BEFORE THE
CALIFORNIA AIR RESOURCES BOARD

In Re:

PROPOSED REGULATION TO IMPLEMENT THE CALIFORNIA CAP-AND-TRADE PROGRAM FOR GREENHOUSE GASES

COMMENTS OF THE NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

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COMMENTS OF THE NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION ON THE CALIFORNIA AIR RESOURCES BOARD'S "PROPOSED REGULATION TO IMPLEMENT THE CALIFORNIA CAP-AND-TRADE PROGRAM" FOR GREENHOUSE GASES

INTRODUCTION

The North American Insulation Manufacturers Association ("NAIMA") appreciates the opportunity to submit written comments on the California Air Resources Board's ("CARB") "Proposed Regulation To Implement the California Cap-and-Trade Program" for greenhouse gases ("the Proposal").

NAIMA is the trade association for North American manufacturers of fiber glass, rock wool, and slag wool insulation products. NAIMA shares a common goal with CARB in that the Association promotes energy efficiency and environmental preservation through the use of energy efficiency. NAIMA specifically promotes energy efficiency and pollution reduction through the use of fiber glass, rock wool, and slag wool insulation products.

As these comments demonstrate, the proposed regulations, without certain modifications, may have significant negative consequences to the fiber glass insulation industry in California. Because this regulation would have serious deleterious impacts on the fiber glass insulation manufacturers in the State, it would also have an adverse impact on California's economy. As noted below, the State of California has stated that increased energy efficiency in buildings has the greatest potential for reducing greenhouse gases. Insulation is the quickest, most economically feasible, and most proven means for achieving those reductions. Fiber glass insulation is the most widely-used insulating material in residential and commercial construction and retrofit applications. If California inhibits the manufacture of this material within the State, it will impair the ability of the State to meet its goal of greenhouse gas reduction and force those needs to be supplied by product made at fiber glass manufacturing facilities located elsewhere in the U.S., Canada, and Mexico.

NAIMA members view climate change regulations as both a threat and an opportunity. Because making fiber glass insulation takes energy,[1] the threat comes largely from the anticipated increase in manufacturing costs, whether from the cost of emissions allowances or from the inevitable increase in the cost of electricity in California. The opportunity comes from the fact that all NAIMA member products made in California are designed to save energy and, by so doing, to also reduce greenhouse gas emissions. In fact, the AB 32 Scoping Plan clearly recognizes the need to make buildings more energy efficient in order to achieve the state-wide emissions reductions required by AB 32. The challenge is to assist the California fiber glass insulation industry and to deal with threats in a way that is fair, reasonable, and predictable. For

[1] On average, the energy used to make fiber glass insulation is recouped in the first month of service. Thereafter, the insulation saves energy every day for the life of the building.

example, the State's fiber glass plants are readily subject to leakage that should entail free allowances for all three compliance periods. On the opportunity side, CARB should take steps to increase the use of insulation in retrofitting existing buildings in order both to save energy and reduce emissions. An important part of this is to encourage the use of energy efficiency-based carbon offsets, which would not only help businesses in the cap-and-trade system reduce their compliance costs, such efficiency-based offsets would also, as explained in more detail below, have many sought-after co-benefits such as improvements in public health, increased health and safety of building and home occupants, increased home value, and reductions in other pollutants beyond greenhouse gas emissions. In short, NAIMA requests that CARB make NAIMA members' California plants part of the solution and not unfairly chase fiber glass insulation production to nearby out-of-state plants employing out-of-state workers.

CAP-AND-TRADE WILL IMPACT FIBER GLASS INDUSTRY

This Proposal is particularly relevant to NAIMA and its members because NAIMA's members have four (4) manufacturing plants located in California:

- CertainTeed – Chowchilla, California
- Johns Manville – Willows, California
- Knauf Insulation – Shasta Lake, California
- Owens Corning – Santa Clara, California

