventory and industry value-added data from the 2007 Economic Census. The approach of using data from a recession year in the numerator and data from a non-recession year in the denominator is highly unusual, and it is likely to significantly underestimate GHG intensities in certain sectors — namely, those that were disproportionally impacted by the economic downturn (*e.g.*, the construction, concrete, and cement industries).

Given that 2008 industry value-added data is not available at the state level, an alternative approach would be to scale the 2007 data based on trends in the national industry. Such an adjustment should eliminate any industry bias due to the impact of the recession. For example,

- According to the 2007 Economic Census, the California cement industry's value added was approximately $835 million or, alternatively, 12 percent of total U.S. cement industry value added.
- According to the 2008 Annual Survey of Manufacturers, total U.S. cement industry value added was $5.5 billion.
- Applying the 2007 state-to-national industry ratio (12 percent) to the 2008 U.S. industry value added data ($5.5 billion), it is estimated that the California cement industry's value added in 2008 was actually $680 million, which contrasts sharply with the $835 million figure we assume is being used in CARB's calculations.

As a result, CSCME believes that CARB's approach of using emissions data from 2008 and value-added data from 2007 is likely to result in an underestimation of the California cement industry's GHG intensity by about 23 percent. We recommend that CARB adjust its methodology to account for this systematic bias.

2.1.2 Trade Exposure

- *The use of an industry's producer price index as an indicator of trade exposure is inappropriate*

CSCME believes that historical trade intensity is the single best quantitative indicator of trade exposure and supports the use of trade intensity metrics to identify industries at risk of leakage.[8] However, the use of producer price indices ("PPI") as an indicator of trade exposure is inappropriate.

In its May 17th presentation, CARB staff indicated that PPI is used to supplement the analysis because the recent economic recession may result in trade intensities that "differ before/after 2007/2008 for many sectors".[9]

[8] However, we have several concerns regarding CARB's application of the trade intensity concept and its calculation of industry trade intensity metrics. We intend to address these concerns upon release of CARB's white paper detailing its methodology.

[9] California Air Resources Board (May 1020). "Greenhouse Gas Cap-and-Trade Regulation Status Update." p 53.

- One possible interpretation of this statement is that CARB is concerned that the recession may have momentarily distorted the "normal" conditions of competition within some industries and thereby biased industry trade intensity metrics. If so, there is a simple solution: exclude recession years (i.e., 2008-2009) from its analysis.
- An alternative interpretation of this statement is that CARB is concerned that the recession may have permanently altered trade patterns in some industries. Although the recent recession has undoubtedly altered trade patterns in many industries, as one might expect given its severity, it is unclear how historical U.S. industry PPI data would compensate for this.

More generally, it is unclear why historical U.S. industry output prices, as measured by PPI, would provide useful, accurate, or additional information about trade exposure beyond that provided by historical trade intensities. CSCME economists are unaware of any generally accepted theory for why producer price indices should have value as an indicator of trade exposure. They are also unaware of any other climate policy frameworks or climate policy experts that have recommended PPI as a relevant measure of trade exposure. In the absence of a coherent, tested, and generally accepted theory of why PPI is a valid indicator of trade exposure, CSCME strongly urges CARB to exclude it from its analysis.

2.2 Allowance allocation

- *CSCME supports CARB's tiered approach to allocating allowances across uses*

CSCME believes that leakage is a fundamental policy failure of any climate policy and the minimization of leakage is a top priority in the design and implementation of climate regulations. Consequently, we commend CARB's proposed "tiered approach" to allocating allowances and its recognition that leakage minimization is a top-tier use of allowance value. In contrast to the Waxman-Markey approach to EITE industries, CARB's approach of prioritizing access to allowance value is likely to significantly reduce the risk that allowance distributions to leakage-prone industries will be unexpectedly and abruptly pro-rated due to an insufficient allocation. This is likely to increase the long-term predictability of leakage assistance and decrease the leakage impacts associated with policy uncertainty.

2.3 Allowance distribution

- *Industry benchmarks should include both direct and indirect emissions*

Cement companies will be faced with increased electricity costs due to the application of a California cap-and-trade program, as well as the application of complementary GHG reduction measures (*e.g.*, renewable portfolio standards), to the electric utility industry. To minimize the risk of leakage, EITE industries should receive allowance value that offsets indirect emissions cost burdens.

There are two basic approaches for offsetting the higher electricity costs that manufacturers experience as a result of climate policies.

(1) Distribute allowance value to the electric power industry with the requirement that they use that value to offset higher GHG-related electricity costs to leakage-exposed manufacturers, which effectively mutes the carbon price signal.

(2) Distribute allowance value directly to the leakage-exposed manufacturing sectors, allowing them to use that value to offset the carbon price signal transmitted from the electric power sector.

CSCME strongly recommends that benchmarks include both direct and indirect emissions and that the allowance value associated with indirect emissions be directly allocated to affected manufacturing entities rather than the electric power sector. This approach has two distinct advantages. First, it is more targeted and transparent, as the allowance value is allocated directly to affected entities. Second, it is likely to be more effective, as it allows the carbon price signal to be transmitted from the electric power sector to the manufacturing sector.

- *The cement industry benchmark should include clinker and mineral additives (e.g., limestone and gypsum), but exclude supplementary cementitious materials.*

Benchmarks must be tailored to the unique characteristics of the industry to which it is being applied. In the case of the cement industry, a key decision is the definition of "output" that forms the denominator of the benchmark. Several options exist, including: (1) cement clinker ("clinker"), (2) cement clinker plus mineral additives ("cement"), and (3) cement clinker plus mineral additives and supplementary cementitious materials ("cementitious"). The California cement industry believes that "cement" — defined as all ASTM cement that does not contain any SCMs and the cement portion of any such cement containing SCMs — is the most appropriate benchmark.

The exclusion of SCMs from the CSCME proposed cement industry benchmark is consistent with the proposed EU-ETS benchmark mentioned in CARB's May 17th presentation. As discussed in EU-ETS documents, it is impossible to achieve an unbiased standard for the cement industry unless SCMs are excluded from the standard. The benchmark proposed by CSCME adheres to the rationale behind the proposed EU-ETS standard, but is expanded slightly beyond clinker to include other key components of ASTM cement, including gypsum and limestone.

This benchmark proposed by CSCME has several beneficial properties:

(1) *Actionable:* The scope of the proposed benchmark includes those decisions that are directly within the cement manufacturer's control — namely, the production of clinker and the use of mineral additives.

(2) *Unbiased:* Like clinker, ASTM cement is a consistent, uniform, and unbiased standard. Furthermore, to the extent that regional or national data are used to establish the benchmark, the exclusion of SCMs from the output metric is necessary to avoid severely and unfairly penalizing California cement manufacturers. Key SCMs (*e.g.*, fly ash and granulated blast furnace slag) are primarily produced east of the Mississippi River, and due to transportation costs and other logistical factors,

economic access to these supplies tends to be highly localized. The use of a benchmark that excludes SCMs eliminates such regional biases.

(3) *Equitable:* ASTM cement is consistent with the vast majority of output from a cement manufacturing plant. For a variety of reasons, including economics and market structure, SCMs are typically blended with cement at concrete batch facilities and are not commonly blended directly at a cement manufacturing facility.[10] Rather, they are primarily blended with cement at concrete batch plants, and furthermore, such blending is highly dependent on the unique characteristics of the local market (*i.e.*, high market variability could favor one manufacturer over another that does not operate under similar market conditions). Consequently, this definition avoids unnecessary competitive distortions among California cement producers and concrete batch plants.

- *The "cap adjustment factor" should reflect differences in leakage exposure across industries*

The uniform "cap adjustment factor" included in CARB's proposed distribution formula effectively dictates that allowances to all industries will decrease in concert with the cap. The use of a uniform cap adjustment factor implicitly assumes that the ability to reduce GHG emissions is equal across sectors and conceptually contradicts CARB's "tiered approach" to allocating allowance value, which recognizes that policy assistance should be differentiated based on exposure to leakage risks.

In reality, the ability to reduce emissions varies by sector and, if the cap adjustment factor is not adjusted based on availability of GHG reductions, it will severely disadvantage sectors that have few GHG reduction measures available. As a result, those industries that are highly leakage-prone and have relatively few cost-effective abatement opportunities will not receive an amount of allowances sufficient to fully offset their realized compliance costs due to the policy — thereby exacerbating leakage.

A more valid approach would be to vary the cap adjustment factor across industries. Specifically, the cap adjustment factor for those industries with relatively more cost-effective abatement opportunities and a low risk of leakage should decline at a rate that is greater than the cap's decline, while the factor for those industries with relatively fewer cost-effective abatement options and a high risk of leakage should be held constant at 1.0 for all compliance periods.

III. Treatment of Imports

3.1 A benchmarking approach alone will not minimize the risk of leakage in the cement industry

Although free allowances can provide relief to industries facing increased compliance costs under an emissions reduction program, an output-based benchmarking approach is insufficient alone to minimize leakage in highly vulnerable industries.

To illustrate this concern, consider a scenario in which allowances are allocated up to an industry average GHG intensity and offset 100 percent of the cement industry's compliance costs throughout the

[10] For a detailed discussion of issues associated with increasing SCM blending in California, see: Wescott, Robert et al. "Prospects for Expanding the Use of Supplementary Cementitious Materials in California".

entire policy timeframe. Given that the allocation of allowances is based on an industry average GHG intensity, rather than the intensity of individual manufacturers, those California producers with above-average GHG intensities will incur a net cost and those producers with below-average GHG intensities will receive a net benefit.

In theory, those California producers with below-average GHG intensities will increase their production and acquire additional market share from those with above-average GHG intensities — resulting in no leakage impacts. In reality, however, capacity limitations in the California cement industry will prevent more carbon-efficient entities from simply increasing production in the short and medium term. Rather, those California producers with above-average GHG intensities are likely to lose market share to foreign competitors.

Given this divergence between theory and reality, even an output-based benchmarking approach that offsets 100 percent of the cement industry's compliance costs (but not 100 percent of each individual entity's compliance costs) will fail to minimize leakage. Furthermore, to the extent that allowance value distributed under an output-based benchmarking approach is less than 100 percent of the industry's compliance costs (*i.e.*, an assistance factor or cap adjustment factor that is less than 1.0) or is phased out prior to the elimination of leakage risk (*i.e.*, prior to comparable carbon constraints being applied to competitors in other jurisdictions), the risk of leakage will increase.

