

*California First*

**A Proposal To Accelerate Low-Carbon  
Technology Deployment and Bring  
California Into a Global Carbon Market**

*California Climate Coalition*

May 15, 2008

*The **California Climate Coalition** was formed to develop recommendations for implementing California's landmark Global Warming Solutions Act of 2006. The Act mandates the reduction of greenhouse gas (GHG) emissions to 1990 levels by 2020 and sets the stage to achieve Governor Schwarzenegger's even more ambitious goal of reducing GHG emissions to 20% of 1990 levels by 2050. Success will require transforming the state's energy and transportation economy. As proven technology and idea leaders, **California Climate Coalition** members are uniquely positioned to provide input to the state as it designs California's climate protection program. Coalition recommendations are designed to accelerate the development and deployment of advanced low-carbon energy and transportation technologies to maximize GHG reductions while simultaneously protecting and growing California's economy.*

*The ideas described in this document are offered specifically for California's program. Different approaches may be appropriate for programs implemented at the regional, national or international level. Furthermore, because this proposal is an integrated package of recommendations that reconciles often conflicting individual company perspectives, no particular position should be attributed to any individual **California Climate Coalition** member. The Coalition offers this integrated proposal recognizing that California's agencies are in the process of developing draft proposals and that other stakeholders will introduce their own ideas. We look forward to continued dialogue with all stakeholders and commit to give serious consideration to and to comment upon constructive ideas that are offered by others.*

*The following **California Climate Coalition** members participated in the preparation of this document.*

**American Honda Motor Company, Inc.**  
**Catalyzed Combustion Technologies**  
**Chevron USA**  
**Codexis**  
**Energy Innovations, Inc.**

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# ***CALIFORNIA FIRST— A PROPOSAL TO ACCELERATE LOW-CARBON TECHNOLOGY DEPLOYMENT AND BRING CALIFORNIA INTO A GLOBAL CARBON MARKET***

## **ABSTRACT**

The California Climate Coalition proposal is an integrated package of policies that, in concert, meet the dual goals of technology development and greenhouse gas (GHG) reduction as established by the California Global Warming Solutions Act of 2006 (AB 32). The package includes the following elements:

### **TARGETED INNOVATIVE TECHNOLOGY MARKETS**

- Closed performance-based trading market with trading only allowed within each sectoral program (i.e., LCFS, RPS, etc.) and one-way trading into (but not out of) the broad open market.
- Forward-Generated Innovative Technology Credits for California-serving projects based on ARB-established criteria demonstrating that the project can, within appropriate future milestones, meet or outperform carbon intensity (or other appropriate) standards for the applicable sector.

### **MASS EMISSIONS REDUCTION-BASED OPEN MARKET**

- Open market *cap and trade* program with a performance-based transition mechanism.
- Geographically broad and quantitatively unlimited offsets market that links to other carbon markets.
- Phased approach allowing California to easily transition to a national or regional *cap and trade* program at clearly defined times.

## INTRODUCTION AND EXECUTIVE SUMMARY

Tackling climate change is a materially different challenge than traditional pollution control. Our global objective is to stabilize atmospheric greenhouse gas concentrations as soon as practicable, but in any event by no later than 2050. Unlike traditional pollution control strategies, we currently lack retrofit technologies to reduce targeted GHG emissions. Instead, reaching our GHG reduction goals will require nothing less than the transformation of our energy and transportation systems. A much greater portion of our electric power and transportation fuel supplies must be both renewable and low-carbon.<sup>1</sup> Our homes, office buildings and manufacturing facilities must become more energy-efficient. Our transportation modes must become less carbon intensive and must be used more efficiently. And our consumption must be informed by prices that more directly reflect the carbon impact of energy and transportation choices.

For California to succeed, it must design its greenhouse gas regulatory program to meet dual goals. Given the scale of required investments, it must design a program that fully complies with the AB32 mandate that the program be as cost-effective as possible. But the program's long-term climate stabilization goal also requires that the program accelerate the development of low-carbon sources of energy and transportation fuels. So it will not be sufficient to design a program that solely encourages the lowest-cost greenhouse gas reductions if such investments do not also yield the innovation and technology deployment we require for long-term success. **Simply stated, reducing state greenhouse gas emissions by 173 million metric tons by 2020, while laudable, will have little effect on global climate change. But dramatically accelerating the development and deployment of new energy and transportation technologies can deliver a profound global benefit.** Accordingly, the California Climate Coalition recommends a dual approach – targeted markets focused towards innovation and technology development in the critical areas of renewable electricity generation, low carbon transportation fuels and motor vehicle fuel economy; and an unrestricted, open market to achieve the state's greenhouse gas emissions in the most cost-effective manner.

Experience with emissions trading programs demonstrates that such programs can deliver greenhouse gas emissions reductions at significantly lower cost than command and control strategies, with relatively high confidence in the environmental outcome. However desirable a single *cap and trade* market would be from a purely cost-minimizing perspective, such an approach alone would not assure that the state would achieve its independent near-term goal of accelerating the development of low-carbon energy supplies and transportation fuels. Many of our targeted technology solutions (e.g., cellulosic ethanol, carbon capture and sequestration (CCS), fuel

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<sup>1</sup> Some experts estimate that the United States will need to reduce its energy and transportation emissions to approximately one-third of expected "business as usual" emissions by 2050. *See, e.g.,* Dipietro, J.P., Kuuskraa, V.A. and Forbes, S., "Examining Technology Scenarios for Achieving Atmospheric Stabilization of GHG Concentrations: A U.S. Pathway" (updated) presented at 8th Annual Intl Conference on GHG Technologies (GHGT-8), June 19-22, 2006 (Norway).

cell or plug-in hybrid vehicles) arguably will not occur at any reasonably large scale until the price of carbon rises to some point significantly above \$30 per metric ton. If we use a single market approach alone, we may neither be able to minimize program costs nor catapult desired technologies. Accordingly, we recommend that the California program establish two types of markets – one designed to accelerate development and deployment of very specific low carbon technologies and the one to achieve mass GHG reductions at the lowest cost. This document explains how each market should be structured and how the two approaches should be integrated.

### **Innovative Technology Markets**

The California Climate Coalition recommends that California establish independent trading markets (i.e., “innovative technology” markets) for those specific technology-advancement programs that it already has identified as having strategic importance to the state. These would include specifically the low carbon fuel standard, the renewable performance standard and the motor vehicle performance program. Under our proposal, trading and banking would be permitted only within the specific sector that is subject to technology performance requirements. Innovative technology market participants would not be able to avoid or defer compliance by purchasing offsets from outside their sectors, although they could obtain greater flexibility and some cost reduction by trading and banking credits within such sectors. As described more fully below, one-way trading also would be permitted with the broader unrestricted (i.e., “open”) greenhouse gas reduction market if an innovative technology sector participant over-performs (i.e., achieves a higher-than-required performance level).

To further encourage innovation and to provide a hedge against failure or delay in anticipated technology development, we recommend that the ARB authorize the generation of special “innovative technology credits” from qualifying advanced technology projects that commit to future performance milestones. Under this program, the state would identify strategic technology goals, including carbon intensity performance and project scale criteria, for projects to generate credits. Any project proponent that demonstrates it has the capability to deliver surplus carbon reductions beyond the specified performance and scale targets would receive credits equal to the surplus amount for which the commitment is made. Innovative technology credits would be issued immediately upon project approval for a period of years in advance of actual performance. Issuing such credits in advance of performance will materially facilitate early stage financing through the sale of credits, their use as collateral for loans or securitization. Each such project would be subject to project and financing milestones. The failure to meet conditions could result in some appropriate discounting of credits, while over-performance could entitle the owner to additional credits. Some portion of any credit sale would be dedicated to the purchase of insurance to offset any program shortfall.

## Open Market

With the sole exception of the innovative technology sectors specifically noted above, the rest of California's carbon market should be designed so as to encourage stationary sources to reduce greenhouse gas emissions in absolutely the lowest cost manner subject only to assuring credit integrity. The most cost-effective way to achieve emission reductions would be to implement an economy-wide *cap and trade* program at the national level and to integrate such a program with an even broader international carbon trading program. Such an approach would permit California's regulated entities to obtain emission reductions from any source in any part of the world, subject only to verification that the reduction is real, quantifiable, verifiable, enforceable and surplus. Taking into account the lack of a national program at this time and the state's requirement to implement AB32, we have carefully considered the best interim steps that California could take to meet the AB 32 requirements, while preparing to move towards a nationally- and ultimately internationally-integrated program.

We have considered the many design challenges California must address to implement a greenhouse gas reduction program that ultimately can be integrated to a broader national market. For some sectors, such as the electric power sector, it may be possible to establish a *cap and trade* model for the electricity sector at the outset, particularly if this program can be launched on a broader Western regional basis so as to avoid the potential emissions leakage or contract shuffling that a more narrow California-only market may permit.