In addition, virtually all of NAIMA's members' products are used or sold in California. More importantly, NAIMA's members provide important manufacturing jobs to the California economy. Specifically, Owens Corning operates a fiber glass building materials manufacturing facility in Santa Clara. According to public sources, Owens Corning's Santa Clara facility employs an estimated 250 – 499 employees (www.manta.com/c/mmcntlv/owens-corning-sales-inc). Johns Manville operates a fiber glass manufacturing facility in Willows, California. According to public sources, Johns Manville's Willows facility employs between 250 and 499 employees and generates annual revenue of $100 to $500 million (www.manta.com/c/mmcckzn/johns-manville-corp). CertainTeed Corporation operates a fiber glass manufacturing facility in Chowchilla, California. According to public sources, CertainTeed's Chowchilla facility employs between 250 and 499 employees and generates annual revenue of $50 to $100 million (www.manta.com/c/mmjhsbb/certain-teed-corp). Knauf Insulation operates a fiber glass manufacturing facility in Shasta Lake, California. According to public sources, Knauf's Shasta Lake facility employs between 100 and 249 employees and generates annual revenue of $50 to $100 million (www.manta.com/c/mm0tt3b/knauf-fiberglass).

California is losing manufacturing jobs – in both traditional and high-tech industries – to other states and nations. One of the key reasons for this exodus from California is the State's existing regulatory requirements and concerns about the future regulatory climate.[2] California's regulatory environment is challenging, time-consuming, complex, duplicative, and costly.

[2] Ross C. Devol, Perry Wong, Armen Bedroussian, Candice Flor Hynek, and David Rice, "Manufacturing 2.0: A More Prosperous California," Milken Institute, June 2009, p. 9.

CARB's proposed Cap-and-Trade Proposal is a perfect example of such a regulation. As discussed in greater detail below, the Proposal, as currently written, could ultimately result in closing these plants or curtailing their operations within the State. That outcome would result in more of the California market being supplied by manufacturing facilities in other states, Canada, and Mexico.

Such a result is totally unnecessary. Fiber glass insulation is an important contributor to the California economy, through direct manufacturing, shipment of finished product to markets within California and other western states, and export of product to foreign markets. It also supports the insulation industry and installers, is a critical material for the construction industry, and a much-used material for do-it-yourself consumers. In addition, fiber glass insulation promotes energy efficiency, environmental preservation, and reduces pollutants, including greenhouse gases. Fiber glass is also the most thoroughly tested and researched insulation product on the market. It is the preferred product for more than 80 percent of the insulation market. If fiber glass insulation would not be available, the supplies of alternative insulating materials would not be sufficient to supply the demands of the market. Raising the cost of insulation products by raising the costs of doing business for fiber glass insulation manufacturers or by artificially reducing the supply of available insulating materials will reduce the ability of the State to meet its greenhouse gas emission reduction goals.

ENVIRONMENTAL BENEFITS OF INSULATION

In balancing the need to protect and preserve California's economy with its environmental goals, it is equally important for CARB to weigh the significant environmental benefits offered by insulation products. Indeed, CARB recognizes that improving the energy efficiency of existing buildings can deliver the desired greenhouse gas reductions.[3] In testimony before the Subcommittee on Energy and Air Quality of the Committee on Energy and Commerce of the U.S. House of Representatives, William Fay, Executive Director of the Energy Efficient Codes Coalition, stated that "homes and commercial buildings are this nation's largest sector of energy use and – because of the close relationship between greenhouse gases and energy consumption –

[3] Insulation does indeed reduce pollutants emitted into the atmosphere. Jonathan I. Levy, Yurika Nishioka and John D. Spengler, "The public health benefits of insulation retrofits in existing housing in the United States," *Environmental Health: A Global Access Science Source*, April 2003, pp.1-16 and Yurika Nishioka, Jonathan I. Levy, Gregory A. Norris, Andrew Wilson, Patrick Hofstetter, and John D. Spengler, "Integrating Risk Assessment and Life Cycle Assessment: A Case Study of Insulation," *Risk Analysis*, Vol. 22, No. 5, 2002, pp. 1003-1017. NAIMA has summarized the findings of these two studies in previous comments which demonstrated the dramatic correlation between the benefits of increased insulation and reduction of air emissions. These Harvard researchers stated that the "magnitude of the economic and public health benefits indicates that creative public policies to encourage" increased insulation "may be warranted." Jonathan I. Levy, Yurika Nishioka and John D. Spengler, "The public health benefits of insulation retrofits in existing housing in the United States," *Environmental Health: A Global Access Science Source*, April 2003, p.14. The Harvard researchers concluded that "[t]his approach allows us to quantify the benefits of energy efficiency on a national scale not seen before, which takes us far beyond energy savings and energy security. Now it is clear that improving energy efficiency not only helps us as a nation, but also has an immediate, positive impact on us, as individuals, and our families." NAIMA "Harvard Study Findings," NAIMA-036, September 2003.