3.2 A partial border adjustment is necessary to level the playing field in the cement industry

Given these concerns, CSCME believes that the best approach for minimizing leakage associated with cement consumed in California is a combination of output-based free allowances up to an industry average and a partial border adjustment on imports with a GHG intensity that exceeds the average. The free allowance program minimizes inter-industry leakage (*i.e.*, reductions in market share in the downstream market for concrete, which tends to have a lower carbon footprint than alternative construction materials) by offsetting compliance costs up to a given level, while the partial border adjustment minimizes intra-industry leakage (*i.e.*, reductions in market share to imported cement) by maintaining compliance cost parity between cement produced in California and imported cement with GHG intensity exceeding the California industry's average GHG intensity.

3.3 The cement industry is uniquely suited to a border adjustment mechanism

CSCME recognizes that a border adjustment may not be appropriate for all imports, particularly because of the administrative burden of such a comprehensive economy-wide measure. However, for certain industries that are at a significant risk of leakage and for which a border measure would not create unreasonable administrative burdens, the implementation of a border adjustment is necessary to uphold CARB's statutory mandate to minimize leakage and is critical to achieving AB 32's climate change objectives. As discussed above and in our extensive prior comments, the California cement industry is at a significant risk of leakage, and the structure of the industry makes it particularly amenable to the use of a border adjustment with limited administrative burdens.

Imports of cement enter California through only limited pathways, with the vast majority entering through a small number of specially-designed import terminals at California ports. Moreover, virtually all cement is used to manufacture concrete, which is extremely impractical to import from out of state. By contrast, other industries may produce a wide range of highly differentiated downstream products (*e.g.*, the steel industry may produce slabs, rebar, tube, and flat products, which are also used in appliances and automobiles). In addition, the raw material for these products (*e.g.*, steel) could be shipped to an unregulated jurisdiction, where it could be further manufactured into a downstream product (such as an automobile) that might be difficult or impossible to cover with a border adjustment. For the cement industry, however, such potential circumvention would not occur because of the lack of imports of downstream products, and therefore, it is not necessary to apply a border adjustment to further manufactured goods in the cement industry. Accordingly, a partial border adjustment applied to imported cement that exceeds the California industry's average GHG intensity (or, more generally, the level of assistance provided to California producers) would be an effective and efficient tool against leakage in the California cement industry.

3.4 A partial border adjustment is WTO consistent and constitutional

A measure to ensure that imports face similar cost burdens associated with their carbon footprint can be designed and implemented in a manner that is consistent with the U.S. Constitution and with obligations under the WTO Agreements.

In general, a border adjustment could be designed to ensure that imported products face the same regulatory requirements as products produced in California, with any differences based solely on the carbon footprint of the product, not on where the product is produced. The objective of any border adjustment would be to minimize leakage and thus ensure that California can achieve its environmental objectives, a traditional area of state interest. Even if found to be discriminatory under applicable WTO provisions, a properly designed border adjustment would qualify for an "exception" under the WTO rules for measures related to the conservation of exhaustible natural resources (*i.e.*, the earth's atmosphere).

CSCME has conducted in-depth constitutional and WTO analysis of various options for implementing effective border measures that would maximize the likelihood of surviving constitutional and WTO scrutiny. For the California cement industry, a partial border adjustment is critical to preserving California cement capacity and ensuring that California cement consumption does not shift to higher GHG-intensive imported cement. CSCME looks forward to further discussions on the appropriate design for a constitutional and WTO consistent border adjustment that would work together with allocations to minimize leakage in the California cement industry and achieve the climate change objectives of AB 32.

IV. Conclusion

CSCME commends CARB's efforts to design a policy framework that recognizes the risk of leakage and addresses it through the provision of allowance value to affected entities. In particular, we support

CARB's development of a "tiered approach" recognizing that the minimization of leakage is a policy priority and allocating allowance value accordingly. We also commend CARB's approach to differentiating assistance across industries based on the severity of leakage risks. In our view, both of these concepts represent significant and necessary innovations in the area of climate policy design.

We have several serious concerns, however, regarding the application of those concepts. These include: the use of emissions data and shipments data from different years in the determination of an industry's GHG intensity, the use of producer price indices in the determination of an industry's trade exposure, the mechanism used to offset increased electricity prices, the definition of output in a cement industry benchmark, the adoption of a uniform cap adjustment factor across all sectors, and the absence of a partial border adjustment mechanism. CSCME intends to comment further on these and other concerns, including the approach used to calculate trade intensities, upon release of CARB's white paper containing applicable methodologies.

Sincerely yours,

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
Linda Adams, California Environmental Protection Agency
Andrew Altevogt, California Environmental Protection Agency
Cindy Tuck, California Environmental Protection Agency
David Crane, California Governor's Office
John Moffatt, California Governor's Office
Dan Pellissier, California Governor's Office
Michael Prosio, California Governor's Office
Steven Cliff, California Air Resources Board
Judith Friedman, California Air Resources Board
Mihoyo Fuji, California Air Resources Board
Kevin Kennedy, California Air Resources Board
James Goldstene, California Air Resources Board
Lucille Van Ommering, California Air Resources Board
Samuel Wade, California Air Resources Board

EXHIBIT 21

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

July 9, 2010

Ms. Mary Nichols, Chairman
California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: Comments on CARB's Proposed Regulation for Energy Efficiency and Co-Benefits Assessment of Large Industrial Facilities

Dear Ms. Nichols,

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), a coalition of all six cement manufacturers operating the 10 cement plants in California,[1] hereby submits the following comments on the California Air Resources Board ("CARB") Proposed Regulation for Energy Efficiency and Co-Benefits Assessment of Large Industrial Facilities ("Proposed Regulation").

1. Audit Information Will Contribute To Ensuring Compliance With AB 32

AB 32 requires that any emission reduction measures adopted by CARB consider cost-effectiveness and minimize leakage. Compliance with these requirements, among others, is critical to ensuring that implementation of AB 32 achieves its climate change objectives without significant and irreversible adverse economic impacts on California industries.

In its Statement of Reasons for the Proposed Regulation, CARB confirms that the Proposed Regulation "does not require any actions to reduce emissions, nor claim any emission reductions associated with implementation of the regulation," and thus, according to CARB, the requirements of cost-effectiveness and minimization of leakage do not apply. However, CARB also confirms that the information collected under the Proposed Regulation will be used to (a) assess the situation if projects are implemented,[2] (b) identify a range of possible approaches, including State and local regulations, to maximize GHG emission reductions,[3] (c) "acquire the necessary data needed to further pursue achieving GHG emission reductions from the largest GHG emitting facilities in the State,"[4] and (d) prepare a report with preliminary findings and recommendations for use as "a starting point for discussion with all

[1] The Coalition includes CalPortland Company, Cemex, Inc., Lehigh Southwest Cement Company, Mitsubishi Cement Corporation, National Cement Company of California Inc., and Texas Industries, Inc.

[2] Statement of Reasons, at ES-2.

[3] *Id.* at ES-6.

[4] *Id.* at ES-8.

preliminary findings and recommendations for use as "a starting point for discussion with all stakeholders on what actions and approaches could be taken to maximize GHG, criteria pollutant, and toxic air contaminant emission reductions."[5] Importantly, if CARB proceeds to adopt any future greenhouse gas reduction measures based on the information provided in the energy audits, the development and implementation of such measures must be in full compliance with AB 32, including the requirements to consider cost effectiveness and minimize leakage.

In CSCME's view, the proposed assessments can provide valuable information that can inform CARB's current and future development of GHG reduction measures and contribute to CARB's assessment of cost-effectiveness and leakage. In particular, the information will reinforce the prior comments of CSCME that the California cement industry is highly GHG-, energy-, and capital-intensive, that it has already implemented state-of-the-art energy efficiency measures in order to maximize its competitive position and comply with stringent California laws and regulations, and that it has few, if any, cost effective abatement options available. Finally, CSCME believes that the information provided under the Proposed Regulation will assist in managing the expectations of CARB and other stakeholders regarding the appropriate design of emissions reduction measures for the California cement industry.

2. Additional Energy Efficiency Improvements Are Extremely limited

In its Statement of Reasons for the Proposed Regulation, CARB states that "{i}nformation gathered from the implementation of the proposed regulation will be a valuable resource in determining what GHG emission reduction opportunities are available" and that the information "is needed to identify promising areas for emission reductions."[6] This language indicates that CARB foresees additional energy efficiency improvements resulting from the audit process. CSCME is concerned about CARB's expectation in this regard. Although cement manufacturers are always searching for additional methods to improve energy efficiency, the cement plants in California are already the most efficient plants in the United States and possibly in the world, and therefore, there are few additional efficiency improvements that have yet to be implemented by California cement producers.

CSCME urges CARB to examine each industry based on its unique circumstances and avoid any presumption that the audit process will necessarily identify a particular level or configuration of energy efficiency improvements for every industry. The California cement industry is proud of the efficiency improvements made to date and feels confident that it has already implemented the most cost-effective improvements that are feasible at this point. CSCME looks forward to demonstrating this fact in the context of the audit process.

[5] *Id.* at ES-10.
[6] Statement of Reasons, at ES-1, 45.

3. The Proposed Regulation Requests Highly Confidential Information That Is Not Subject To Public Disclosure Under California Law

Section 95155 of the Proposed Regulation requires covered facilities, including cement plants, to submit an Assessment Report containing the information specified in section 95154 of the Proposed Regulation. Under section 95158(b), the Executive Officer will establish an Internet site "in which all Assessment Reports will be made available to the public." Importantly, section 95160(b) of the Proposed Regulation confirms that any entity submitting information may:

> designate information that is not emissions data as confidential because they believe it to be a trade secret or otherwise exempt from public disclosure under the California Public Records Act (Government Cod section 6250 et seq.). All such requests for confidentiality will be handled in accordance with the procedures specified in title 17, California Code of Regulations, section 91000 to 91022.

As indicated in previous comments, CSCME has serious concerns about the confidentiality of information required for the Assessment Reports and about CARB's intent to fully comply with the legal and procedural requirements for protecting confidential information. According to the Statement of Reasons:

> ARB staff believes it is critical that the information collected be publicly available, particularly to those communities that are located near the facilities. In developing the proposed regulation, ARB staff's goal was to require information that would provide sufficient detail about energy efficiency improvement projects to facilitate transparency, yet not reveal any confidential business information about the facility. As such, it is expected that a majority of the information received will not be confidential business data. In addition, ARB staff will work with the facility operators throughout the analysis and reporting process to address issues regarding confidentiality such that most if not all of the information provided to ARB can be directly released to the public.[7]

These statements about all or almost all data being disclosed to the public are in striking contrast to the core information required to be submitted in an Assessment Report under section 95154 of the Proposed Regulation, which is largely proprietary, confidential, and highly competitive business information that would not be made public by any entity that is in competition for sales and market share. Moreover, it is unclear if it would be legal for competitors to share the type of information being requested by CARB because of potential anti-trust violations. Cement companies and other covered entities in California devote significant effort and resources to develop business and investment strategies to optimize market share, and they necessarily maintain this information as confidential. If

[7] Initial Statement of Reasons for Proposed Rulemaking for the Proposed Regulation, at 32 (emphasis added).

they were forced to divulge this information, it would lead to significant domestic as well as international competitive disadvantages.