At this point in time, however, we believe that it may be more appropriate for the Air Resources Board (ARB) to bring certain other sectors of the economy into a *cap and trade* program by using a transition strategy to phase in such sectors. The state can administer such a transition by first establishing for such other sectors performance expectations (e.g., appropriate benchmarks and emission reductions goals). During the phase-in period, sources subject to such performance standards would still be permitted to generate credits relative to the applicable performance standard and to trade credits with any source in the overall cap and trade program or to obtain credits from any source to make up any performance shortfall. The use of an interim *performance-based averaging and trading* approach for other sectors of California's economy would allow the state to continue to evaluate such sectors so as to make the determinations regarding emissions performance and economic activity required ultimately to issue allowances to and impose caps for such sectors. Whether a sector is subject to a *cap and trade* program or to a transition *performance-based averaging and trading* program, all sectors regulated under the open market should be entitled to trade surplus emission reduction credits or purchase geographically broad offsets so as to reduce the overall program cost and to reward innovation in any sector.<sup>2</sup> The ARB would track

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<sup>2</sup> As discussed more fully below, sources subject to the interim *performance-based averaging and trading* standards can comply directly with the applicable standard(s), average their performance across the sector, offset any shortfall calculated based on their net performance, and trade any unused credits generated through over-performance. These programs should transition to a *cap and trade* design at a later date or be replaced by an applicable national (or regional) program.

and adjust sector-specific performance standards, as appropriate, to reflect improved information and to assure that the 2020 statewide emissions cap is achieved. While the use of a transition *performance-based averaging and trading* model will permit the ARB to phase in sectors as it obtains the necessary information and tools to regulate such sectors, sectors should be transitioned to the most geographically broad *cap and trade* program available during the earliest compliance period for which such transition proves appropriate (particularly as broader regional or national programs are implemented).

If the open market is designed, as recommended, to link to other markets across the United States and in other countries, as appropriate, then the overall size and diversity of the linked markets and access to a wide range of emission reduction opportunities should provide sufficient flexibility and cost containment. Under such circumstances, there should not be a need for a safety valve. On the other hand, if the California program commences as a narrow and restricted market, then the state may need to consider as an interim protective measure the use of a ceiling price safety valve. Under this mechanism, any regulated source would have the option of complying with the program by purchasing surplus credits from the state at a predetermined ceiling price. The price would be set above the expected open market greenhouse gas reduction price and at a level sufficient to incentivize technology development but also would reflect the upper bound of expected program cost. Funds collected under the program would be invested in qualified surplus greenhouse gas reduction projects available anywhere in the world. This safety valve mechanism could be designed to expire once the state, or an appropriate independent expert board, has sufficient confidence that a broad inter-sector trading market has developed so as to ensure access to low-cost greenhouse gas reductions across jurisdictions.

### Dual Market Effects and Relationship

The California Climate Coalition recognizes that its recommendations for two types of trading markets will result in a ton of greenhouse gas emission reductions being valued differently in the innovative technology markets and the broad open market. Our expectation is that the higher currency value in the focused technology markets will encourage the desired innovation within individual targeted sectors while the ability to bank or sell credits for over-performance within such sectors will minimize costs to the extent feasible.

We also recognize that there is some risk of overlap between the two types of markets, as entities subject to regulation in one market also may be regulated in the second. For example, power sector emissions would be regulated under both the renewable portfolio standard and a power plant *cap and trade* program.<sup>3</sup> Likewise, refineries may be subject to regulation under the open market (initially

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<sup>3</sup> Some retail electricity providers also are required to implement a significant statewide energy-efficiency program, which is potentially a third type of regulation of the power sector. We are currently evaluating the best way to integrate the state's

under a transition *performance-based averaging and trading* program as we recommend below) and indirectly as part of the low carbon fuel standard. We recommend that the state avoid risks of double-counting or other interference between the two parts of the program by setting clear performance expectations for each part of the program. These expectations can be adjusted over time as the state gains more information, but the state should be able to avoid interference or double-counting by assigning separate carbon reduction benefits to each aspect of the program and by using such assignments as inherent assumptions in the development and administration of the other aspects of the program.

### California First

Although California should implement AB32 so as to permit rapid integration into a broader national and international carbon market, there is much that California can do now to spur innovation within the state and to accelerate the reduction of in-state emissions. Probably the most important step that California can take is to set immediate performance criteria for the innovative credit program proposed above. This will jump-start technology development and deployment in and near California and enable the state to be a global leader in technology advancement. Likewise, California can promptly develop or approve emission reduction protocols for in-state greenhouse gas reduction projects. These could include dramatically increased investment in energy efficiency at residential, commercial, governmental and industrial facilities. It also could include the accelerated turnover of the state's public and private diesel engine fleets. Issuing protocols and approving projects for such greenhouse gas reductions need not wait until the AB32 program formally commences in 2012, but can move ahead now. To maximize investment in such projects, however, the state not only should quantify project benefits (i.e., the "tons" reduced) by developing or approving accounting protocols and projects, but also should signal how credits generated from such projects could be used as part of the state's overall program. The credit usage signal would best be made formally as part of the state's scoping plan adoption in the fall of 2008. By approving the innovative credit program, issuing protocols for in-state credit generation and approving projects, California can move ahead now with valuable in-state reductions, thus delivering the other benefits of such projects such as reducing criteria air pollutants and conserving energy.

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energy-efficiency program into the state's overall greenhouse reduction strategy. We will provide recommendations on this aspect of the program in a future submittal.



## **SPECIFIC PROGRAM RECOMMENDATIONS**

For the reasons noted above, we recommend that California's greenhouse gas reduction program be structured to contain two primary elements – (1) targeted technology advancement, or “innovative technology,” markets for which emissions trading is limited within each sector; and (2) a broad, open market for which trading is permitted across different sectors of the economy and different geographic jurisdictions. Sectors that are not addressed under either of these two major components of the overall program would be subject to other strategies, including, but not necessarily limited to, regional planning and pricing strategies.

### **I. TARGETED INNOVATIVE TECHNOLOGY MARKETS**

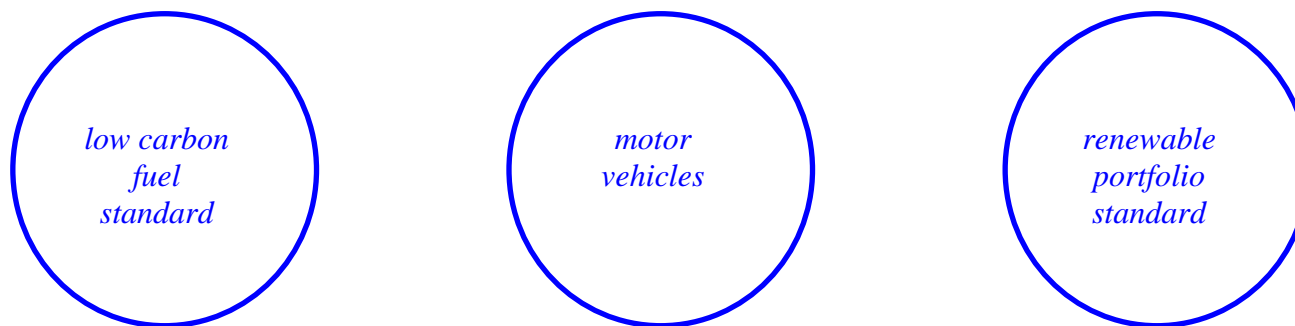
#### **A. Performance Standards**

The first element would consist of a set of independently-administered and targeted performance or market penetration standards for renewable power portfolios, transportation fuels and, depending upon the future resolution of state authority, motor vehicle greenhouse gas emissions performance and fuel economy.<sup>4</sup> Such standards already have been established by appropriate state agencies in most cases, but they are likely to be further revised in the years ahead. Under our proposal, entities subject to such standards would be permitted to comply by any of the following means: (1) meeting the standards directly; (2) averaging, respectively, across their California-serving generation sources, their fuels supplied to the California market or their fleets of vehicles sold (nationally or in California, as appropriate); (3) offsetting any shortfall in corporate average performance with surplus reductions obtained from other regulated entities within the same targeted sector; or (4) offsetting any shortfall with innovative technology credits, as discussed below.

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<sup>4</sup> References to motor vehicle greenhouse gas reduction performance or fuel economy standards are intended to refer to currently-applicable corporate average fuel economy standards or to requirements under Assembly 1493 to the extent they are or become currently applicable.

## INNOVATIVE TECHNOLOGY MARKETS



### **B. Forward-Generated Innovative Technology Credits**

Under our proposal, the ARB also would establish criteria for projects to qualify for generating technology innovation credits. Qualification to generate such credits would be based on the project proponent demonstrating that the project can, within appropriate future milestones, meet or outperform carbon intensity (or other appropriate) standards for the applicable sector. To accelerate advanced low-carbon technology development and deployment, we strongly recommend that the ARB certify greenhouse gas reduction credits associated with each qualifying project. Furthermore, we recommend that the certification occur as soon as the project proponent can demonstrate that the proposed technology can deliver benefits equal to or superior to the ARB threshold requirements. To facilitate the expeditious financing of such projects, the ARB should issue formal greenhouse gas reduction (or other appropriate) credit for use and trade within the targeted sector as soon as the project demonstration is made and the project is certified as meeting the ARB requirements. These targeted “innovative technology credits” thus would be issued in advance of actually achieving the reductions.

### *INNOVATIVE TECHNOLOGY CREDITS (ITCs)*

“Innovation Technology Credits” could include:

- Solar (including distributed as well as thermal energy production and energy storage), wind and other renewable energy technologies (including advanced component and system manufacturing)
- Low-carbon biomass fuel production (e.g., cellulosic ethanol, biodiesel)
- Advanced combustion technologies (e.g., IGCC, oxyfuel, supercritical diesel)
- Carbon capture and sequestration
- Advanced battery technologies
- Certain energy-efficiency projects

Specific projects will fall within a wide range of commercial readiness, with some projects still at the research, development and demonstration stage and others at the early commercial stage. We believe that this approach should both assist in the funding of strategic research, development and demonstration and finance commercial technologies where such assistance can accelerate market penetration or otherwise promote important sector technology advancement goals.

This approach would offer at least two important program benefits. First, the advance credit generation would assist the project proponent with project financing through the sale of credits, by providing marketable collateral for loans and by providing an asset that could be securitized to raise funds. Second, by issuing such credits in advance of performance, the ARB would provide regulated entities with a means of hedging various technology development and deployment risks (e.g., technology underperformance, insufficient market penetration or delays).