also the largest US source of anthropogenic greenhouse gases. Suffice it to say that buildings – and particularly residences – represent one of the last great frontiers of wasted energy."[4]

Since homes and commercial buildings consume nearly one half of California's energy, these structures must become an integral part of any successful effort to improve energy efficiency. The California Integrated Waste Management Board states that the residential sector (excluding commercial and industrial) accounts for approximately 31 percent of the electricity consumed in California.[5] The U.S. Department of Energy, along with various other government and third party organizations, put installation of insulation at the top or in the top five suggestions for energy savings. To understand why, consider the following attributes of insulation and it is easier to understand why this existing technology offers so many advantages.

Energy efficiency is a resource. Indeed, insulation products are resources. In fact, energy efficiency, including insulation, has been deemed the greatest untapped resource available to address the current energy crisis and climate change.[6] Unlike other energy efficiency measures, such as energy efficient appliances or energy saving light bulbs, insulation, once installed, requires no additional energy to save energy. NAIMA supports CARB's investigation of zero net energy targets for new buildings.[7]

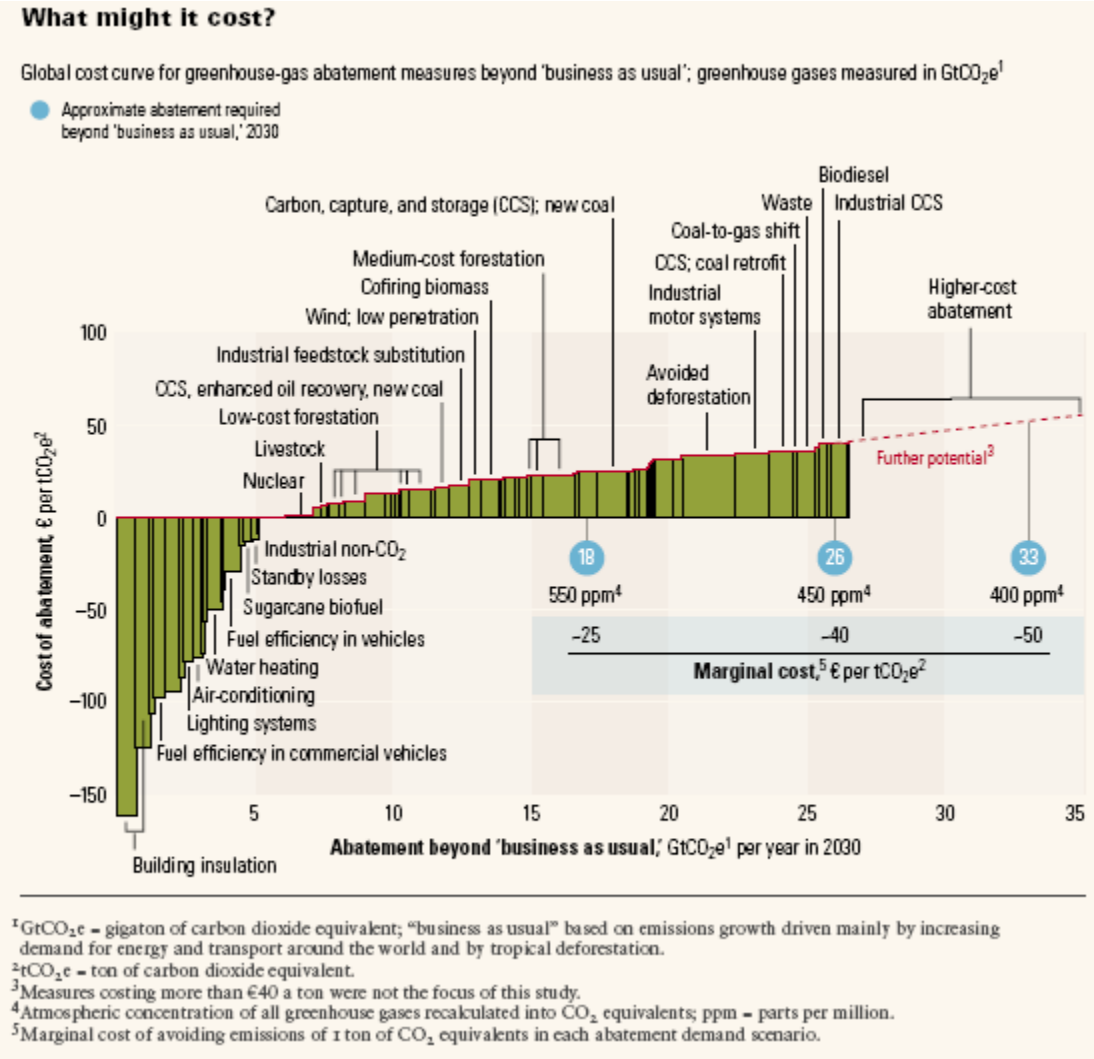
Therefore, increasing energy efficiency through insulation is cost effective. In *The Ecology of Commerce*, Paul Hawken asserts that "ceiling insulation and double glazed windows can produce more oil than the Arctic National Wildlife Refuge at it most optimistic projections; at about one-twentieth the cost, with four times the employment per unit of energy conserved versus the energy consumed by burning oil."[8]