The concern about confidentiality is particularly relevant to the cement industry, which is forced to treat virtually all data associated with energy efficiency as confidential, because this data can be used to understand the cost structure of their product (given the large contribution of energy cost to total cost for an energy-intensive process). Understanding the effects of particular energy efficiency improvement projects on a specific plant is a way to know how competitive that plant is compared to other plants.

As CARB is aware, cement production is highly capital- and energy-intensive, and thus, cement producers are always taking steps to improve overall operations/design/costs in order to improve their bottom line. Accordingly, decisions about whether to make significant investments in energy efficiency measures and the nature and scope of such investments directly impact a cement facility's competitive position in relation to other California cement producers and in relation to imports from non-California sources.

Section 95154 of the Proposed Regulation lists the various types of information that must be included in an Assessment Report. Although some of this information, such as emissions data, is clearly public, most of the information requested precisely fits within the definition of "trade secrets" as defined by the California Public Records Act:

> any formula, plan, pattern, process, tool, mechanism, compound, procedure, production data, or compilation of information which is not patented, which is known only to certain individuals within a commercial concern who are using it to fabricate, produce, or compound an article of trade or a service having commercial value and which gives its user an opportunity to obtain a business advantage over competitors who do not know or use it.[8]

Although the disclosure of any individual trade secret in isolation would create competitive concerns, the Proposed Regulation requires the submission and potential disclosure of the entire range of confidential information that is critical to preserving the competitive position of each cement facility. In other words, the disclosure of one type of information may not raise significant concerns, but when this information is combined with the other information required under the Proposed Regulation, domestic and foreign competitors will gain a significant competitive advantage.

Section 95154(a) the Proposed Regulation requires that covered entities conduct a facility energy consumption and emissions analysis. As demonstrated below, the overlapping categories of requested information in section 95154 require the submission of a substantial amount of highly sensitive, business proprietary information that cannot be disclosed publicly without significant harm to the facility's competitive position. This information qualifies as "trade secrets" because these types of

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[8] *Cal. Gov't Code § 6254.7(e).*

information are "known only to certain individuals" within manufacturing facilities, and the information gives these manufacturers "an opportunity to obtain a business advantage over competitors who do not know or use it".

A cement manufacturer's ability to design and operate a production facility is at its core an effort to produce a product with certain chemical specifications that, when combined with other materials to produce concrete, will outperform a competitor's product. Closely tied to this proprietary effort to produce a superior product is the ability to produce such a product at a lower cost. This involves design, process equipment, and controls (in some fashion common throughout the industry) that are adapted to the specific operation of an individual quarry and facility. This not only relates to the fuel types, but the raw materials and various additives that are part of the production process to manufacture cement. Each of these would be directly compromised by the public dissemination of the requested information:

- § 95154(a)(5) "Process flow diagram of the facility, identifying each process or system and its geographic location."

  Process flow diagrams provide detailed information regarding the manufacturing process, which varies among manufacturers and by which manufacturers are able to maintain competitive advantages both through the operational alterations themselves (some may be patented) as well as the timing of improvements. Process flow diagrams would inherently identify the differences between plants and equipment technologies, including differences in types of energy used, process technology, and relative energy consumption, which allow competitors to readily calculate costs.

- § 95154(a)(6) "Name and description of each process or system and the equipment types used in each."

  Similar to process flow diagrams above, the specific descriptions of processes and equipment types are also essential elements of a facility's manufacturing process. Public disclosure of this information would reveal unique facility-specific information that is part of a facility's overall business plan. Disclosing the types of equipment in use would allow competitors to use the energy cost or energy types with standard costs to estimate manufacturing costs based on known energy consumption factors for the equipment.

- § 95154(a)(7) "Types of energy used in each process or system (i.e., natural gas, purchased electricity, etc.), and whether the energy is purchased or produced by the facility.

  The types of energy used in the manufacturing process are sensitive, proprietary information that represent a key component in energy-intensive cement manufacturing. This information is a specific component of a manufacturer's dynamic to lower costs and, as such, is extremely sensitive information that is not publicly disclosed at the level of detail requested. In addition, whether the energy is purchased or produced by the facility can be a significant element in the overall cost structure of the product. The type of fuel in conjunction with the equipment technology can be used to determine costs. Disclosing the types of fuel used would also potentially be detrimental to the use of alternate fuels. The markets for alternative fuels are highly competitive both within the cement industry and among other industries, and *manufacturers often have to innovate with respect to handling, processing, and firing technologies. These investments in technology and equipment could be compromised by competitors if the technologies were known or costs could be determined.*

- § 95154(a)(8)a-c "Facility energy use and emissions" including amount of fuel and electricity consumed in 2009.

  Similar to § 95154(a)(7), the amount of fuel and electricity consumed in the manufacturing process is sensitive, proprietary information that is a key component of the cost structure of cement manufacturing. A breakdown of energy use by type would potentially identify the facility among competitors, effectively revealing manufacturing costs. Making the data anonymous would not be sufficient to protect the data because there are few facilities in California.

Section 95154(b) requires that covered entities conduct an analysis of the energy efficiency improvement opportunities that exist at the facility. According to the Statement of Reasons, the analysis must cover "the full range of potential energy efficiency improvement opportunities that exist at a facility, from those with relatively low costs that can be implemented quickly, to improvements requiring large expenditures that will take more time and have more extensive facility impacts."[9] This section essentially requires facilities to provide their capital investment plans, detailing future potential projects specific to improving energy efficiency. Public disclosure of this information would reveal long-term, facility-specific investment decisions that are the result of significant research and strategic planning. Competitors (in particular, foreign entities) would benefit greatly from knowledge of these investment plans and would likely revise their own planning to reflect this knowledge.

As demonstrated below, the information requested in section 95154(b) of the Proposed Regulation is, by its nature, highly confidential and qualifies as "trade secrets":

- § 95154(b)(1) "Identify potential improvement projects for equipment, processes, or systems that cumulatively account for at least 95 percent of the facility's total greenhouse gas emissions reported in section 95154(a)."

  Similar to 95154(a)(5) and (6), identifying potential improvement projects for equipment, processes, and systems used in the production process will require identifying all of these items. The majority of energy used in cement plants is in two main processes, the kiln fuel and grinding electricity. Identifying the potential improvements in these systems will reveal facility-specific manufacturing plans and techniques such as capacities, costs, demand information, and essentially any potential modification that may be performed to obtain a competitive advantage. Such information is highly confidential and proprietary in nature and would not be publicly disclosed.

- § 95154(b)(2) "Include a comprehensive assessment of potential energy efficiency improvement opportunities."

  Providing a complete assessment of improvement opportunities is akin to providing a facility's long-term investment plans for energy efficiency. Such planning is intrinsic to the performance and strategy among competitors, and reveals decision-making logic that would allow a

[9] *Id.* at 29.

competitor to discern the key strengths, weaknesses, and investment timing of potential upgrades. This information has a significant effect on competitive positions and is therefore highly confidential.

- § 95154(b)(4) detailed information regarding each potential improvements evaluated, including:

  This entire section would reveal details about equipment selection, capital requirements, and timing that could potentially be used by competitors and equipment suppliers. The decision-making process would reveal not only those projects that are worth considering further but also, perhaps more importantly, those that are not necessary or do not provide economic benefit. This information is sensitive to acquiring capital, equipment, and engineering resources and could be used to the advantage of suppliers of these resources.

  - (a) "Existing facility equipment, process, or system involved;"

    As under § 95154(b)(1), this information is highly proprietary and will reveal facility-specific manufacturing plans and techniques, therefore it should remain confidential.

  - (b) "Type of potential improvement, including, but not limited to, equipment upgrades or modifications, process changes, changes to operating procedures or maintenance practices, or investment in new technologies; potential improvement projects should encompass low-cost projects that could be implemented quickly to mid- and long-term projects requiring higher capital expenditures and that may have more extensive facility impacts; emerging technologies that are not yet commercially available may also be considered;

    This section requests extremely detailed information regarding potential efficiency improvements that reveal an array of facility-specific technologies and procedures. This information, when provided in such detail, constitutes confidential information that affects a company's competitive position.

  - (c) "Summary description of each potential improvement, including but not limited to, a description of the system(s) involved and the energy efficiency issues that have been identified, and a description of how the improvement would benefit energy efficiency;

    Describing potential improvement projects and their efficiency benefits will reveal not only sensitive facility-specific investment plans, but also the potential financial gains that will result from these projects.

  - (d) "Status of the improvement (i.e., under investigation, scheduled, on-going, completed, or not implementing);"

    Again, revealing the status of potential improvements will provide information regarding facility-specific investment plans, which affect a company's competitive position.

  - (e) "For any improvement projects not being implemented, provide a description of the rationale for not implementing the project;"

    The rationale for not implementing a particular improvement project may be a complex evaluation of investment planning and other considerations that are highly confidential in nature.

- (f) "Estimated time frame for the project implementation and the estimated completion date for those that are under investigation, scheduled, or ongoing, and the actual completion date for those that have been implemented;"

  Similar to 95154(b)(4)(d), information regarding project time frames reveals facility-specific investment plans that affect competitive position.

- (g) "Estimated total one-time budgetary costs (in 2010 dollars), including, but not limited to, capital costs of equipment, installation, design, construction, and permits;"

  This information reveals the results of investment and business plans that affect a company's competitive position.

- (h)"Estimated total average recurring annual budgetary costs (in 2010 dollars), including, but not limited to, operation and maintenance;"

  This information also reveals the results of long-term business plans and future budgetary issues that play a large role in a facility's financial health and therefore affect its competitive position.

- (i) "Estimated project life;"

  Providing information about estimated project life of efficiency improvement projects reveals the timing of long-term investment decisions, indicating when certain future investments will need to be made.

- (j) "Estimated average annual energy savings;"

  Similar to 95154(b)(4)(c), providing details about the savings associated with efficiency improvement projects reveals information related to a facility's financial planning, which should remain confidential.

- (k) "Estimated associated average annual GHG emission reductions and criteria pollutant and toxic air contaminant emission impacts;"

  Although emissions data is public information, projections of future emissions data associated with future projects necessarily discloses critical data about the nature of the projects and the energy efficiency and cost advantages linked to such projects.

- (l) "Estimated annual cost savings (in 2010 dollars), if applicable;"

  Again, this information provides details about a facility's specific financial planning and investment decisions, which should remain confidential.