We considered but do not currently recommend an alternative hedging technique – the use of a ceiling price safety valve or “in lieu” payment, by which the regulated entity could pay into an investment fund that would be applied to targeted technology development. The potential problem with this approach is that, depending on the price level, a ceiling price payment alternative could discourage the desired direct investments if they are perceived to be more costly than the alternative compliance fund. Yet another approach would be to establish an alternative compliance investment fund for which the price fluctuates depending on the level of investment actually required to deliver the target technology or strategy. That level could be very difficult, if not impossible, to establish. Moreover, establishing such a fund still could compete with and inadvertently undercut private sector investments. Finally, assuming there is a reasonably high-confidence mechanism for monetizing the greenhouse gas reduction benefits of privately-funded projects, it is probably preferable for the private markets to operate as the steering mechanism for technology investment than to shift funding decisions to the government through a publicly-administered fund. Private sector direction is potentially a superior steering mechanism to the extent private sector technology expertise is available to recognize and select promising projects and because

lenders, shareholders and other private sector funding participants may be more likely to demand, and more effective at demanding, project performance without chilling appropriate risk-taking by project proponents.

A central purpose of the “innovative technology credits” concept is to accelerate investment in qualifying low-carbon or greenhouse gas reducing technologies. We are proposing that the state authorize the generation of credits in advance, a forward-crediting approach similar to a manufacturer’s use of forward pricing to price a product today as if it already has reached a more mature sales volume. The idea is that credits would be generated today as if the project already is producing the credits anticipated at project maturity. Because this approach obviously involves some risk, the proposed program would provide that a percentage of proceeds from the first sale of such advance credits be used to fund an insurance mechanism. The insurance fund would purchase the lowest-cost qualified greenhouse gas reductions available anywhere in the world, thus providing an actual offset hedge against any underperformance within the innovative technology markets. Because the insurance fund’s purchase would not be used as a compliance alternative for the targeted innovative technology markets, it would not dampen the investment incentive in the same manner as would an alternative compliance fund.

Notwithstanding the insurance mechanism, under the proposed technology innovation credit program, the ARB would be expected to take appropriate steps to ensure that credit-generating projects have integrity. The steps would include the following:

1. Qualifying Performance Thresholds - the ARB would establish minimum carbon intensity performance levels and minimum project scale for each innovative technology advancement sector beyond which a qualifying project must perform, and timelines within which the project must achieve its objectives, for a project to qualify for generating credits.
2. Greenhouse Gas Emissions Reduction Protocols – the ARB, either in review of proposed protocols submitted by the project proponent, or on its own initiative, would review and approve appropriate protocols for quantifying credits issued under different project categories. It also would provide or confirm an expected range of emission reductions (or performance) from proposed technologies.
3. Technology Review Board - the ARB would establish an expert technology review board,<sup>5</sup> consisting of experts familiar with current and emerging technologies in the sector for which they would be expected to review project proposals. The purpose of the technology review board would be to review protocols and projects to confirm that they would advance technology by providing a pilot level demonstration of previously undemonstrated low-carbon technology, by delivering commercial scale experience of previously demonstrated technology that had not yet (or only recently had) been deployed

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<sup>5</sup> Previous models for technology investment or feasibility, such as CARB’s Battery Technology Review Panel or the U.S. Department of Energy’s grant selection process, could be evaluated for applicability

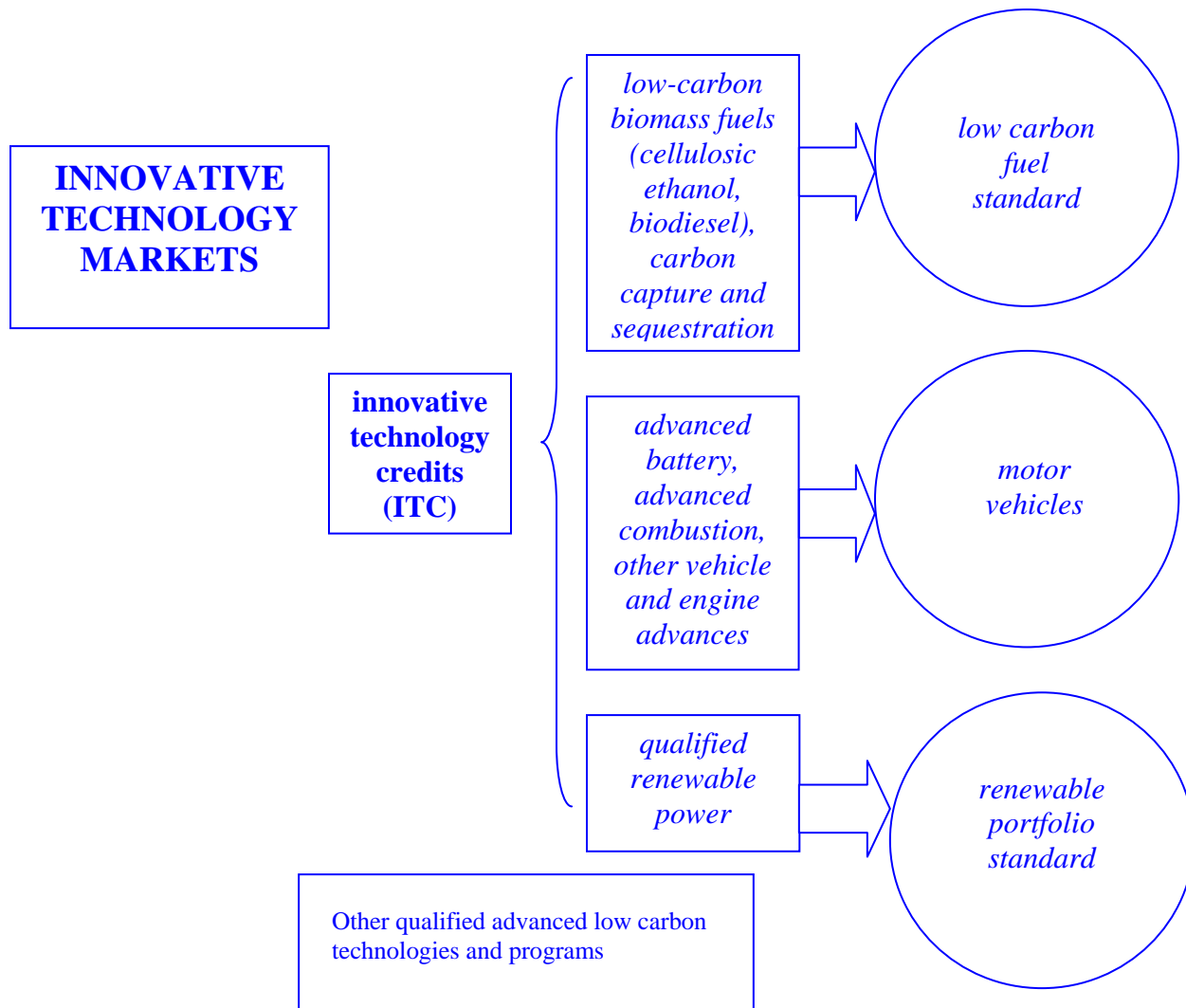
at a commercial scale, by achieving at a commercial scale a low-carbon technology that is found to be required to meet an ARB program goal, or similar appropriate findings. The technology review board's findings should be technology and fuel neutral.

4. Performance Milestones - the expert review board would establish milestones and criteria for project performance.
5. Rewards and Penalties - the ARB should consider mechanisms for rewarding over-performance or early success, such as the generation of bonus credits. It also should consider appropriate mechanisms for discouraging over-promising. One such disincentive might be to list the project proponents on a list of failed projects.<sup>6</sup>

Selecting qualifying categories will require a deliberate immediate-term process to ensure that all stakeholders have a reasonable opportunity to comment and that the selected actions indeed represent the state's strategic interests. However, in this exercise, it is important that the perfect not be the enemy of the good and that the ARB initiate the program as quickly as possible, so as to jump-start the investments on which the state depends for ultimate success. We recommend that the selection of qualifying projects err on the side of inclusion rather than exclusion so that the state can benefit from the experience gained during this first stage to maximize the probability of success during later stages of the program.

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<sup>6</sup> It is important to recognize that, in the context of technology-forcing or technology-accelerating programs, some delays or other failures will occur (e.g., the vehicle battery development experience). That is why we recommend developing an insurance mechanism to deliver a significant amount of the expected greenhouse gas reductions at a much lower cost than the cost expected to prevail in the innovative technology advancement sectors. The program is designed, however, to encourage the earliest possible investment in a broad array of technically sound projects and to lessen the need for escape valves that could dampen the technology advancement impetus. The proposal does this by allowing companies to rely on commitment-based (i.e., future) credits rather than requiring that the technologies actually succeed before credit can be recognized.



## II. OPEN MARKET

For all other sectors of the economy and for those stationary sources (e.g., power plants, refineries) whose greenhouse gas emissions are not directly determined by compliance with the innovative technology sector programs noted above, we believe the two primary principles that should govern the market structure for a greenhouse gas reduction program are cost-minimization and the integrity of the emissions reduction accounting system. Thus, for these sectors we recommend that the ARB establish a broad inter-sector trading market. This open market should be integrated into a broader regional or national program as soon as practicable.

Individual sectors within this market can be regulated through a *cap and trade* model. In some sectors (e.g., the power sector), where the state already has sufficient information regarding the relative emissions performance of sector activities and reasonable confidence regarding the sector's historic and anticipated economic activity, it can issue allowances and impose sector and facility caps at the outset of the program.