The U.S. Environmental Protection Agency ("EPA") gives weight to cost effectiveness in identifying emissions reductions because a cost effective measure does not present the usual impediments to implementation of an action plan.[9] Rather, cost effective measures help meet goals and objectives expeditiously without overburdening budgets.[10] In focusing on the cost effectiveness of energy efficiency and specifically increased insulation, NAIMA strongly urges CARB to complete its energy efficiency emissions reduction measures before expending valuable resources on the sometimes uncertain, unpredictable, and distant rewards identified in the "Renewables Portfolio Standard."[11]

In "A Cost Curve for Greenhouse Gas Reduction," the *McKinsey Quarterly* reports "that almost a quarter of possible emission reductions would result from measures (such as better insulation in

[4] Energy Efficient Codes Coalition, Testimony of William D. Fay Before the Subcommittee on Energy and Air Quality of the Committee on Energy and Commerce, U.S. House of Representatives, Thursday, July 17, 2008.
[5] www.ciwmb.ca.gov/GreenBuilding/Residential.
[6] "Transforming Energy Efficiency." www.duke-energy.com/docs/CGI - Fact-Sheet.doc, September 27, 2007.
[7] Scoping Plan at p. 38.
[8] Paul Hawken, *The Ecology of Commerce* (New York: Harper Business, 1993), p. 178.
[9] 70 Fed. Reg. 65,983, 66,007, 66,019, 66,020-24, 66,049, 66056, and 66059.
[10] *Ibid*. at 66,006.
[11] Scoping Plan at p. 24.

buildings) that carry no net life cycle cost – in effect they come free of charge.[12] As the graphic from the above-referenced article demonstrates, no other efficiency measure is as cost effective as building insulation.



From a pragmatic perspective, insulation is easily installed and the materials are immediately available. As evidenced by the McKinsey report cited above and the Harvard studies discussed below, insulation delivers significant reduction in pollutants, specifically greenhouse gases. Therefore, it is imperative for California to protect the insulation industry in the State of California; it not only provides significant economic benefits to the State of California, but it helps CARB meet its goal to reduce greenhouse gas emissions through increased energy efficiency.

[12] Enkvist, Per-Anders, Tomas Nauclér and Jerker Rosander. 2007. "A Cost Curve for Greenhouse Gas Reduction." *The McKinsey Quarterly* 1: 38.

HARVARD STUDIES DOCUMENT THE BENEFITS OF IMPROVING EFFICIENCY

Two studies conducted by the Harvard School of Public Health (the "Harvard Studies") analyzed the benefits of increased insulation and projected resultant reductions of various pollutants. Those study results are set forth in Appendix 1, attached hereto.

BENCHMARK FOR MINERAL WOOL INDUSTRY

California's fiber glass insulation plants are the best performing in the nation. Based on 2007 numbers, the table below identifies California's fiber glass insulation plants' direct and indirect emissions.

	California				
	Direct Emissions	Indirect Emissions	Raw Material Emissions	Total Direct & Indirect Emisions	2007 Tons Pulled
	CO2	CO2	CO2	CO2	mTPY
Totals	107,084	150,712	16,951	274,747	318,867
mTCO2/mT	0.336	0.473	0.053	0.862	

It is important to compare California's performance to that of the other mineral wool plants throughout the United States as they would be the primary source of fiber glass insulation for the California market if the industry's California plants cannot supply the market. As the table below demonstrates, the U.S. performance is below that of California's plants.

U.S.