- (m) "Specification in detail of the estimation method, source test method, or other measurement method that was used to quantify the estimated GHG, criteria pollutant, and toxic air contaminant emission impacts in (10) above. The estimation method must include, but is not limited to, emission factors, control efficiency assumptions, and any other key assumptions used. The Executive Officer may work with the facility operator to determine appropriate values and may provide guidance for specific methodologies to be used;"

As indicated above, disclosure of estimated future emissions and the methodologies for calculating them will necessarily disclose competitive details about the nature and commercial benefit associated with such projects.

- (n) "Identification of any District air quality permit requirements, California Environmental Quality Act requirements, and other implementation considerations (including, but not limited to building, zoning, operational, safety, noise, water, and other environmental impacts)."

  The reference to "other implementation considerations"(including a wide range of potential "impacts") is open-ended and suggests that CARB may require an unspecified amount of additional confidential information and may find that an assessment is incomplete without such information.

Despite CARB's intention to "facilitate transparency, yet not reveal any confidential business information about the facility," the Proposed Regulation does indeed require a significant amount of information that is by its very nature highly confidential. Public disclosure of the information identified above by design would reveal a significant amount of information about the manufacturing process and investment decisions of covered facilities, both of which are highly sensitive and have a considerable impact on the competitive position of any given facility. This information, therefore, should be classified as "trade secrets" under the Public Records Act and not subject to public disclosure.

In sum, in order to optimize cooperation by covered entities and ensure that CARB's objectives underlying the Proposed Regulation can be achieved, CSCME requests assurances in the Final Regulation and any further statement of reasons that CARB will not attempt to force public disclosure of confidential information to the detriment of the competitive position of California cement producers.

Sincerely yours,

John T. Bloom, Jr.

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
Linda Adams, California Environmental Protection Agency
Andrew Altevogt, California Environmental Protection Agency
Cindy Tuck, California Environmental Protection Agency
John Moffatt, California Governor's Office
Dan Pellissier, California Governor's Office
Michael Prosio, California Governor's Office
James Goldstene, California Air Resources Board
Kevin Kennedy, California Air Resources Board
Lisa Williams, California Air Resources Board

EXHIBIT 22

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

September 2, 2010

Ms. Linda Adams, Secretary
California Environmental Protection Agency
1001 "I" Street
Post Office Box 2815
Sacramento, California 95814

Ms. Mary Nichols, Chairman
California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95814

Subject: Follow-Up to August 24, 2010 Meetings

Dear Secretary Adams and Chairman Nichols:

On behalf of the Coalition of Sustainable Cement Manufacturing and Environment ("CSCME"), I would like to thank you and your staff for the opportunity to meet and discuss the California Air Resources Board ("CARB") implementation of the Global Warming Solutions Act of 2006 ("AB 32").

As a general matter, CSCME has serious concerns regarding the extent to which CARB's proposed approach will satisfy its statutory obligation under AB 32 to minimize leakage. As you know, leading federal climate policy frameworks address the risk of emissions leakage through the administrative allocation of allowance value. Specifically, such frameworks provide allowance value to offset 100% of the policy-related costs, including those associated with both direct and indirect emissions, for emissions-intensive and trade-exposed ("EITE") industries. Furthermore, such frameworks envision the development and implementation of border adjustments that will maintain a level playing field between domestic and imported products in the event that allowance value is phased out over time.

In contrast, CARB's proposed approach is likely to offset substantially less than 100% of the policy related costs between 2012 and 2020 for EITE industries, including those that it deems to be "highly exposed" to leakage, and does not envision the implementation of a counterbalancing border adjustment. Specifically, CARB is proposing to allocate allowance value according to an output-based benchmarking system. The conceptual centerpiece of this proposed system is the allocation formula:

$$A = (O) \times (B) \times (a) \times (C)$$

Where,

A = the quantity of allowances allocated to an industry in a given year

O = an entity's output in the prior year;

B = the industry's benchmark value of emissions intensity

a = the transition and leakage assistance factor, which is based on an industry's leakage exposure

C = the cap adjustment factor, which declines in proportion with the economy-wide cap.

For EITE industries, each element of the allowance allocation formula is a critical determinant of ultimate leakage exposure. The formula's multiplicative nature ensures that the erroneous application of any one element (*e.g.*, an overly stringent benchmark, an undifferentiated cap adjustment factor) will have a profound impact on the overall level of assistance to a particular industry. Consequently, it is critical that each element be developed and implemented in the context of each industry's unique characteristics, opportunities, and challenges in adapting to a carbon-constrained world.

As demonstrated during the August 24 meeting, CARB's own data indicate that the California cement industry has a GHG intensity that is more than twice as high as any other California industry and an order of magnitude higher than the vast majority of industries. This extraordinarily high GHG intensity amplifies the cement industry's exposure to both high carbon costs and poor policy design. In short, the cement industry's high GHG intensity substantially narrows the margin for error with respect to developing and implementing each element of CARB's proposed allocation formula.

Furthermore, as demonstrated through a series of submissions to CARB during the past two years, the California cement industry is highly exposed to import competition. The industry's vulnerability has been extensively documented in reports by the U.S. International Trade Commission ("ITC") in multiple antidumping investigations and reviews (the specific findings and evidence from the record of these investigations were submitted to CARB). High antidumping duties on imports of cement were originally imposed and were continued on the basis of investigations and reviews in which the ITC analyzed enormous amounts of detailed data to assess the vulnerability of cement producers to low-priced imports. For example, expert economists at the ITC found that "the elasticities of substitution between U.S.-produced and imported Japanese, Mexican, Venezuelan, and nonsubject gray Portland cement should all be in the range of 4 to 8."[1] To put this into context, if the cement industry attempted to pass through the costs associated with a \$20 per ton carbon price, imports would increase by a staggering 100 to 200%.[2] To effectively minimize emissions leakage, CARB must consider this unique vulnerability

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[1] U.S. International Trade Commission, *Gray Portland Cement and Clinker from Japan, Mexico, and Venezuela*, Pub. 3361 (October 2000), at II-25. "[B]ecause of the homogeneity and commodity nature of cement, its elasticity of substitution should be relatively higher than the elasticities of substitution for most of the other products previously investigated by the Commission." *Id.*

[2] A substitution elasticity of 4 to 8 means that a 1% increase in the relative price of domestic cement would result in an increase of 4 to 8% in the relative quantity of imports. Assuming the price of cement is \$80 per ton and one

to imports in developing each element of its allocation equation and in determining the overall allocation of allowance value to the California cement industry.

Given this context, the following sections discuss each element of CARB's allocation equation in greater detail, including our discussions during the August 24 meeting, our understanding of CARB's proposed approach, our concerns with that approach, and our recommendations for improving the allocation framework in a manner that will minimize the risk of leakage in EITE industries to the extent feasible.

Assistance Factor

During the August 24 meeting, CARB staff indicated that it had reconsidered its leakage risk classification system and confirmed the cement manufacturing's status as a "highly leakage exposed" industry for the period from 2012 to 2020. According to CARB staff, this determination is based on several methodological changes to the calculation of trade intensity, including the use of landed duty paid imports instead of customs value imports and the elimination of PPI as a relevant factor at this stage. CARB staff also reaffirmed statements made in the May 17, 2010 workshop that those industries in the "highly leakage exposed" category would be assigned an assistance factor of 1.0 through the 2012-2020 timeframe. CSCME agrees with CARB's methodological refinements for leakage criteria and its determination that the cement industry meets the criteria for high leakage exposure.

During the meeting, CSCME proposed that CARB staff consider establishing an "extraordinary GHG intensity" threshold of 9,000 metric tons of GHG emissions per million dollar of value added. As demonstrated from CARB's own data, the cement industry's GHG intensity is significantly higher than any other California industry, indicating that a given carbon price will necessarily have a more extensive impact on the cement industry. Indeed, the cement industry's extraordinarily high GHG intensity suggests that any exposure to carbon prices is likely to result in asymmetric cost pressures that are well beyond the bounds of historical experience and have the potential to radically reshape production location decisions and international trade patterns. Thus, consistent with other frameworks, including the EU ETS, any industry with an extraordinary GHG intensity should automatically qualify as a "highly leakage exposed" industry, regardless of its trade intensity or other risk factors.

Benchmark Factor

CARB's current thinking is to establish a benchmark that is equal to the average intensity of the national cement industry (US and Canada) multiplied by a yet to be determined discount factor for *all* industries. CSCME welcomes the use of a national industry benchmark, which would both recognize the significant investments that California producers have historically made in GHG efficiency relative to their national counterparts and provide a reasonable benchmark that could be adopted by other programs, including the Western Climate Initiative and any future federal cap-and-trade system. Furthermore, CSCME urges

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ton of cement results in one ton of GHG emissions, a carbon cost of $20 would require producers to raise prices by 25% to recover these costs, resulting in a corresponding relative increase in imports of 100 to 200%.

the use of data that pre-dates AB 32, which would appropriately recognize early actions taken by California cement producers.

With that said, as we expressed during the August 24 meeting, we are both concerned and confused by CARB's current thinking to discount a national industry average for each sector by a common discount factor for all industries. Although we believe that CARB may share some of our concerns in this regard, we would like to re-iterate them as follows:

- One potential advantage to adopting a national industry average as a benchmark is that it provides a reasonable benchmark that can be adopted by other U.S. cap-and-trade programs, minimizing the competitive distortions that allocation systems can have on industries that span multiple jurisdictions and regulatory systems. To the extent that other jurisdictions fail to follow California's lead in discounting benchmarks by the same factor, a level playing field is unlikely to be maintained.

- CARB staff indicated that the use of a discount factor would provide "further incentive to reduce emissions." CSCME believes, and economic theory indicates, that the benchmark itself provides the incentive and that the absolute level of the benchmark only determines the extent to which an incentive is positive or negative and should not influence its efficacy in encouraging cost-effective GHG abatements.

- CARB staff appears to rely heavily on the example provided by the EU ETS, which has proposed to establish benchmarks in its third phase based on the GHG intensity of the top 10% "best performers" in each industry. At the same time, staff seems to ignore the example provided by leading U.S. climate policies, which have proposed to establish benchmarks based on industry averages.[3] CSCME believes that U.S. climate policies offer a more relevant and appropriate model.

- Despite its apparent desire to implement the EU ETS proposed framework, CARB lacks the data necessary to directly calculate a robust and credible "best performers" metric. Rather, CARB is attempting to mimic the EU ETS approach by adopting a uniform discount factor for all industries. By ignoring industry-specific realities, this "one-size-fits-all" approach risks establishing unrealistic benchmarks, regardless of the potential impact on highly leakage-exposed industries.

- CARB staff indicated that it plans to determine the appropriate discount factor once it has established national benchmarks for all industries. CSCME is concerned that CARB is significantly underestimating the availability of credible industry emissions data at the national level for all industries and, accordingly, its ability to establish consistent and comparable benchmarks for all industries that result in an unbiased discount factor.