In many other instances, however, the state may not have sufficient information to issue allowances or to impose sector or facility-specific caps at the beginning of the program. In such circumstances, it can phase a sector into the broader state *cap and trade* program by initially establishing sector-specific (and in appropriate cases, facility-specific) performance standards and by permitting averaging and trading both across such sectors and within the overall state *cap and trade* program. The mechanism for this transition period thus would be called a *performance-based averaging and trading* phase. This would allow the agency to stage its implementation of the program as it obtains the necessary information regarding the relative carbon intensity of different sector and facility activities and regarding both the likely levels of activity within a sector and potential shifts in activity among sectors.<sup>7</sup> Using this approach, the state may commence regulation of a sector without having to issue allowances during the initial years by establishing a *performance-based averaging and trading* program for certain sectors. In either case, surplus credits (either unused allowances in the case of sectors for which allowances have been issued or emission reduction credits for sectors subject to a *performance-based averaging* approach) should be available to participants in any part of the open market.

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<sup>7</sup> Among other activity level-related risks, a poorly set sector or source category cap may inadvertently chill development within California of energy-efficient, and thus globally-desirable, projects, thereby creating the risk that such projects would be developed in more carbon intensive form outside the state. This problem is lessened or resolved by expanding the geographic scope of a *cap and trade* program. But during the early years of a state program until a larger regional or national program is in place, a *performance-based averaging and trading* approach can avoid this problem because it rewards the project's relative energy-efficiency (thus continuing state leadership in the development of energy-efficient projects). As noted above, the state would complement this transitional approach with appropriate tracking of total mass greenhouse gas emissions and, as necessary, would adjust program elements to ensure that the statewide cap is achieved.

To the extent the state uses *performance-based averaging and trading* as a mechanism to phase a sector into the statewide *cap and trade* program, the state does not need to establish an allocation method (including either administrative or auctioned allowances), because credits or debits are generated automatically relative to the applicable performance curve. For similar reasons, a *performance-based averaging and trading* program arguably can be integrated much more easily into a broader regional or national program since allowances will not have been allocated.

## COMPARISON OF PROGRAM DESIGNS

### CAP AND TRADE

Each source must surrender allowances sufficient to offset its emissions for the compliance period. Sources may obtain allowances from other program participants and possibly allowances or offsets from other sectors and other states. Overall sector emissions are effectively capped when the program commences, but the program may (or may not) permit emissions growth within the sector depending upon whether it permits sources to purchase allowances or offsets from other sectors. Allowances may be distributed based on historic considerations (e.g., historic activity levels, current emission rates), on the basis of relative performance, by auction, or by some combination of methods. **Examples: Acid Rain Program, EU Emissions Trading System, RECLAIM.**

### PERFORMANCE-BASED AVERAGING AND TRADING

Each facility must measure its emissions to comply with a specified emissions rate (or carbon intensity). Debits or credits relative to the emissions rate are calculated automatically relative to the standard. If a facility's average emissions do not demonstrate compliance with the standard, it must obtain offsetting emissions from other sources sufficient to make up the shortfall. The source may sell to others (or bank for future use) any unneeded credits (i.e., tons of GHG reductions) reflecting its performance beyond the required emissions rate. The scope of trading may or may not permit the source to purchase offsetting reductions (or allowances) from other sectors or to sell to other sectors its credits. **Example: EPA's Lead Phase-Out Program.**

Because a *performance-based averaging and trading* program does not cap overall emissions during the transition period, the state would manage total program emissions to a desired tonnage level by periodically adjusting the required emissions rate, if necessary to account for any unanticipated growth in activity levels.



## A. Selecting the Appropriate Phase-In Strategy for Sectors

As noted above, the state should evaluate each major sector of the economy to determine the most appropriate means of achieving the statewide 2020 cap in a fair and cost-effective manner.<sup>8</sup> For those sectors for which the state determines that emissions trading markets should be used, then the state should consider whether it has sufficient information to issue allowances (i.e., emission factors for sector activities and adequate information regarding sector economic activity) and whether there are other factors, such as anticipated shifts in activity, that warrant the initial use of a *performance-based averaging and trading* strategy during the early compliance periods.

## B. Open Market Design Elements

(1) Compliance Periods: We recommend that the AB 32 compliance period consist of three three-year periods:

Compliance Period One:	2012-14
Compliance Period Two:	2015-17
Compliance Period Three:	2018-20

Although we recommend that the program commence as part of a broader regional or national program, if that is not possible, then we recommend it be integrated with such a program as soon as it is practical, most likely at the end of any of the three proposed compliance periods within the AB 32 framework.

(2) Compliance Obligation:

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<sup>8</sup> Some of the emissions reductions anticipated as a means of achieving the 2020 cap will occur as a result of the state's specific technology programs, discussed in the context of "innovative technology markets," while others will be achieved through other programs that may not be part of the open market. In establishing appropriate sector and facility emission targets under either the *performance-based* or *cap and trade* components of the open market, the state should assume that the emission reduction goals of these other programs will be met. As each of these programs matures, the state should make appropriate adjustments to any of these programs to ensure that the statewide 2020 cap is achieved.

- a. Sectors subject to the full *cap and trade* program would be required to provide allowances or qualified offsets for greenhouse gas emissions attributed to their regulated activities for each applicable compliance period.
  - b. Sectors subject to the *performance-based averaging and trading* program during the phase-in period would be required to demonstrate compliance with the applicable performance (i.e., carbon intensity) standards on a corporate average basis or to provide allowances, surplus emission reduction credits (from over-performance by others subject to applicable state performance standards) or offsets to make up any performance shortfall.
- (3) Assignment of Responsibility Among Sources: We describe more fully below the potential means of assigning relative responsibilities among participants. These would be used either to assign performance (i.e., carbon intensity) responsibility under a *performance-based averaging and trading* approach or to allocate allowances under a *cap and trade* approach. We illustrate below how relative emission reduction responsibility can be assigned under either type of program.
- (4) Administrative Allowances versus Auctions: For those sectors that commence the program under a *cap and trade* model or as sectors are phased into a *cap and trade* model, we recommend that the program start with a relatively small percentage of allowances auctioned, at a level sufficient to reduce the risk of windfalls but not so great as to risk economic disruption due to rapid price increases. The auction percentage should increase gradually over the life of the program, provided that the state adequately addresses the difficult and important questions related to the administration and allocation of auction revenues. As described more fully below, we also recommend that administrative allocations reflect periodically updated economic activity levels to reflect appropriate shifts in market activity. The state would not need to allocate allowances for those sectors that commence the program under a *performance-based averaging and trading* approach.
- (5) Banking: The program would permit full banking from one compliance period to the next.
- (6) Access to Allowances, Surplus Emission Reduction Credits and Offsets: The program would permit any regulated open market participant access to allowances (issued to *cap and trade* sectors), to surplus emission reduction credits (generated by over-performance with *performance-based* standards from other sectors within the open market) or to qualified offsets from linked state, national and international programs. The ARB would identify the qualification criteria for offsets. We recommend that the only qualifications for applying other program allowances, emission reduction credits or offsets to meet open sector compliance requirements in California would be those set forth as minimum requirements in AB 32 (e.g., the greenhouse gas reductions are “real, permanent, quantifiable, verifiable, and

enforceable by the state board,” CGWSA § 38562(d), do not significantly impact local communities or cause an “increase in the emissions of toxic air contaminants or criteria air pollutants.” CGWSA § 38570(b)(1)-(2)).

- (7) Safety Valve: ***Provided*** that the state program is linked at the outset to other state, national and international programs so as to provide broad access to a variety of surplus and otherwise qualified offsets, then the state need not adopt an independent safety valve as a cost containment mechanism and we would not recommend one. Recognizing, however, the potential that the state program may commence as a narrow and geographically limited program,<sup>9</sup> the state should consider alternative means of addressing unanticipated economic risk. In such an event, then we recommend that the state consider the temporary use of a ceiling price safety valve as a contingency.<sup>10</sup> The safety valve would provide regulated entities with the option of purchasing additional allowances at a price not to exceed the upper bound level anticipated for the open sector program cost. The program would provide that this safety valve would sunset upon a finding by the ARB (or appropriate expert board) that the open sector market has matured to the point at which regulated California entities can obtain allowances and offsets in sufficient volumes and from sufficiently diverse sectors and jurisdictions as to provide an adequate protection against unanticipated and severe economic damage. Funds from the safety valve program would be used to purchase greenhouse gas reductions at the lowest possible cost anywhere in the world, subject only to the conditions noted above.

### ***C. Performance-Based Averaging and Trading Phase-In Program Within the Open Market***

We recommend that the ARB develop cost-effective and sector-specific carbon intensity performance standards as the initial step for implementing a broad-based *cap and trade* program. At the outset, this program would function as a *performance-based averaging and trading* program, but over time (e.g., at the commencement of an appropriate compliance period) sectors would transition to a *cap*

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<sup>9</sup> Past state experience with regulatory initiatives may be instructive. The South Coast Air Quality Management District (SCAQMD) initially adopted its Regional Clean Air Incentives Market (RECLAIM) with a provision that permitted access to other sectors (e.g., area and mobile sources) as a hedge against market shortages and cost volatility. *See* SCAQMD Rule 2008. The cost containment value of this provision was lost when the U.S. Environmental Protection Agency failed to approve that element of the program. During the 2000-01 power crisis, the SCAQMD implemented a mitigation fee program, essentially a ceiling price safety valve, to contain program costs. In all likelihood, the mitigation fee program would not have been necessary if the original Rule 2008 provisions had been in place.