	Direct Emissions	Indirect Emissions	Raw Material Emissions	Total Direct, RM & Indirect Emissions	2007 Tons Pulled
	CO2	CO2	CO2	CO2	mTPY
Totals	762,791	1,808,722	107,544	2,679,057	1,878,931
mTCO2/mT	0.406	0.963	0.057	1.426	

Based on the average performance of U.S. plants, NAIMA recommends a benchmark for the fiber glass (mineral wool) industry of 0.463 mTCO2e per metric ton of glass pulled. One hundred (100) percent of the average U.S. direct and process emissions are 0.463 mTCO2e per metric ton of glass pulled.

NAIMA is collecting 2009 greenhouse gas emissions data. Based on the collection of that new, more recent and more relevant data, NAIMA may ask CARB to consider another benchmark. The collection of this 2009 emissions data is ongoing and NAIMA will provide this to CARB in early 2011.

LEAKAGE IN CALIFORNIA

Fiber glass insulation (mineral wool) has been given a medium level of allowances, which equates to 100 percent in 2012–2014; 75 percent in 2015–2017; and 50 percent in 2018–2020. The other two glass sectors (flat glass and glass packaging) received 100 percent allowances for all three compliance periods. CARB has justified that distinction based on its perception of the effect of foreign competition on each segment of the glass industry. Prevention of leakage is how CARB intends to address the alternative supplier threat to California industry from the cap-and-trade program and the inability of California to regulate those suppliers' greenhouse gas emissions. Put more pragmatically, CARB's effort to stop leakage is really an effort to reduce the effect on industry and employees from the implementation of the cap-and-trade program.

Given that simple premise, the facts fully support 100 percent allowances for fiber glass insulation for each of the three-year compliance periods designated in the legislation.

CARB should recognize that if the California fiber glass operations are not economically viable as a result of AB 32, some of NAIMA's members might close their plants or significantly reduce capacity. The fiber glass insulation products produced in other jurisdictions will be able to adequately supply the California market. This fact is particularly relevant at the present moment

because industry product resources are and will continue to be underutilized for many years due to current economic conditions and the downturn in the construction industry.

Any demand previously fulfilled by a California plant can be easily and economically supplied from other U.S. plants. This industry does not have to look to offshore facilities to supply the California market. In addition to the increase in greenhouse gas emissions per ton of fiber glass insulation produced at these plants located out of California, the transportation needed to get that material to California markets would have a further negative impact on greenhouse gas emissions; other forms of pollution will also be added to the environment from that motor vehicle transport.

Aislantes Minerales, S.A. de C.V.
San Luis Potosí,Mexico

Amerrock Products, LP
Nolanville,TX

CertainTeed Corp.
Athens,GA
Chowchilla, CA
Kansas City,KS
Mountain Top, PA
Ottawa,Ontario
Redcliff,Alberta
Sherman,TX
Tilsonburg,Ontario

FiberTEK Insulation, LLC
Lakeland, FL
Nephi, UT

Fibrex Insulations Inc.
Sarnia,Ontario

Guardian Industries Corp.
Albion,MI
Erin,Ontario
Inwood,WV
Kingman,AZ
MineralWells,MS

Industrial Insulation Group, LLC
Phenix City,AL

Isolatek International
Huntington, IN
Stanhope,NJ
San Bernardino, CA
Houston,TX

Johns Manville
Berlin,NJ
Cleburne,TX
Defiance,OH
Defiance,OH
Innisfail,Alberta
McPherson,KS
Richmond, IN
Waterville,OH
Willows, CA
Winder,GA