Regardless of its merits or practicality, the application of a discount factor would degrade the benefits of adopting a historical national industry benchmark and would add unnecessary complexity.

[3] For example, Waxman-Markey provides for the establishment of a benchmark for direct emissions based on the average direct GHG emissions per unit of output for all covered entities in a particular sector.

Consequently, assuming that CARB intends to recognize early action, reward California industries for greater levels of investment in GHG efficiency relative to their national counterparts, and maintain a level playing field relative to industries in other cap-and-trade systems, CSCME recommends that it abandon its efforts to develop a discount factor and simply adopt historical national industry averages as the benchmark for each industry.[4]

Finally, as explained during the meeting, the increase in electricity prices associated with GHG-reducing policies is a significant potential source of emissions leakage. Consequently, minimizing leakage requires a mechanism for offsetting these costs for highly exposed industries.

During our meeting, CARB indicated that its current thinking is to allocate allowance value to local distribution companies ("LDCs") to be used for the benefit of ratepayers. At the same time, CARB indicated that it is reluctant to mandate or otherwise direct how that allowance value will be used (so as not to get directly involved with rate making), although CARB would monitor what the LDCs actually do. As we expressed at the meeting, we are very concerned about how this framework would work in practice and believe that there is considerable uncertainty over how the LDCs will distribute allowance value to customers and especially how they will differentiate distributions among industrial sources in accordance with assessed leakage risk. Although the allocation of allowance value to LDCs for redistribution to residential and commercial rate payers may be an efficient option, given that rate payers in these categories are not regulated entities under AB 32 and are large in number, the situation for industrial users is different. The approach of distributing allowance value directly to regulated industrial sectors is both more efficient and a more effective way to minimize leakage. It also fits CARB's desire not to get into rate making complexities and would avoid the need to expend additional resources to monitor the LDCs. Given that direct allocation through the inclusion of indirect emissions in the benchmark is more efficient, more transparent, and more effective, CSCME looks forward to the results of CARB's further analysis in relation to its current thinking to allocate allowance value indirectly to industrial users through an LDC "middle man."

CSCME recommends distributing allowance value directly to industrial sources to assist them in an accurate manner with offsetting the policy-induced cost increase associated with electricity emissions. Specifically, CSCME recommends expanding the scope of the benchmark to include indirect emissions. This would both ensure that the appropriate amount of leakage assistance reaches the intended policy target (*i.e.*, leakage exposed industries) and avoid the need for CARB to direct LDCs on how to distribute allowance value to industry. Leading U.S. federal climate legislation, including both the Waxman-Markey and Kerry-Lieberman ("American Power Act") bills, provide an effective model for achieving this objective in a manner that is both administratively feasible and preserves incentives to pursue cost-

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[4] Another approach is to adopt a "rolling" industry average that updates over time, as proposed in Waxman-Markey (H.R 2454). Updating industry averages are attractive in that they implicitly reflect each industry's ability to pursue cost-effective abatement opportunities while preserving the proper incentives to reduce GHG intensity over time. CSCME would be open to discussing the relative merits of establishing an updating industry average benchmark for the cement industry.

effective abatement opportunities. CSCME is encouraged that CARB will take these suggestions into consideration.

Cap Adjustment Factor

CARB's current thinking is to apply a uniform cap adjustment factor ("CAF") that would force allowance allocations for all industries, regardless of their assessed leakage exposure, to decline in concert with the cap. As explained during the meeting, CSCME has significant concerns about this approach.

First, we believe that the concept of a CAF is inconsistent with the stated policy objectives of the allocation framework. In the May 17 workshop, CARB identified two goals for free allocation to industry: (1) in the short term, provide a transition period to smooth market start-up and address uncertainty in the evaluation of leakage and (2) in the long term, settle on the level of free allocation needed to prevent leakage. Considering that both of these concepts are represented in the "assistance factor" component of the framework, CSCME fails to see how a uniform CAF advances these goals. Indeed, given that a uniform CAF fails to consider an industry's assessed leakage risk at all, we believe that it actually works in opposition to the goal of minimizing emissions leakage.

Second, CARB staff has expressed the view that the CAF represents the "equity" portion of its formula. Although a uniform CAF undoubtedly treats all industries equally, it fails to treat them equitably by virtue of not reflecting their leakage risk or ability to pursue cost-effective abatement opportunities. To clarify this important distinction, consider the example of a so-called "flat tax" in which all individuals, regardless of their income levels, are taxed at the same marginal rate. Although virtually all would agree that such a system provides equal treatment, many would strongly disagree that it is equitable. By not reflecting each industry's assessed leakage risk, the concept of a uniform CAF is incompatible with the stated policy objective and statutory requirement to minimize leakage to the extent feasible.

Third, the CAF is not essential to operationalize CARB's allocation framework. Any policy objective expressed in the CAF (*e.g.*, allocations to industry should decline in concert with the cap) can be implemented more directly and transparently through the assignment of assistance factors to each leakage risk category. In short, the CAF simply adds unnecessary complexity to a framework that already has a significant number of "moving parts."

Finally, a uniform CAF implicitly assumes that all sectors are equally capable of achieving GHG reductions in concert with the cap and passing through the related cost. As demonstrated above, the cement industry cannot pass through additional carbon costs without significant loss of market share to imports or an unsustainable decline in profit margins. Moreover, although we understand that virtually all industry groups claim to have relatively few cost-effective abatement opportunities, the unfavorable mathematics associated with GHG reductions in the cement industry are undeniable. Approximately 57% of the California cement industry's GHG emissions are so-called process emissions, which are technically infeasible to reduce in the absence of carbon capture and sequestration technology. Thus, unlike all other industries, the cement industry would need to decrease fuel combustion emissions at more than twice the rate of the overall cap if the industry is to "keep pace" with a uniform CAF, avoid substantial carbon costs, and prevent leakage. This is simply unachievable in the 2012-2020 timeframe under any scenario.

Based on our discussions, CSCME understands that CARB will take our concerns into account and reconsider the application of a uniform CAF. CSCME believes that such reconsideration will be critical to ensure that CARB's approach is consistent with both its stated policy objectives and its statutory obligation to minimize leakage.

Border Adjustment

For over two years, CSCME has highlighted the importance of addressing imports in order to minimize the risk of leakage. Under a policy design that allocates allowance value that is less than 100% of a highly exposed industry's policy-induced costs, an incremental border measure that creates a level playing field with imports becomes even more critical to prevent leakage. As specifically addressed above and in prior submissions by CSCME, CARB's current approach to the benchmark and cap adjustment factors will necessarily result in less than 100% allocation of allowances for the cement industry. In fact, with the application of these factors, it is likely that all or almost all of California's cement producers will be well above the "effective benchmark" and will be required to purchase an increasing and substantial number of allowances.[5] Absent an incremental border adjustment that imposes a comparable cost burden on imports that have a GHG intensity above the effective benchmark, CARB's implementation of AB 32 will cause significant leakage and irreversible damage to the California cement industry.

During the meeting, CARB staff confirmed the conclusion from lawyers from CARB and the Attorney General's Office that there was no legal impediment to adopting a border measure. However, staff expressly stated that such measure was not possible in the immediate period because they did not have enough time or capacity to develop such a measure. CSCME does not consider that CARB's reasoning can justify the failure to timely develop a border adjustment, especially when its other policy decisions are inadequate to prevent leakage.

As reflected in Waxman-Markey and other proposed frameworks, substantial leakage can only be prevented by ensuring that any decline in allowance allocations is paired with a corresponding incremental border measure to maintain a level playing field.[6] In the case of CARB's current thinking, the inadequate benchmark factor and undifferentiated cap adjustment factor will significantly increase the cement industry's compliance costs from the outset and will cause substantial leakage without an incremental border adjustment to level the playing field with imports. If CARB does not have the time

[5] The "effective benchmark" is defined as the allocation rate per unit of output. In the context of CARB's allocation formula, the effective benchmark would be the product of the benchmark factor, assistance factor, and cap adjustment factor.

[6] It is worth noting that substantial leakage could be avoided if competing jurisdictions adopt similarly stringent policies. For the California cement industry, which is economically accessible from vast distances via water, the appropriate list of competing jurisdictions would include a host of nations, most notably China. However, the probability that such nations would adopt comparable carbon constraints prior to 2020 seems remote.

or resources to develop a border measure from the outset, it must adjust its methodologies (*e.g.*, delaying the application of the cap adjustment factor) to ensure that sufficient allowances are allocated in order to prevent the California cement industry from suffering irreversible damage and guarantee that the climate change objectives of AB 32 are not undermined. In any event, as stated during the meeting, CSCME continues to stand by to assist CARB in the development of an incremental border adjustment necessary to minimize the risk of leakage.

Conclusion

Consistent with our discussions, we look forward to another meeting with CARB staff in the next few weeks and prior to the release of the proposed regulation in order to share thoughts on how the cap and trade framework will achieve California's climate change objectives in an effective, efficient, and equitable manner that provides the maximum protection against the risk of leakage.

Sincerely yours,

John T. Bloom, Jr.

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:

Andrew Altevogt, California Environmental Protection Agency
Michael Gibbs, California Environmental Protection Agency
Margret Kim, California Environmental Protection Agency
Steven Cliff, California Air Resources Board
Judith Friedman, California Air Resources Board
Mihoyo Fuji, California Air Resources Board
James Goldstene, California Air Resources Board
Kevin Kennedy, California Air Resources Board
Jan Mazurek, California Air Resources Board
David Crane, California Governor's Office
John Moffatt, California Governor's Office
Dan Pellissier, California Governor's Office
Michael Prosio, California Governor's Office

EXHIBIT 23

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

October 20, 2010

Ms. Susan Kennedy, Chief of Staff
Office of Governor Arnold Schwarzenegger
State Capitol Building
Sacramento, CA 95814

Re: October 13, 2010 Meeting with the California Cement Industry Regarding Implementation of AB 32

Dear Ms. Kennedy:

On behalf of the Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), I thank you for the opportunity to express our concerns about CARB's draft staff plan for implementation of AB 32. CSCME has worked constructively with the state of California over the last three years to develop an environmentally-effective, economically-efficient, and equitable regulatory framework.

A statutory requirement of AB 32 is the minimization of leakage. Minimizing leakage is not only a necessary element for the statutory success of GHG reductions, but is also of paramount importance to maintaining the viability of the California cement industry and preserving a sustainable and reliable supply of cement to meet the state's demand for public and private infrastructure construction. Moreover, due to the substantial transportation-related GHG emissions required to ship cement long distances, <u>a ton of cement produced in California will always be cleaner than a ton of cement shipped to California from outside of the United States</u>. Thus, a program design that avoids leakage in the cement industry must be a primary goal of AB 32.