<sup>10</sup> Note that we are not recommending even a contingency safety valve for the innovative technology markets. In the innovative technology markets, regulated entities would have the option of generating credits by undertaking qualified technology advancement projects, partnering with project sponsors or purchasing such credits.

*and trade* program as the state develops sufficient information to issue allowances and to establish facility- or sector-specific caps. It may be appropriate to apply a full allowance-based *cap and trade* model to some sectors (e.g., the electric power sector) at the very beginning of the program **provided** that the state has adequate emissions and activity data, that other Western states will commence linked programs simultaneously so as to prevent leakage or contract shuffling and that other significant impediments (e.g., uncertainties regarding unspecified system power) have adequately been addressed. Given the PUC's potential interest in a deliverer-based cap and trade model for the power sector, in Attachment C we provide for illustration purposes a description of how allowances could be allocated in such a system.

#### **D. Assigning Emission Reduction Responsibility Under a Performance-Based Averaging and Trading Approach**

As noted above, under the *performance-based averaging and trading* approach, there is no allocation of allowances. The state allocates compliance responsibilities instead through the selection of applicable performance standards. The following illustration describes how the state could transition regulated facilities into the broader *cap and trade* program by starting with a *performance-based averaging and trading* model.

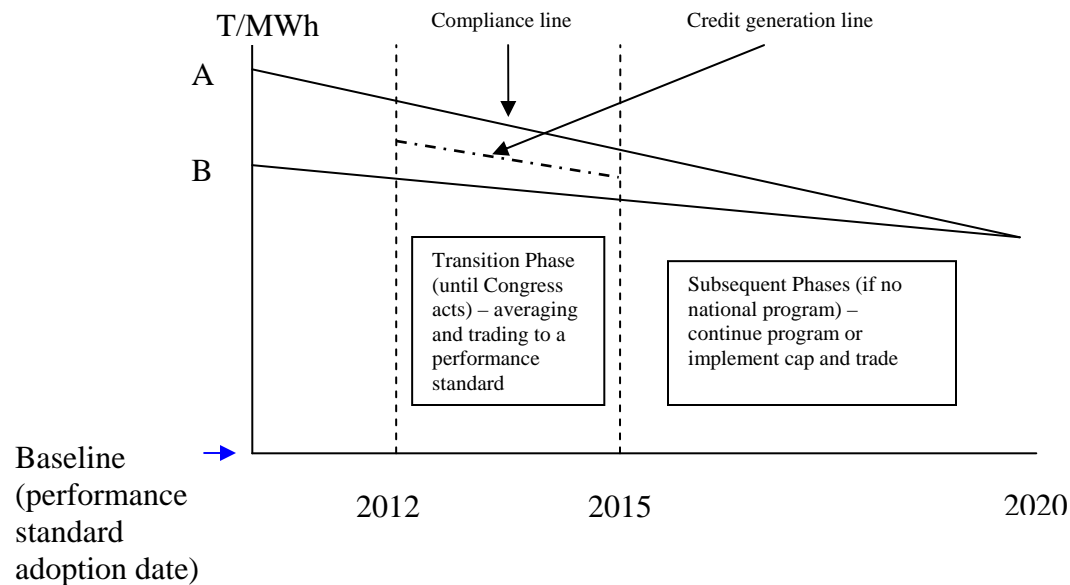
- (1) First Compliance Period (2012-14): During the first compliance period, each entity must demonstrate compliance on average for its regulated sources with a performance line that starts at its current emissions rate (i.e., grandfathered carbon intensity) as of the date the performance standard is established or identified<sup>11</sup> and ends at the common (i.e., benchmarked) emissions rate that all sources within the category or sector would have to achieve to meet the 2020 (or other) end point. During the first compliance period, each entity either would demonstrate compliance with its individually applicable compliance line or purchase surplus credits from other sources in the same sector, surplus credits from any other sector in the open market, allowances from any sector for which allowances have been issued, or qualified offsets. Because during the catch-up period, some entities would have the benefit of a more lenient compliance line, we recommend that the ARB consider establishing also a separate credit-generation line that would reflect expected category- or sector-wide performance. Entities complying with their individual line but not outperforming the category- or sector-wide line would not be able to trade credits to others. Entities that outperform both lines would be able to generate tradable credits to the extent that they outperform the category- or sector-wide line. This approach is illustrated below.
- b. Second Compliance Period (2015-17): Take any of the following actions:

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<sup>11</sup> Note that in the illustration the performance catch-up period starts prior to 2012, assuming knowledge prior to program commencement regarding expected future performance.

- i. replace with a national program, if implemented;
  - ii. continue with a *performance-based averaging and trading* program through the end of the second compliance period; or
  - iii. if the ARB has appropriate confidence in the necessary elements of a *cap and trade* program (e.g., stable activity levels), then convert one or more sectors from a *performance-based averaging and trading* program to a *cap and trade* program.
- c. Third Compliance Period (2018-20): Take any of the following actions:
  - i. replace with a national program, if implemented;
  - ii. continue with a *performance-based averaging and trading* program through the end of the third compliance period; or
  - iii. if the ARB has appropriate confidence in the necessary elements of a *cap and trade* program (e.g., stable activity levels), then convert one or more sectors from a *performance-based averaging and trading* program to a *cap and trade* program.

### Illustration of Performance-Based Averaging and Trading Model



*Under this approach, compliance is measured by averaging to a carbon intensity standard. Baseline grandfathered performance is used as a starting point so that sources with higher carbon intensity initially receive a less stringent compliance standard recognizing their relatively more difficult near-term challenge, but are subject to a steeper rate of decline. A separate credit-generation line is used (e.g., reflecting a common performance level). Facilities must outperform both their compliance and credit lines to generate tradable credits. Failure to meet the applicable performance line can be offset by purchasing credits from over-performers within the same sector, credits from over-performers in other sectors, allowances from the capped sectors or any qualified offsets from any sector or location.*

### III. PRIORITIZING CALIFORNIA COMMUNITY BENEFITS

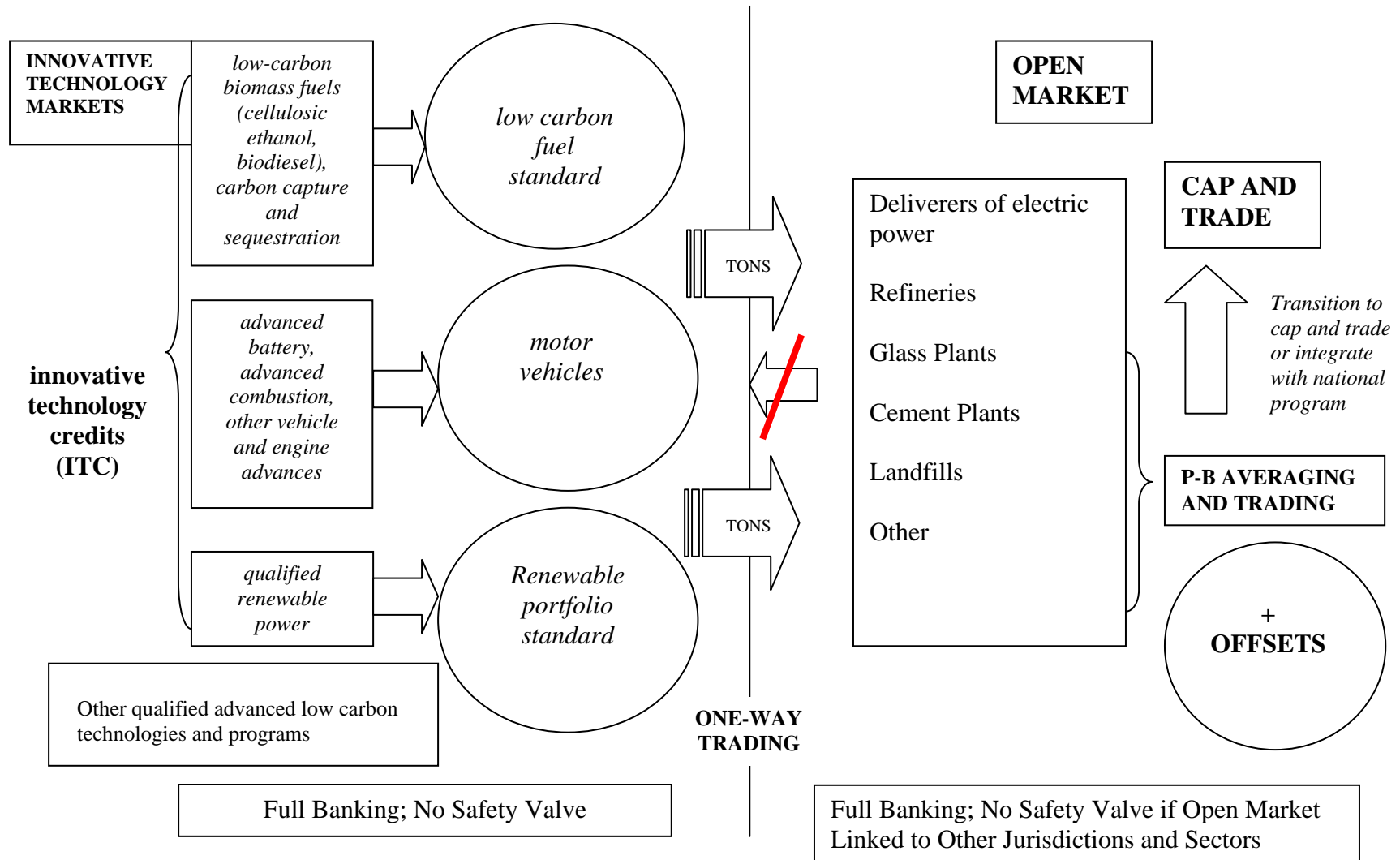
Although California should implement AB32 so as to permit rapid integration into a broader national and international carbon market, there is much that California can do now to spur innovation within the state and to accelerate the reduction of in-state emissions. Probably the most important step that California can take is to set immediate performance criteria for the innovative credit program proposed above. This will jump-start technology development and deployment in and near California and enable the state to be a global leader in technology advancement. Likewise, California can promptly develop or approve emission credit (i.e., offset) generation protocols for in-state projects that can reduce greenhouse gas emissions from sectors that may not directly be regulated under the *cap and trade* program. These could include dramatically increased investment in energy efficiency at residential, commercial and industrial facilities (subject to appropriate limitations to avoid double counting of reductions achieved from the power sector). It also could include the accelerated turnover of the state's public and private diesel engine fleets. Issuing protocols and approving projects for such greenhouse gas reductions need not wait until the AB32 program formally commences in 2012, but can move ahead now. To maximize investment in such projects, however, the state not only should quantify project benefits (i.e., the "tons" reduced) by developing or approving accounting protocols and projects, but also should signal how credits generated from such projects could be used as part of the state's overall program. The credit usage signal would best be made formally as part of the state's scoping plan adoption in the fall of 2008. By approving the innovative credit program, issuing protocols for in-state credit generation and approving projects, California can move ahead now with valuable in-state reductions, thus delivering the other benefits of such projects such as reducing criteria air pollutants and conserving energy.