Knauf Insulation
Lanett, AL
Shasta Lake, CA
Shelbyville, IN

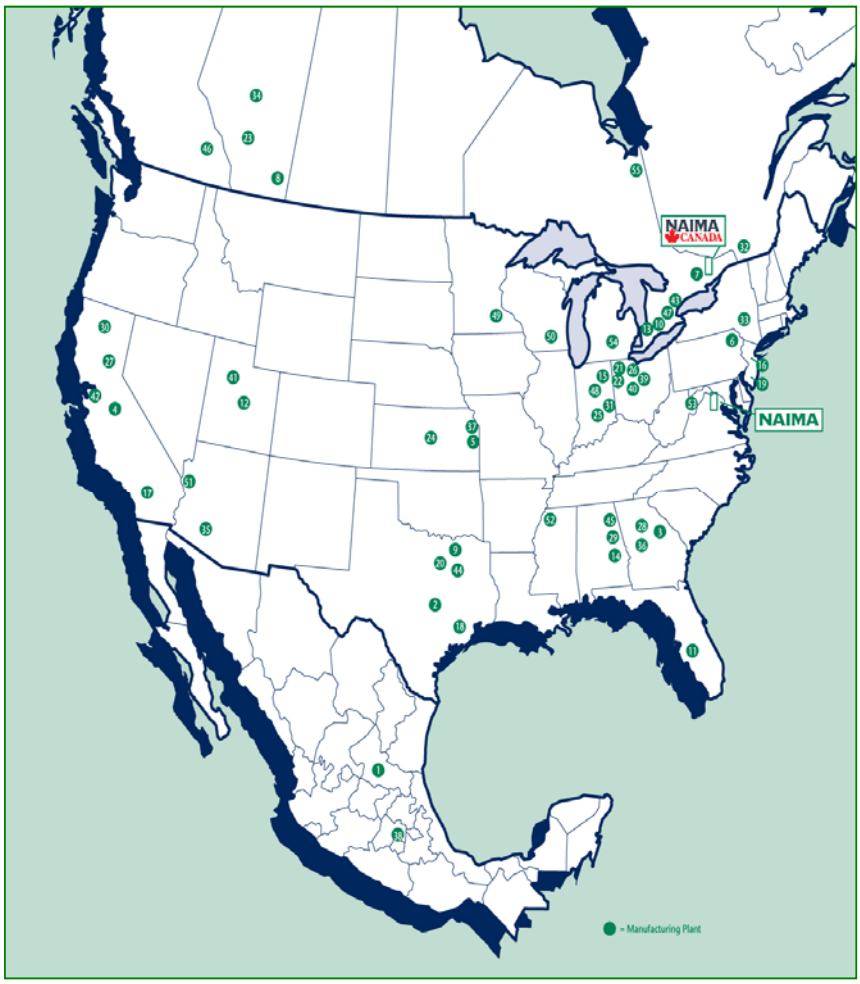
Owens Corning
Candiac,Quebec
Delmar, NY
Edmonton, Alberta
Eloy, AZ
Fairburn,GA
Kansas City,KS
Mexico City,Mexico
Mount Vernon,OH
Newark,OH
Salt Lake City, UT
Santa Clara, CA
Scarborough,Ontario
Waxahachie,TX

Rock Wool Manufacturing Co.
Leeds, AL

Roxul Inc.
Grand Forks, BC
Milton,Ontario

Thermafiber, Inc.
Wabash, IN

USG Interiors, Inc.
RedWing, MN
Walworth,WI



A close look at the map of currently operating fiber glass plants in North America effectively illustrates why fiber glass companies should be treated the same as the other segments of the glass industry and be given 100 percent allowances for all compliance periods through 2020. NAIMA points out two manufacturing plants right at California's border in Arizona. Two additional plants in Utah also could easily take up the work of supplying the California market. There are also four manufacturing plants in Western Canada.

The fiber glass insulation plants in the states bordering California are far more relevant to assessing the potential for leakage in this industry than the 20 plants in Europe or the 10 plants in Asia. If CARB is serious about preventing leakage from the State of California, it must carefully weigh the manufacturing potential, as illustrated on the above map of U.S. manufacturers. The presence of those 40-plus plants are the most effective argument for giving fiber glass plants 100 percent allowances for the compliance periods through 2020.

The fiber glass industry in California does face some competition from plants in Canada and Mexico. There have been some efforts by Chinese manufacturers to supply the U.S. market. The insulation produced was inferior to U.S.-produced product, and to date, China has not caught on as a source of supply for the U.S. market. A reduction of production in California could prompt a renewed effort on the part of Chinese manufacturers to supply this market.

All California fiber glass manufacturers have stated to CARB that products presently produced in California that are used in California or are shipped out of California could be supplied from fiber glass manufacturing plants located within the U.S., Canada, and Mexico. As the costs to produce the product in California goes up, the economies supplying the California market shift so that at some point it becomes more cost-efficient to do so than to continue to supply the California market from the California facilities. As indicated in NAIMA's face-to-face meeting with CARB, NAIMA will be providing to CARB a more detailed analysis on the impact of competition from within the United States. At the meeting, CARB indicated that it looked forward to getting that data because its leakage analysis was hampered by the unavailability of such U.S. market data as opposed to the foreign market data which is what it relied upon thus far in its analysis.