THE CEMENT INDUSTRY IS AT HIGH RISK OF LEAKAGE

As we discussed, the cement industry has an extraordinarily high exposure to carbon leakage due to three predominant characteristics:

(1) <u>Extraordinarily High GHG Intensity</u>: As demonstrated on the attached graph (presented at the 10/13/10 meeting), the California cement industry's GHG intensity is unparalleled.

(2) <u>High Trade Exposure</u>: The industry's vulnerability to import competition has been extensively documented by the U.S. International Trade Commission ("ITC"). The ITC found that the elasticity of substitution between U.S. and imported cement is in the range of 4 to 8. Put in perspective, <u>if the cement industry attempted to pass through a carbon price of only $20 per ton, imports would increase by a staggering 100 to 200 percent</u>.

(3) <u>Substantial Irreducible Process Emissions</u>: Approximately 59% of the cement industry's direct GHG emissions are process emissions, which are an unalterable consequence of the chemical process required to convert limestone into cement clinker. In the absence of carbon capture and storage technology, only a small fraction of the remaining 41% of emissions are potentially reducible

through technologically-feasible and cost-effective measures (CCS technology is generally conceded to be unattainable before 2020).

Many California industries exhibit one of these characteristics, and some exhibit two; however, the cement industry is the only California industry that exhibits all three characteristics - a combination that results in an extraordinarily high risk of leakage.

CARB OCTOBER STAFF REPORT - EFFORTS TO REDUCE THE RISK OF LEAKAGE

As discussed, we are continuing to have discussions with CARB on many open issues that will impact the allocation of free allowances. Although we are hopeful that we can reach agreement on a framework that will minimize leakage, the proposal that CARB presented to us would expose the industry to a very high risk of leakage. In this regard, it is important to note that each individual element of CARB's proposed formula impacts the final quantity of free allowances and thus the level of leakage protection. As we discussed at the meeting, it is also important to realize that any uniform adjustment across all industries has a disproportionately higher impact on compliance costs for those industries with high emission intensities, effectively diluting the level of leakage protection. With respect to the cement industry, CARB confirmed that the following elements will be reflected in the October Staff Report:

(1) The application of the full leakage assistance factor to reflect that the cement industry is in the high leakage risk category;

(2) The use of a cement output metric (clinker, gypsum, and limestone);

(3) Reducing the amount of the cap adjustment factor to ensure equitable treatment of the industry due to its high process emissions (the amount was not stated, but the cap adjustment is presumed to be reduced by the average industry process emissions of approximately 59%); and

(4) A California industry average carbon intensity benchmark reduced by a uniform 10% benchmark adjustment factor starting in 2012.

Our principle concern is with the last element of CARB's proposal -- a 10% uniform reduction in the intensity benchmark for all industries. This not only imposes a much more stringent benchmark on the cement industry than other industries due to our high level of process emissions, but is also an approach that counteracts effective leakage protection for the following reasons:

- It is arbitrary and bears no relation to the cement industry's assessed leakage risk or its ability to attain such a target through technologically-feasible and cost-effective abatement options.

- It is implemented immediately in 2012 and as such does not provide the industry with any transition to meet what is an unattainable objective.

- It does not reward early actions or other additional investments in energy and carbon efficiency (relative to other plants in the United States) already taken by the California cement industry.

- Because the benchmark does not include indirect emissions, the industry would face leakage risk if it does not receive sufficient rebates from local distribution companies to cover the increased cost of power resulting from AB 32.

Indeed, CARB's proposed 10% reduction to the benchmark is far more aggressive than leading climate change proposals at the federal level (*e.g.*, Waxman-Markey and Kerry-Lieberman), which envision free allowance allocations beyond the 2020 timeframe that are up to 100% of each industry's average GHG intensity.

Furthermore, CARB has signaled that, despite confirmation from counsel in both CalEPA and the Attorney General's office that there are no legal obstacles to doing so, it is unwilling to implement an incremental border adjustment for imported cement but rather intends to monitor imports and react to leakage by adjusting elements of its framework in the future, after irreversible harm has already been done. A border adjustment is essential to enabling California producers to pass through to consumers the immediate costs associated with CARB's current approach to GHG reductions.

ESSENTIAL CHANGES TO REDUCE THE RISK OF LEAKAGE

Ultimately, CARB's proposed benchmark would expose the cement industry to immediate and irreparable harm when the regulations become effective in 2012. The majority of, if not all, cement producers will incur significant compliance costs that will not be faced by imports, placing domestic cement at a competitive market disadvantage within the first year of the program. Moreover, the imbalance in favor of imports will grow due to the combined multiplier effect of the unachievable benchmark factor multiplied by the continuing annual reduction of the cap adjustment factor; none of which will be imposed upon imported cement.

Accordingly, to avoid causing irreversible harm to the industry and undermining the state's climate change objectives, CSCME requests your assistance in ensuring that CARB:

(1) Establishes a benchmark factor for process-related emissions between 2012-2020 that is equal to 100% of the California cement industry average GHG intensity for such emissions (i.e., process-related GHG emissions per ton of output);

(2) Establishes a benchmark factor for combustion-related emissions in 2012 that is equal to 100% of the California cement industry average GHG intensity for such emissions (i.e., combustion-related emissions per ton of output);

(3) Delays any reduction in the benchmark factor for combustion-related emissions until an incremental border adjustment for imported cement is implemented;

(4) In the event that an incremental border adjustment is implemented, ensures that the benchmark factor for combustion-related emissions is reduced gradually to 90% in 2020.

We would like to continue working cooperatively with you and CARB to establish a climate change regulatory program for the cement industry that minimizes leakage and can serve as a model for the United States and for other countries.

Sincerely yours,

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
Dan Pellissier, California Governor's Office
Linda Adams, California Environmental Protection Agency
Michael Gibbs, California Environmental Protection Agency
Mary Nichols, California Air Resources Board
James Goldstene, California Air Resources Board
Kevin Kennedy, California Air Resources Board

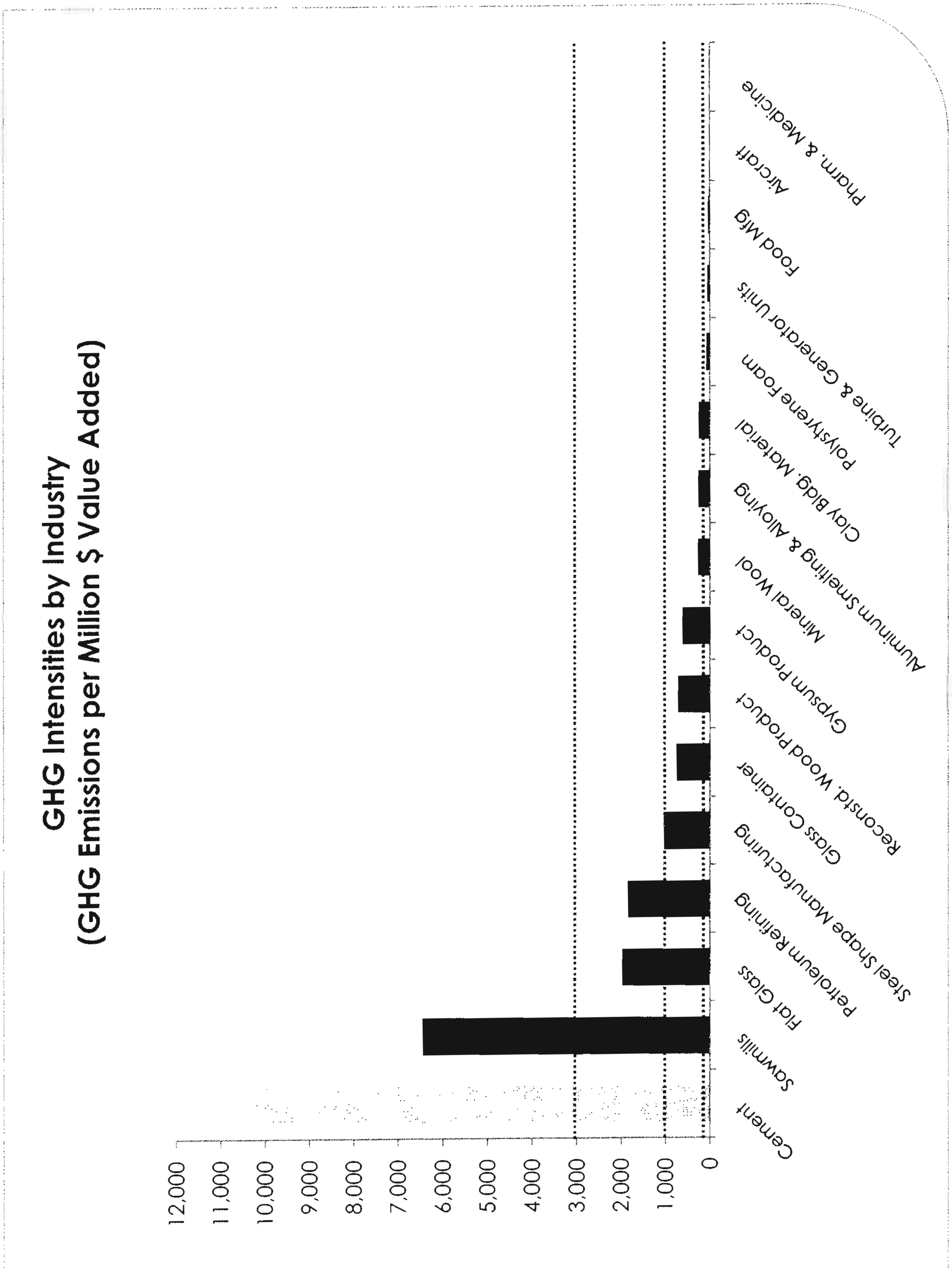
GHG Intensities by Industry
(GHG Emissions per Million $ Value Added)
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Cement
Sawmills
Flat Glass
Petroleum Refining
Steel Shape Manufacturing
Glass Container
Reconstd. Wood Product
Gypsum Product
Mineral Wool
Aluminum Smelting & Alloying
Clay Bldg. Material
Polystyrene Foam
Turbine & Generator Units
Food Mfg
Aircraft
Pharm. & Medicine

EXHIBIT 24

COALITION FOR SUSTAINABLE CEMENT MANUFACTURING & ENVIRONMENT
1029 J Street, Suite 300, Sacramento, CA 95814

October 20, 2010

Ms. Mary Nichols, Chairman
California Air Resources Board
1001 I Street
Sacramento, CA 995814

Re: October 13, 2010 Meeting with the California Cement Industry Regarding Implementation of AB 32

Dear Chairman Nichols:

On behalf of the Coalition for Sustainable Cement Manufacturing and Environment ("CSCME"), I thank you for the opportunity to discuss CARB's draft staff plan for implementing AB 32. As you know, CSCME has worked constructively with CARB during the last three years. We appreciate your willingness to discuss our concerns, and we are hopeful that CARB remains committed to developing an environmentally-effective, economically-efficient, and equitable regulatory framework for the California cement industry.