### IV. INTEGRATING THE INNOVATIVE TECHNOLOGY AND OPEN MARKETS

By structuring the AB 32 and other climate change-related programs as outlined above, California can achieve its dual goals of accelerating the development and deployment of advanced, low-carbon technologies and achieving greenhouse gas emission reductions at a relatively low cost. The recommended hybrid approach would provide focused and robust incentives for businesses to invest in California to develop new energy and transportation systems. This part of the strategy will ensure that California becomes a low carbon technology investment center and that deployment of advanced low-carbon technologies is accelerated globally. In the meantime, the open market portion of the recommended program will ensure that the state remains competitive by minimizing the cost impact of the state's program to reduce greenhouse gas emissions. The program thus is carefully optimized for dual goals. This integrated, hybrid program is illustrated in the chart that appears on the following page. We also provide a summary table as Attachment A, which compares the elements of each program component.

Recognizing that there are certain other elements of a successful climate program that are not strictly covered by this integrated market, we also suggest below certain pilot strategies for state consideration.

## ILLUSTRATION OF INTEGRATED MARKETS





## IV. SPECIAL CONSIDERATIONS

### A. Motor Vehicle Sector

To provide additional assurance that California will achieve significant greenhouse gas emissions reductions from the motor vehicle sector and to stimulate further the introduction and penetration of technologies that will improve fuel economy, we recommend that the state consider implementing a manufacturer-based feebate program as outlined below.

In general, a feebate is a self-financing system of government-imposed surcharges (fees) and refunds (rebates) that have the intent of shifting the market toward an economically, socially, environmentally, or politically desired goal. Specific to the mobile transport sector, feebates can be an efficient way of promoting greater fuel efficiency and therefore lowering greenhouse gas emissions.

Traditionally, feebates have been considered for application directly to consumers, thereby internalizing otherwise external costs their actions would impose on society. Recent academic literature suggests, however, that consumer response to feebates of any reasonable scale is likely to be limited and that the primary response to feebates is at the producer level.

There are important reasons that explain why the consumer response to feebates is likely to be small. In the first place, consumer demand for automobiles is considered to be relatively inelastic, so that small price increases do not result in a significant shift in consumer purchasing behavior. Thus, it is not surprising that there has been a relatively small observed consumer response to recent increases in the price of gasoline.<sup>12</sup> While very large price impacts could have a significant impact on choice, there is no evidence that the state or the nation has the political will to impose the magnitude of charges that would be required to significantly alter choices at the consumer level. There is also evidence that most consumers do not fully consider a technology's long-term benefits (e.g., payback over time) at the time they make their purchasing decision. Consider, for example, the analysis presented by David Greene of Oakridge National Laboratory at the 2007 Asilomar conference, in which he evaluated a potential explanation for why consumers seem unwilling or unable to value more than three years of fuel savings. Dr. Greene's analysis suggests that consumer behavior operates similarly to risk aversion, in that individuals devalue benefits when they are considered uncertain.

By contrast, there is good reason to believe that producers will respond strongly to a feebate program. Motor vehicle manufacturers will minimize costs by installing all technology that costs less than (and thus permits them to avoid) a new cost imposed by the feebate charge. A feebate program that reduces the relative cost of a more fuel efficient vehicle will also cause a net shift in production

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<sup>12</sup> This small response also could reflect the fact that the price of gasoline today is about the same as the real gasoline price per gallon in 1980 when adjusted for the consumer price index and that the cost per mile driven today may actually be considerably less than it was in 1980.

towards more fuel-efficient vehicles. Moreover, manufacturers will recognize and respond to economies of scale offered by feebate benefits that can be applied to a fleet of vehicles. Of course, success at the producer level will require that any such program be implemented on a continuous basis so that production planning can depend on the relative cost and reward signals a feebate program offers. DOE studies confirm that the predominant (~90%) impact of a feebate program would result from manufacturers spreading technology across their fleets, with only about 10% of the impact resulting from changes in consumer purchase decisions.<sup>13</sup>

Feebate programs may also offer other significant advantages. Because producers can respond to a continuous feebate program by implementing fleet-wide and long-term changes, a well-constructed program could bring continuous improvement to fleet fuel efficiency. Further, because a revenue neutral feebate program fixes the **COST** of fuel economy improvements, rather than the **AMOUNT** of such improvement, as does the corporate average fuel economy (CAFÉ) program, a feebate program could prove more effective than CAFÉ and potentially could replace such a program. The relative attributes of the two approaches are summarized in the following table:

Policy Construct	Attributes
CAFÉ	<ul style="list-style-type: none"> <li>• If standard set too high, incremental costs rise significantly and the market may not accept the technology or vehicles</li> <li>• If standard set too low, cost-effective technology may not be applied. No incentive to do more than the absolute minimum (witness “stagnation” of fleet fuel economy today)</li> <li>• Not responsive to market or technology changes</li> <li>• <i>Can provide certainty of fuel economy increases in set periods of time</i></li> </ul>
Feebate	<ul style="list-style-type: none"> <li>• Economically sound if revenue neutral</li> <li>• Provides continuous incentive to improve fuel economy</li> <li>• Automatically adjusts to technology changes</li> <li>• <i>Can provide certainty of cost-effectiveness</i></li> </ul>

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<sup>13</sup> Green, David L., Patterson, Philip D., Sigh, Margaret, Li, Jia, “Feebates, Rebates and Gas-Guzzler Taxes: A Study of Incentives of Increased Fuel Economy,” Paper for Energy Policy (Energy Policy 33) (2005) at 759, citing Davis, W.B. Levine, M.D., Train, K., Duleep, K.G., “Effects of Feebates on Vehicle Fuel Economy, Carbon Dioxide Emissions, and Consumer Surplus, DOE/PO-0031, Office of Policy, US Department of Energy (February 1995).

A well-designed feebate program would likely need to be attribute-based, i.e., adjusted for the size of the vehicle. An attribute-based program would greatly reduce or eliminate impacts on customer choice (by addressing size mix shifts), “wealth” transfers and other potential competitive impacts among manufacturers, and any perceived motor vehicle safety effects. In designing a program that is attribute-based, it is important to understand that the choice of the number and placement of pivot points for the fee or refund application will have little influence on the fleet fuel economy that is actually achieved. What matters is the *rate* of fuel economy chosen, which applies to the entire set of attribute classes.

The following example is provided to illustrate, for comparative purposes only, how an *attribute-based* feebate program might affect several vehicles.

Vehicle Make/Model	Trans	Engine	2008 FE Label Values			Rebate (Fee)
			City	Hwy	Combined	
Chevy Tahoe	2WD	4.8L	14	19	16	\$416
	2WD	5.3L	14	20	16	\$416
	2WD	6.2L	12	19	14	(\$883)
Chevy Tahoe	4WD	5.3L	14	19	16	\$416
Chevy Tahoe	2WD	Hybrid	21	22	21	\$2,581
Chevy Tahoe	4WD	Hybrid	20	20	20	\$2,235
Honda Civic	5AT	1.8L	25	36	29	\$757
Honda Civic	CVT	Hybrid	40	45	42	\$2,310

(Feebate Concept Assumptions: 150,000 mile lifetime VMT, 19.4 lbs CO<sub>2</sub>/gallon, \$100/ton CO<sub>2</sub> = about \$1.00/gallon, the “zero-point” for vehicles was assumed to be 25.2 mpg for Civic-sized vehicles and 15.3 mpg for Tahoe-sized vehicles.)

There are also inherent assurances of energy savings associated with a feebate program. While an attribute-based program could stimulate a small shift toward larger vehicles, mix shifts have been shown to have relatively minor effects on overall fleet fuel economy, as exhibited by the fact that the large shift of the light duty vehicle market to light trucks since 1987 only affected overall CAFÉ by 1.5 mpg. It also takes massive incentives to move customers into different kinds of vehicles than those they otherwise prefer; new vehicle customers rarely shop outside of the vehicle class they are targeting for purchase. The potential technology response from feebates is much larger than merely the mix shifts hoped for in a traditional CAFÉ or customer incentive-based program. If focused on manufacturers, who ultimately make the decision to develop and introduce new technology, there are inherent assurances of energy savings.