Since California plants are the best performers, it provides yet another incentive for CARB to keep fiber glass plants operating in California. In fact, a production cost incentive to move more production to California facilities would have a positive impact on greenhouse gases and California jobs.

INDIRECT EMISSIONS

While indirect emissions are not part of the Proposal, the preceding exhibits also point out that any plan which does not address the negative financial impact of indirect emissions for electrical usage in the fiber glass industry will have the same negative impacts to California jobs and greenhouse gases.

OFFSETS

CARB recognized in the Scoping Plan that increasing the energy efficiency of existing buildings provides the "greatest potential for GHG reductions in the building sector."[13] CARB's Scoping Plan urges "adopting mechanisms to encourage and require retrofits for existing buildings that do not meet minimum standards of performance."[14] NAIMA urges CARB to broaden its scope of acceptable offsets. Energy efficiency offsets should be added to the list of acceptable/approved

[13] Scoping Plan, App. C, at C-146.
[14] Scoping Plan, App. C, at C-108.

offsets. Insulation can be a key resource for combating climate change. Energy efficiency measures should be given top priority over renewable, where benefits tend to be uncertain, distant, and unpredictable.

AUCTIONS

Auctions are unknown and depend upon many variables. The unpredictability of auctions is not a positive point for conducting business in California. If an auction is instituted, the auction proceeds should go back into advancing energy efficiency.

APPENDIX 1

HARVARD STUDIES DOCUMENT THE BENEFITS OF IMPROVING EFFICIENCY

Two studies conducted by the Harvard School of Public Health (the "Harvard Studies") analyzed the benefits of increased insulation and projected resultant reductions of the following pollutants: $PM_{2.5}$, NO_X, and SO_2. These numbers were acquired pursuant to a model designed to predict emissions reductions of fine particulate matter and its precursors, nitrogen dioxide and sulfur dioxide.

While the pollutants analyzed in the Harvard studies are not technically listed as one of the six Kyoto Protocol greenhouse gases, some of these pollutants are deemed as indirect greenhouse gases or other greenhouse gases.[1] For example, another pathway for NOx in the atmosphere is that of dry deposition back on land. Such deposition can then lead to increased emissions of the direct greenhouse gas nitrous oxide (N_2O).[2]

An estimated 45 million homes in the U.S. lack the proper levels of insulation according to today's energy standards. An estimated 1.2 million new single family homes are built each year, but varying energy codes in each region mean that many of these homes will not be insulated to the internationally accepted minimum standard – 2003 IECC with 2004 IECC Supplement. Most commercial and industrial buildings similarly are under-insulated.

The Harvard Studies, however, have determined that improving energy efficiency of homes not only saves energy and reduces environmental air pollution, but also has a significant, immediate, positive impact on public health. Improving the energy efficiency of commercial and industrial buildings will provide these benefits as well.

The Harvard Studies demonstrate that properly insulated buildings significantly reduce the release of sulfur oxide, nitrous oxide, and fine particulate matter. With every Btu of energy produced, harmful gases such as nitrous oxide and sulfur oxide are released into the air, causing pollution in our communities. But, a well-insulated home, commercial building, or industrial facility reduces the amount of energy required to maintain a comfortable living or working environment. Reducing energy consumption means power plants burn less fossil fuel to produce the energy and the result is a reduction in polluting gases emitted into our communities. Each Btu saved through energy-efficiency technologies such as insulation means cleaner air and improved public health.

Harvard researchers stated that the "magnitude of the economic and public health benefits indicates that creative public policies to encourage" increased insulation "may be warranted."[3] Harvard researchers concluded that "[t]his approach allows us to quantify the benefits of energy efficiency on a national scale not seen before, which takes us far beyond energy savings and

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[1] http://www.ghgonline.org/othernox.htm and http://www.sciencedaily.com/releases/2007/12/071220140813.htm.
[2] http://www.ghgonline.org/othernox.htm.
[3] Jonathan I. Levy, Yurika Nishioka and John D. Spengler, "The Public health benefits of insulation retrofits in existing housing in the United States," *Environmental Health: A Global Access Science Source*, April 2003, p. 14.

energy security. Now, it is clear that improving energy efficiency not only helps us as a nation, but also has an immediate, positive impact on us, as individuals, and our families."[4]

Specific Findings – Existing Homes

One Harvard study found that nearly 65 percent of U.S. Homes (46 million) have insulation levels that are inadequate by even 2000 energy standards. That likely is equally true of commercial and industrial buildings.[5] If just these homes were insulated to levels equivalent to the 2003 IECC with 2004 IECC Supplement, more than 800 trillion Btus – 76 supertankers of crude oil or 800 billion cubic feet of natural gas – could be saved each year. Savings would be similarly dramatic if commercial and industrial buildings upgraded their current insulation levels.