As we have discussed, the minimization of leakage is critical to satisfying both the statutory requirements and fundamental intent of AB 32. Due to the substantial transportation-related GHG emissions required to ship cement long distances, <u>a ton of cement produced in California will always be cleaner than a ton of cement shipped to California from outside of the United States</u>. Thus, a primary goal of CARB's approach to implementing AB 32 must be the minimization of leakage in the California cement industry.

During the October 13 meeting, you and your staff confirmed CARB's current thinking regarding its approach to allocating allowances to leakage-exposed industries. Specifically, CARB indicated that the following elements will be reflected in the October Staff Report:

(1) The application of the full leakage assistance factor to reflect that the cement industry is in the high leakage risk category;

(2) The use of a cement output metric (clinker, gypsum, and limestone);

(3) The reduction of the cap adjustment factor for cement to ensure equitable treatment of the industry due to its high process emissions (the amount was not stated, but the cap adjustment is presumed to be reduced by the average industry process emissions of approximately 59%); and

(4) The application of a cement industry benchmark starting in 2012 that is 10% below the California industry average GHG intensity, as determined by 2009 mandatory reporting data.

As discussed in the meeting, we believe that CARB has adopted a reasonable approach with respect to the cement industry's assistance factor, output metric, and cap adjustment factor. However, the proposed benchmark effectively undermines the other above referenced elements that are intended to provide effective leakage protection:

- The 10% discount factor is arbitrary and bears no relation to the cement industry's assessed leakage risk or its constraints (e.g., the presence of substantial and irreducible process emissions) in attaining such a target through technologically-feasible and cost-effective abatement options.

- The 10% discount factor is implemented immediately in 2012 and as such does not provide the industry with any transition to meet what is an unattainable objective.

- The benchmark is constructed using 2009 California data and, thus, does not reward early actions or other additional investments in energy and carbon efficiency (relative to other plants in the United States) already taken by the California cement industry.

- The benchmark excludes indirect emissions, which could result in additional leakage risk if the industry does not receive sufficient rebates from local distribution companies to cover the increased cost of power resulting from AB 32.

Ultimately, CARB's proposed benchmark would expose the cement industry to immediate and irreparable harm when the regulations become effective in 2012. The majority of, if not all, cement producers will incur significant compliance costs that will not be faced by imports, placing domestic cement at a competitive market disadvantage within the first year of the program. Moreover, the imbalance in favor of imports will grow due to the combined effect of the unachievable benchmark factor multiplied by the reduction of the cap adjustment factor.

Given these concerns, we would like to continue working with CARB to establish an industry benchmark that rewards early action and effectively minimizes the risk of leakage. Notwithstanding our concerns regarding the data used and the treatment of indirect emissions, we believe that the following approach will advance this shared objective:

(1) Establish a benchmark factor for process-related emissions between 2012-2020 that is equal to 100% of the California cement industry average GHG intensity for such emissions (i.e., process-related GHG emissions per ton of output);

(2) Establish a benchmark factor for combustion-related emissions in 2012 that is equal to 100% of the California cement industry average GHG intensity for such emissions (i.e., combustion-related emissions per ton of output);

(3) Delay any reduction in the benchmark factor for combustion-related emissions until an incremental border adjustment for imported cement is implemented;

(4) In the event that an incremental border adjustment is implemented, gradually reduce the benchmark factor for combustion-related emissions to 90% in 2020.

We look forward to working cooperatively with CARB to establish a climate change regulatory program for the cement industry that minimizes leakage and can serve as a model for the United States and for other countries.

Sincerely yours,

John T. Bloom, Jr.

John T. Bloom, Jr.
Chairman, Executive Committee, Coalition for Sustainable Cement Manufacturing & Environment
Vice President & Chief Economist, U.S. Operations, Cemex

CC:
Susan Kennedy, California Governor's Office
Dan Pellissier, California Governor's Office
Linda Adams, California Environmental Protection Agency
Michael Gibbs, California Environmental Protection Agency
James Goldstene, California Air Resources Board
Kevin Kennedy, California Air Resources Board

EXHIBIT 25

**APPLICATION OF AB 32 TO IMPORTED CEMENT:
PREVENTING LEAKAGE AND FACILITATING SECTORAL COOPERATION**

December 9, 2010

This paper provides background on certain fundamental principles for addressing imported cement under AB 32 and how to integrate relevant requirements into the Proposed Regulation to minimize leakage and ensure that the climate change objectives of AB 32 are achieved.

GENERAL PRINCIPLES

The imposition of obligations on imported cement can be designed to maximize compliance with the U.S. Constitution and the agreements of the World Trade Organization ("WTO"). In setting out the purpose for extending AB 32 requirements to imported cement, whether in any regulation, resolution, or supporting documents, and in the development of specific regulatory language, CARB should adhere to the following key principles:

1. The primary purpose of including imported cement is to better achieve California's climate change objectives.

CARB should ensure that sections discussing the purpose or objective of incorporating imported cement into the framework focus on meeting California's climate change objectives and, more specifically, on minimizing emissions leakage. The GHG emissions associated with the production and transportation of a ton of cement to California from outside California is virtually always higher than the GHG emissions associated with the production of a ton of cement in California. Moreover, the California cement industry has an extremely high GHG intensity and has historically been highly vulnerable to imports. Thus, an incremental emissions-related cost burden assigned to California producers that is not shared by imported cement will result in an immediate shift of California consumption to imported and more GHG intensive cement or otherwise cause disinvestment in the California industry that will result in such a shift over the medium term. The result is a net increase in the GHG emissions associated with California's cement consumption, which is counter to the climate change objectives of AB 32.

2. The secondary purpose of including imported cement is to incentivize the development of a sector-specific approach to GHG emissions reductions in other countries.

Absent the inclusion of imports within the AB 32 regulatory framework, other countries will have a disincentive to develop their own climate change measures to address GHG emissions in the cement sector. Given the nature of the industry (*i.e.*, the need to operate at high capacity utilization rates and the significant incentives to sell excess capacity at a low prices) and the excess capacity available in the market (*e.g.*, 600 million metric tons in China alone), other countries need a strong incentive to develop climate change measures in order to overcome these disincentives and ensure that California's climate change objectives are not undermined by a shift in California consumption to higher GHG intensive imports.

3. **To the extent feasible, CARB should apply the same rights and obligations in relation to imported cement that apply in relation to cement produced in California.**

The objective is to first develop an approach that, to the extent feasible (*i.e.,* it does not undermine climate change objectives or otherwise adversely affect verification and enforcement of relevant obligations), applies the same rights and obligations to imported cement and to cement produced in California. This equality of treatment is important for limiting potential Constitutional and WTO challenges and is the reason for integrating the requirements into the Proposed Regulation rather than developing a separate framework applicable to imported cement only. Any deviations from such equal treatment should be justified as necessary to achieve the climate change (*i.e.*, environmental) objectives of the measure. Moreover, in the optimal situation and to the extent feasible, any regulatory revisions or other instruments would refer to the expansion of the coverage to imported cement rather than the development of a separate "border" measure. This integration is similar to the coverage of imports under the LCFS and the treatment of imported electricity under the Proposed Regulation.

OVERVIEW

Consistent with the above principles, the general summary below identifies the key elements of how to integrate the coverage of imported cement into the cap-and-trade regulation. A more specific, section-by-section discussion of how to integrate these elements into the Proposed Regulation, as well as suggested locations for placeholders in the regulatory text, is provided in the subsequent sections.

- Cement importers would be required to submit Cement Leakage Prevention Allowances ("CLPAs") for each ton of GHG emissions associated with a ton of cement delivered for sale in the California market. This requirement would be effective on the same date as the state-wide cap-and-trade program.

- The CLPAs submitted by cement importers would not be purchased from the pool of allowances under the state-wide cap-and-trade program. Rather, CARB would establish a separate Cement Leakage Prevention Allowance Account (similar to the international allowance reserve proposed under Waxman-Markey), from which importers would purchase the allowances necessary to cover their obligations.

- CLPAs would not be tradeable but would otherwise be subject to the same rights and obligations applicable to other compliance instruments. After importers surrender the CLPAs, they would be retired immediately. Cement importers cannot meet their obligations with California GHG emissions allowances, but CARB may permit cement importers to use offset credits, including sector-based credits, or other instruments in accordance with the provisions in the Proposed Regulation on linkage.

- The price of CLPAs would be directly tied to the price of California GHG emissions allowances, with any movement in the price of cap-and-trade allowances being reflected in CLPAs.

- CLPAs may not be used by domestic producers for compliance with the state-wide program. Given that cement imports are not included within the scope of CARB's cap-and-trade program or emissions inventory, the CLPA account would not in any way threaten the integrity of the cap or the overall environmental effectiveness of the program.

- Cement importers would be required to surrender a quantity of allowances equal to the quantity of cement imported multiplied by the GHG intensity of the imported cement. CARB would distribute CLPAs to an importer for free in an amount equivalent to the free allocation of allowances distributed to California cement producers in any given compliance year, effectively requiring cement importers to surrender CLPAs or other available compliance instruments for the difference. Alternatively, cement importers could be required to surrender a quantity of allowances equal to the quantity of cement imported multiplied by the difference between the GHG intensity of the imported cement and the level or free allowances or "effective benchmark" for the California cement industry. Both of these approaches would ensure that the GHG-related costs imposed on imported cement are comparable to those imposed on California cement producers.

- Emissions of imported cement would include the direct emissions associated with production and emissions associated with transportation to the California market. Indirect emissions would also be included, to the extent that they are also included in the calculations of emissions and the benchmark applicable to California cement producers.

- CARB would establish default emissions values based on certain defined pathways for imported cement. Using the best information available, the emissions values would be based on the average direct (and, if applicable, indirect) emissions for producers in a particular country of origin or region and estimates of applicable transportation emissions based on mode of transportation and geographic distance. These defaults could be provided in a Cement Carbon Intensity Lookup Table, which would be similar but less complex than the lookup table developed for the LCFS.

- Importers could petition for individual treatment or pathway by demonstrating lower emissions compared to the CARB default emissions values assigned to a particular pathway and agreeing to submit required data and allow on-site verification, if considered necessary.

- CARB could also enter agreements with particular producers, provinces, or countries to facilitate the collection and verification of data for the purpose of revising or updating its carbon intensity values for relevant pathways.

- In certain rare cases, imported cement may ultimately be destined for a market outside of California. In such cases, if the importer can certify that relevant imports will not be sold in California and submit supporting documentary evidence, CARB could exempt such imports from the allowance requirement.

SECTION-BY-SECTION SUMMARY

Subarticle 2: Purpose and Definitions

Section 95802. Definitions.