Most proposed feebate programs have been targeted specifically towards consumers. However, 90% of the benefit comes from the manufacturer and technology response, not from changes in consumer choices. This 90% benefit is obtained whether the program is targeted at consumers or at producers, as manufacturers will recognize the cost savings will be the same in either case. Further, whether the program is targeted at consumers or producers will also have little impact on the 10% benefit from consumer choice. If the program is targeted at the consumer, the consumer will see the feebate rates directly. If the program is targeted at the producer, the customer will simply see the additional cost or rebate on the sticker price, instead of paying or receiving it directly from the government. Forcing consumers to individually pay fees or receive rebates from the government might raise their awareness of the costs, but the net effect would simply be a fraction of the 10% consumer response share. Given this very small additional consumer response, it does not make sense to burden every customer with applying for rebates or paying fees. In fact, this could cause a backlash against the program. A producer-based program will achieve virtually all of the benefits of a consumer-based program and will avoid substantial administrative costs and consumer burdens.

We suggest that the ARB consider establishing a manufacturer-targeted feebate program on a state pilot basis that could be expanded nationally. The details of a California pilot feebate program could take various forms. For example, it could provide for a single or multiple pivot points. However, there is growing recognition that a program based on multiple attribute classes will yield greater acceptance by and provide greater flexibility for vehicle manufacturers. This is confirmed by the recent Congressional enactment of a revised attribute-based CAFÉ program under the federal energy bill. For the reasons noted above, a state pilot feebate program would have relatively minor impacts on consumers. And while a state program is likely to be far less effective than a national approach, state experience could be invaluable in demonstrating the program's potential benefits, including most importantly the creation of an economic incentive to spread cost-effective technology throughout motor vehicle fleets.

## **B. Land Use Planning and Transportation System Efficiency**

We have considered various strategies for capturing opportunities in the general areas of land use and transportation systems. We recognize, for example, that further removing existing barriers to and otherwise encouraging infill development could, by expanding such development, reduce regional greenhouse gas emissions. To an extent this is already occurring, driven by incentives and changing market forces. In addition, master planned communities designed to encourage walking, bicycling, and transit use can reduce emissions. The effect of these efforts along with enhanced mass transit and climbing fuel costs has been the leveling off of per

capita vehicle miles traveled (VMT) such that VMT is projected to increase at the same rate as population and may be trending lower.<sup>14</sup>

We also recognize that, because new homes and buildings are, and will increasingly become, materially more energy efficient than much of the existing building stock,<sup>15</sup> there are significant benefits to be gained by encouraging the upgrading and turnover of housing and other building stock. A home constructed in the early 1980's is approximately 50% less energy efficient than a home constructed today (*see, e.g.*, Title 24 of the California Code of Regulations governing residential energy efficiency) and this difference will increase in the future. Considering that in normal years new development adds less than 1% to the existing stock, it is critical that we focus on programs to improve the energy efficiency of the existing stock.

In later years of the program and to the extent additional strategies are needed to improve the efficiency of the transportation system, then we recommend that the state consider implementing on a pilot basis a demand-side program to encourage reductions in trips and vehicle miles traveled (VMT). One such strategy that was developed in the mid to late 1990s may be worth considering. Under a concept developed by the Coalition for Local Environmental Solutions and a Competitive Economy (COALESCE), drivers would be charged for vehicle miles traveled over the amount allocated for employment. Revenues collected would be returned to drivers in the form of targeted coupons that could be used, among other purposes, for transit and other high-occupancy travel. The concept was intended to educate drivers as to the impacts of their choices, to develop a source of revenues to fund services that could plug gaps in transportation service (e.g., shuttles and jitneys) and to increase transit ridership. Initial polling regarding such a program received generally positive results.<sup>16</sup> Other approaches should be considered as well. *See, e.g.*, Cameron, Michael W., Environmental Defense Fund, "Efficiency and Fairness on the Road: Strategies for Unsnarling Traffic in Southern California," March 1994; *see also* California Air Resources Board Research Division, "Transportation Pricing Strategies for California: An Assessment of Congestion, Emissions, Energy, and Equity Impacts," Contract No. 92-316, November 1996.

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<sup>14</sup> Southern California Association of Governments, *State of the Region 2007*, page 74, Figure 67, Growth of Vehicle Miles Traveled (VMT) v. Population.

<sup>15</sup> *See* Hodgson, Michael (ConSol), *Study of Relative California Home Energy Efficiency*, prepared for the California Building Industry Association, forthcoming 2008.

<sup>16</sup> *See* GRA/Guerra and Associates, "Analysis of February 1996 Survey Findings," Southern California Association of Governments at page 37, noting that, among respondents in Los Angeles, Orange, Riverside, San Bernardino and Ventura Counties, 25% described the concept as "excellent," 50% as "good," 12% as "poor" and 8% as "very poor." 5% on average did not have an opinion.

## CONCLUSION

The California Climate Coalition appreciates the opportunity to submit these recommendations to the ARB and looks forward to further dialogue among stakeholders as the state evaluates various options for the AB32 and other climate programs.

## ATTACHMENT A

### COMPARISON OF KEY ELEMENTS

Element	“Innovative Technology” Markets	Open “GHG Tonnage” Market
Primary Purpose	Accelerate low-carbon technology development and deployment.	Reduce greenhouse gas emissions.
Covered Sectors	1. transportation fuel providers for the low carbon fuel standard; 2. motor vehicle manufacturers; and 3. publicly- and investor-owned retail service providers for the renewable portfolio standard.	Large GHG emissions sources, including power plants, refiners, cement plants, glass plants, landfills, etc.
Form of Program	Programs already have been established and include:  1. low carbon fuel standard; 2. applicable motor vehicle standards; and 3. renewable portfolio standard.	The open market would function overall as a cap and trade program. Some sectors (e.g., power sector) would commence with a <i>cap and trade</i> program, preferably on a regional or national basis, while the ARB would phase in other sectors initially with a <i>performance-based averaging and trading</i> program. These would transition to a national or regional program or to a California <i>cap and trade</i> program, as appropriate.
Assignment of Responsibility	Unless otherwise provided, each regulated entity is responsible for meeting the performance standard on a carbon intensity, fuel economy, or portfolio basis, as of the deadlines specified in the specific program (e.g., in the case of the low carbon fuel standard, a 10% reduction by 2020 in the carbon intensity for fuels sold in California)	Responsibility would be assigned on a fuel-neutral output (or benchmarked) basis, although the ARB could apply an equity-adjusted catch-up approach for one or more compliance periods to reflect relative carbon intensities at the start of the program.
Compliance Periods	Compliance deadlines to be determined, as appropriate, for each technology sector.	Three compliance periods: 2012-14 2015-17 2018-20
Scope of Credit or Allowance Trading	Limited to each innovative technology sector.	Unrestricted – any qualified GHG reduction from any sector or jurisdiction. Note that trading of

	One-way trading of surplus (over-performance) credits from the innovative technology sectors to the open market would be permitted.	surplus allowances or tons could occur without restriction between <i>cap and trade</i> and <i>performance-based averaging and trading</i> components as compliance under either type of program is based on GHG tons.
Qualifications for Credit Generation	Must outperform ARB (or other agency) performance standard and scale.	Must be “real, permanent, quantifiable, verifiable, and enforceable by the state board,” CGWSA § 38562(d) and must not significantly impact local communities or cause an “increase in the emissions of toxic air contaminants or criteria air pollutants.” CGWSA § 38570(b)(1)-(2).
Banking	May be banked for use in any future compliance period.	May be banked for use in any future compliance period.
Safety Valve	No safety valve. Innovative Technology Credits (ITCs) serve as hedging and cost containment mechanism.	No safety valve if at the outset the program is linked broadly to other jurisdictions and to multiple sectors. If not, then the state should implement an interim, transitional safety valve. If the safety valve is used, then sources would have the option of complying by purchasing surplus tons from a public or private investment fund at a predetermined ceiling price. This safety valve would expire upon a finding by the ARB or appropriate market committee that the open market has matured to the point at which regulated California entities can obtain allowances and offsets in sufficient volumes and from sufficiently diverse sectors and jurisdictions as to provide adequate protection against economic damage.
Auction	Not relevant to the innovative technology sectors.	<p>Auctions would be conducted for sectors as they enter the <i>cap and trade</i> portion of the program. The percentage of allowances auctioned would start small and increase over time.</p> <p>No auction would be held for the <i>performance-based averaging and trading</i> portion of the program.</p>



Integration with a National or Regional Program	One or more innovative technology sectors may or may not be integrated with a larger regional or national program depending upon the relative regional or national performance expectations.	<p>All sectors in the open market should transition to a larger regional or national program. Ideally, each sector's program would commence on a regional or national basis.</p> <p>The ARB would evaluate integration opportunities for each upcoming compliance period.</p>
Accounting for the Statewide Cap	The ARB (together with other appropriate state agencies) would determine the appropriate 2020 tonnage reduction expected for each innovative technology sector.	The ARB would establish sector-specific GHG tonnage reduction targets for each sector in the open market, providing for appropriate revisions and updates from compliance period to compliance period to reflect shifts in the economy. Open market targets would assume that the innovative technology sector targets are achieved by 2020.
Innovation Technology Credits (ITCs)	Generated on a project-specific basis upon demonstration that the project meets the ARB's (or other agency's) advanced technology, performance and scale criteria. An appropriate percentage of revenues (e.g., 10%) from ITC sales would fund an insurance program.	Not applicable.