As reported by the Harvard School of Public Health, bringing all existing homes up to 2003 IECC with 2004 IECC Supplement codes would reduce $PM_{2.5}$ by 31,000 tons, would reduce NO_X by 100,000 tons per year, and would reduce SO_2 by 190,000 tons per year:

> According to our calibrated energy model, increasing residential insulation in the 46 million existing homes where insulation retrofits are necessary would save approximately 800 TBTU per year – 17 MMBTU . . . per household per year. . . . Given these energy savings, the aggregate emission reductions from residential fuel combustion and power plants include approximately 31,000 fewer tons per year of $PM_{2.5}$, 100,000 fewer tons per year of NO_X, and 190,000 fewer ton per year of SO_2.[6]

The Harvard study is careful to point out that the majority of emissions are linked to power plants and a significant share of pollution reduction achieved from increased insulation would be from power plants:

> For all three pollutants, the majority of emissions are linked to power plants (69% for $PM_{2.5}$, 76% for NO_X, and 89% for SO_2), even though only 39% of energy savings is related to electricity generation. . . .[7]

This seems especially helpful to State of California in that CARB has identified power plants as a significant source of SO_2 and that finding also has been made by the U.S. EPA.[8]

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[4] NAIMA "Harvard Study Findings," NAIMA-036, September 2003.

[5] In a study conducted by The Alliance to Save Energy, it was reported that insulation in existing commercial buildings saves at least 30 percent of the total U.S. commercial consumption – 2,305 trillion Btus. The study found that if all existing commercial buildings had been built to ASHRAE 90.1 standards, an additional 380 trillion Btus would have been saved. Moreover, the report stated that 20 percent of commercial buildings have no insulation and, if retrofitted, could save a potential 497 trillion Btus. The report also found that if all existing commercial buildings had been insulated to ASHRAE 90.1 standards, carbon emissions would have been 10.5 million short tons lower. Alliance to Save Energy, *Green and Clean: The Economic, Energy, and Environmental Benefits of Insulation* (Washington, DC: April 2001, pp. 12-16. The study also found dramatic energy savings for manufacturing facilities with accompanying reductions in pollution. *Ibid*. at pp. 18-23.

[6] Levy, Nishioka and Spengler at p. 7.

[7] *Ibid*.

[8] 70 Fed. Reg. at 65,994.

Specific Findings – New Homes

According to the second Harvard study, each year, more than 1.2 million new homes are built in the U.S.[9] Moreover, this study shows that by insulating these homes to even the modest 2000 IECC levels would over ten years save 300 billion Btus – 28 supertankers of crude oil or 300 billion cubic feet of natural gas. Based on this volume of energy savings, Harvard researchers estimate the following reduction of pollutants:

> First focusing on the aggregate emission reductions, the 300 TBTU energy savings is associated with reduced emissions of approximately 1,000 tons of $PM_{2.5}$, 40,000 tons of SO_2, and 30,000 tons of NO_X during the 10-year period. . . . On a per-unit basis, the emission reductions $PM_{2.5}$ are fairly similar across regions (ranging between 0.02 kg/year in the Midwest and 0.01 kg/year in other regions). Patterns are similar for NO_X with the South and Midwest having the greatest per-unit emission reductions. At the state level, Texas had the greatest reduction of $PM_{2.5}$, and Virginia had the greatest reductions of NO_X and SO_2, all of which were largely related to substantial electric space heating.[10]

While California is not specifically identified in the above quote, significant reductions can and will be achieved throughout California with improved energy efficiency, including increased insulation.

[9] Given the current slump in the housing market, this number would not reflect current building patterns.

[10] Yurika Nishioka, Jonathan I. Levy, Gregory A. Norris, Andrew Wilson, Patrick Hofstetter, and John D. Spengler, "Integrating Risk Assessment and Life Cycle Assessment: A Case Study of Insulation," *Risk Analysis*, Vol. 22, No. 5, 2002, p. 1009.