The objective would be to establish another type of compliance instrument that falls within the definition of "allowance" but that is not tradeable. In order to do so, CARB would need to expand the definition of "allowance" to include the type of certification contemplated by the Cement Leakage Prevention Allowance ("CLPA"). This type of allowance is referred to as a certification rather than an authorization because CARB lacks the authority to "authorize" emissions outside its jurisdiction. Rather, it is certifying compliance based on the emissions intensity associated with the consumption of one ton of cement within California.

CARB would also need to define "cement importer," which could be based on the existing definitions of "electricity importer" or "enterer" or could be based on the definition of "importer" in the LCFS regulation. For example, cement importer could be defined as "the person who owns imported cement when it is received at the cement import facility in California."

CARB may also want to define "import" and "cement import facility" consistent with the definitions of these terms in the LCFS regulation. For example, import would be defined as "to bring a product from outside California into California," and cement import facility would be defined as "with respect to imported cement, the storage silo or other structure in which the cement was first delivered from outside California into California."

CARB will also need to define "cement leakage prevention allowance" ("CLPA"), which could be as simple as the current definition for "California greenhouse gas emissions allowance."

A conforming change would also be required for the definition of "covered entity" to clarify that the applicable threshold for a cement importer is in a new section.

Additional conforming changes may be necessary, including new or revised definitions necessary to address imports of clinker and assigning a cement equivalent for purposes of the regulation.

Subarticle 3: Applicability

New Section

A new section should be reserved (Section 95815) to designate cement importers as covered entities and establishing an inclusion threshold, if any.

Subarticle 4: Compliance Instruments

Section 95820. Compliance Instruments Issued by the Air Resources Board.

A new section should be reserved for the designation of Cement Leakage Prevention Allowances ("CLPAs") as compliance instruments for cement importers. In designating these allowances as compliance instruments, it should be clear from this provision or from other provisions discussed below that this instrument is not tradeable and is not available to other covered entities for compliance with applicable obligations.

An additional conforming revision is necessary in section 95820(c) to reflect the different nature of the CLPAs as a compliance instrument.

Subarticle 5: Registration and Accounts

Section 95830. Registration with ARB.

As a covered entity, cement importers would be subject to the applicable registration requirements. A conforming change is needed to specify the deadline for cement importers to register.

A provision could be added under this section to require that a cement importer also post a bond at the time of registration in order to limit the risk that a particular entity will "import and disappear" before compliance.

Section 95831. Account Types.

CARB would also need to include a new account type under Section 95831 for the administration of CLPAs. This Cement Leakage Prevention Allowance Account would be administered by the Executive Officer in the same way as other accounts and would facilitate the allocation and/or sale of CLPAs to cement importers.

Subarticle 7: Compliance Requirements for Covered Entities

Section 95850. General Requirements.

Conforming revisions are needed to reflect the relevant document retention and recordkeeping requirements applicable to cement importers' compliance obligations.

Section 95851. Phase-in of Compliance Obligation for Covered Entities.

As in the previous question, a conforming revision is needed to confirm that the compliance obligation for cement importers begins with the first compliance period.

Section 95852. Emission Categories Used to Calculate Compliance Obligations.

A section should be reserved to specify the compliance obligation applicable to cement importers. Consistent with other provisions in this section, the compliance obligation for cement importers would be based on the emissions associated with cement imported into California, including an obligation for every metric ton of CO2e for process emissions, stationary combustion emissions, and transportation emissions to the cement import facility (*i.e.*, the point equivalent to the gate of a California cement producer where cement is placed on the California market for consumption).

New section

This new section (section 95853.1) would establish the compliance obligation for cement importers. The obligation would be based on the GHG emissions associated with a ton of imported cement, including the direct (and, if applicable, indirect) emissions associated with the production of cement plus transportation emissions associated with the relevant truck, rail, or maritime transportation pathway to the point at which the cement is available for sale on the California market. The objective would be to establish default values for those countries, provinces, or states from which cement originates based on the best information available and publish such default values in, for example, a Cement Carbon Intensity Lookup Table.

This section would also include procedures for cement importers to petition for an individual intensity, for foreign producers to obtain an individual intensity by, for example, submitting necessary date in conformity with the Mandatory Reporting Regulation, and for certain countries, provinces, or states to establish more definitive default values.

This section could also be used to insert other provisions to facilitate enforcement and verification in relation to cement importers, including, for example, documentary requirements to accompany shipments and facilitate verification of relevant details.

Section 95856. Timely Surrender of Compliance Instruments by a Covered Entity.

Conforming revisions are necessary to account for the compliance obligations associated with a cement importer and the applicable deadline for surrendering such obligations.

Subarticle 8: Disposition of Allowances

Section 95870. Disposition of Allowances.

If CARB decides to distribute CLPAs consistent with the level of California GHG allowances distributed to the California cement industry, this section could stipulate that the amount distributed of one type of allowance should be equal to the amount distributed of the other type of allowance to ensure equal treatment.

PROPOSED PLACEHOLDERS IN THE REGULATORY LANGUAGE

Subarticle 2: Purpose and Definitions.

Section 95802. Definitions.

(a) Definitions. For the purposes of this article, the following definitions shall apply:

(5) "Allowance" means a limited tradable authorization to emit up to one metric ton of carbon dioxide equivalent **and, where applicable, a nontradable certification of emissions up to one metric ton of carbon dioxide equivalent outside California defined in Section 95802(a)(32.2).**

(32.1) Reserved for Definition of "Cement importer".

(32.2) Reserved for Definition of "Cement import facility".

(32.2) Reserved for Definition of "Cement leakage prevention allowance".

(44) "Covered entity" means an entity within California that has one or more of the processes or operations and has a compliance obligation as specified in subarticle 7 of this regulation; and that has emitted, produced, imported, manufactured, or delivered in 2008 or any subsequent year more than the applicable threshold level specified in section 95812 (a) **or 95815** of this rule.

(96.1) Reserved for Definition of "Import".

Subarticle 3: Applicability

Section 95815. Reserved for Designation of Cement Importers as Covered Entities Meeting the Inclusion Threshold.

Subarticle 4: Compliance Instruments

Section 95820. Compliance Instruments Issued by the Air Resources Board.

(a) California Greenhouse Gas Emissions Allowances.
{...}

(b) Offset Credits Issued by ARB.
{...}

(xx) Reserved for Cement Leakage Prevention Allowances

(c) **Unless otherwise specified, e**~~E~~ach compliance instrument issued by the Executive Officer represents a limited authorization to emit up to one metric ton in CO_2e of any greenhouse gas specified in section 95810, subject to all applicable limitations specified in this article. No provision of this article may be construed to limit the authority of the Executive Officer to terminate or limit such authorization to emit. A compliance instrument issued by the Executive Officer does not constitute property or a property right.

Subarticle 5: Registration and Accounts

Section 95830. Registration with ARB.

{...}

(d) Registration Deadlines.

(1) An entity that meets or exceeds the inclusion thresholds in section 95812 must register with the accounts administrator pursuant to this section:

(A) within 45 calendar days of the reporting deadline contained in the MRR if the entity is not a covered entity as of January 1, 2012; or

(B) within 30 calendar days of the effective date of this regulation for an entity that exceeds the inclusion thresholds in section 95812 for any data year 2008 through 2010.

(C) within 30 calendar days of the effective date of this regulation for a cement importer.

Section 95831. Account Types.

{...}

(c) Accounts under the Control of the Executive Officer. The accounts administrator will create and maintain the following accounts under the control of the Executive Officer:

{...}

(7) Reserved for Cement Leakage Prevention Allowance Account.

Subarticle 7: Compliance Requirements for Covered Entities

Section 95850. General Requirements.

(a) Reporting Requirements. Each covered entity identified in section 95811 is subject to the Mandatory Reporting Regulation.

(b) Record Retention Requirements. Each covered entity must retain all of the following records for at least 10 consecutive years and must provide such records within 20 calendar days of receiving a written request from the Executive Officer:

(1) Copies of all data and reports submitted to the Executive Officer under this article and section 95105 of the Mandatory Reporting Regulation,

Document Retention and Recordkeeping Requirements;

(2) Records used to calculate a compliance obligation as specified in section**s** 95853 **or 95853.1**; and

(3) Verification statement as required pursuant to section 95103(f) of the Mandatory Reporting Regulation, Greenhouse Gas Reporting Requirements **or as set forth in section 95853.1,**

Section 95851. Phase-in of Compliance Obligation for Covered Entities.

(a) Operators of facilities and first deliverers of electricity specified in section 95811(a) and (b) and suppliers of CO_2 specified in section 95811(g) that meet or exceed the annual emissions threshold in section 95812(b) **and cement importers specified in section 95815** have compliance obligations beginning with the first compliance period.

Section 95852. Emission Categories Used to Calculate Compliance Obligations.

(a) Operators of Facilities.

{...}

(b) First Deliverers of Electricity.

{...}

(c) Suppliers of Natural Gas.

{...}

(d) Suppliers of RBOB and Distillate Fuel Oils.

{...}

(e) Suppliers of Natural Gas Liquids.

{...}

(f) Suppliers of Blended Fuels.

{...}

(g) Suppliers of Carbon Dioxide.

{...}

(xx) Cement Importers. Reserved.

(h) The compliance obligation is calculated based on the sum of (i) emissions of CO_2, CH_4, and N_2O resulted from combustion of fossil fuel; (ii) emissions of CH_4 and N_2O resulted from combustion of all biomass-based fuel; (iii) emissions of CO_2 resulted from combustion of unverifiable biomass-derived fuels, as specified in section 95852.2; (iv) emissions of CO_2 resulted from combustion of biomass-derived fuels not listed in section 95852.2; and (v) all process and vented emissions of CO_2, CH_4, and N_2O as specified in the Mandatory Reporting Rule except for those listed in section 95852.2(a)(6) below.

Section 95853.1. Reserved for Calculation of Cement Importer's Compliance Obligation.

Section 95856. Timely Surrender of Compliance Instruments by a Covered Entity.

{...}

(c) A covered entity must transfer from its holding account to its compliance account a sufficient number of compliance instruments to meet compliance obligation set forth in sections 95853, **95853.1,** and 95855.

(d) Deadline for Annual Surrender. For any year in which a covered entity has an annual compliance obligations pursuant to section**s 95853.1 or** 95855 or, it must fulfill that obligation

(1) By May 15 of the calendar year following the year for which the obligation is calculated if the entity reports by April 1 pursuant to section 95103 of MRR;

(2) By July 15 of the calendar year following the year for which the obligation is calculated if the entity reports by June 1 pursuant to section 95103 of MRR **or if the entity is a cement importer**.

Subarticle 8: Disposition of Allowances

Section 95870. Disposition of Allowances.

{...}

(g) Reserved for Allocation to Cement Importers.