## **ATTACHMENT B**

### **CALIFORNIA CLIMATE COALITION PRINCIPLES**

#### **Program Scope and Relationship to Regional and National Programs**

1. Although each sector of the economy should be addressed in a manner appropriate to its own circumstances and recognizing that some reductions should be implemented at a national level, the overall program should be economy-wide and permit access to surplus reductions across all sectors.
2. California's program should be designed so that it could ultimately be integrated with, or replaced by, a regional or national climate program, in a manner that does not place California at a further competitive disadvantage relative to other states, if such a program is adopted.
3. The program should permit appropriate linkages with other state, national and international programs.

#### **Technology Incentives and Requirements**

4. The program should reward investments in low-GHG technologies and fuels, in energy efficiency improvements and in conservation, including early actions. The program should avoid disincentives to such actions.
5. Program requirements must be technologically feasible. The program should provide the necessary lead time for capital investment and technology development.
6. The program should be fuel- and technology-neutral (i.e., the program should reduce greenhouse gas emissions, lower carbon intensity, improve energy efficiency, but not designate specific technologies or fuels).

#### **Economic and Equity Considerations**

7. California's program should ensure the continued safety, availability, reliability and energy security of the state's energy and transportation fuel supplies.

8. California's program should be cost-effective. It should be designed to minimize consumer cost impacts, protect California's growing economy and ensure the continued affordability of California's energy and fuel supplies.
9. The program should avoid economic dislocation due to competition by firms in less-regulated jurisdictions.
10. The program should not prevent regulated entities from recovering their costs.
11. The state should consider impacts on low-income consumers.
12. The state should consider potential program environmental benefits and impacts on overburdened communities.
13. The program should fairly distribute allowances or performance expectations. It should recognize and reward early actions. It should avoid the immediate price or cost impacts that would result from requiring all entities to achieve comparable performance (e.g., carbon intensity) at the outset of the program, but at the same time it should not reward firms for relative underperformance.
14. The program should not result in the creation of windfall profits that are not commensurate with greenhouse gas reduction benefits.

#### **Other Program Design Considerations**

15. The program must be transparent to all and based on accurate and reliable information.
16. Program performance must be verifiable.
17. The program should ensure market liquidity.

## ATTACHMENT C

### ILLUSTRATION OF A DELIVER-BASED POWER SECTOR CAP AND TRADE PROGRAM

At the present time, the sector currently best suited for a *cap and trade* program is the electric power sector because we already have a good understanding of the relative carbon intensity of the generating units providing power to the California grid, because we have a high-confidence way of measuring those emissions at the point of generation and because we have a reasonable, albeit not necessarily a high-confidence, way of projecting future electricity demand. As noted in the CPUC analysis, a California-only program faces some significant obstacles, including, among others, the difficulty of assigning greenhouse gas emissions attributes to unspecified system power and the prospect that a California-only program could result in significant leakage or contract shuffling. For these reasons, if at all possible, we believe that the program should be initiated as a part of a broader Western Climate Initiative (or national) greenhouse gas reduction program. Ideally, the broader regional program should integrate standards for all power generation serving the western region and should permit emissions trading among sources across the entire western region.

We recognize that the specific details of an electricity sector *cap and trade* program will require a great deal of further consideration. For the purpose of clarity, however, we set forth the following details of a potential *cap and trade* design to illustrate how such a program could be designed. We use in this illustration a deliverer-based model based on its potential value in harmonizing with a broader regional or national program, although there may be benefit to alternative (e.g., LSE-based) approaches. In any event, there will be significant trade-offs in selecting any approach. We do not view these particular details as essential to the success of a final program; although they illustrate how California could address important equity issues. As noted above, we put forth these ideas with the hope that any ultimate *cap and trade* power sector program would be implemented from the outset at a regional or national level.

We also recommend that the predominant number of allowances during the three compliance periods be allocated administratively<sup>17</sup> on an output basis among all fossil-fired generating units (or deliverers of power from such units). For the first compliance period, the state should evaluate any relevant equity considerations (related to the differential performance of certain generators, deliverers or

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<sup>17</sup> To the extent power sector allowances are auctioned, we support the idea that a significant percentage of any auction proceeds be directed to retail providers for the purposes of mitigating potential rate impacts on all electricity consumers (industrial as well as residential) and for supporting aggressive programs for improving energy-efficiency at all customer levels, including providing customers with financial support for energy efficiency upgrades. A significant percentage of any auction revenues also should be available to generators and deliverers for the continued development of low-carbon power generation and for carbon sequestration. This portion of the revenues should be retained at the state level and made available by the CPUC or CEC to support qualifying projects.

retail providers) to determine whether a limited adjustment should be made during the first compliance period. If the state determines that such an initial adjustment is warranted, then one approach for the first compliance period would be to allocate allowances on an adjusted fuel- and unit-specific output basis. This would have the effect of giving underperforming generating units until the end of the first compliance period to catch up with the sector-wide performance benchmark that would be used for administrative allocations during the second and third compliance periods. Given that all generators and deliverers of power had notice of the AB32 goals and of the CPUC and CEC *cap and trade* objectives for the power sector no later than the end of 2006, we do not see any basis for extending an equity-oriented adjustment beyond the end of the first compliance period. We provide an illustration below for how the state would apply an adjustment based on a unit- and fuel-specific output-based allocation method.

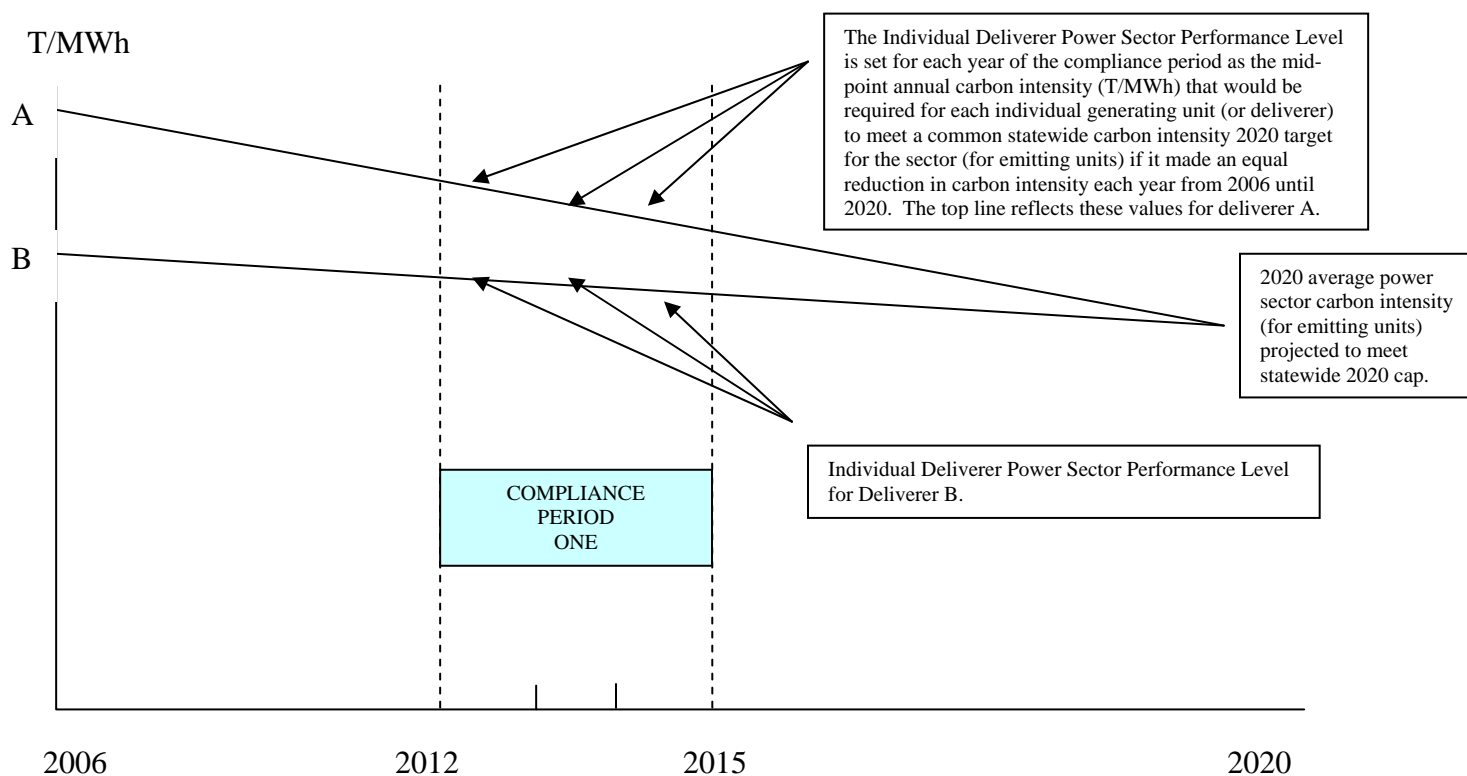
- (1) Type of Program – *cap and trade* implemented at Western regional (or national) level.
- (2) Point of Regulation – deliverer (i.e., in-state generating unit delivering power to California and entities delivering imported power to California).
- (3) Compliance Periods – three, three-year periods (2012-14, 2015-2017 and 2018-2020).
- (4) Manner of Allocation for each<sup>18</sup> Compliance Period
  - a. determine appropriate baseline periods to identify generators and deliverers and their respective generation levels for each of the compliance periods. We recommend using the five-year periods as noted below. To account for fluctuations in temperature, hydro conditions and business cycles and to determine an updated but representative level of generation (MWh), we recommend discarding the highest and lowest generation year and averaging the remaining three years.
    - i. for the first compliance period (2012-14) use the base period 2006-10;
    - ii. for the second compliance period (2015-17), use the base period 2009-13; and
    - iii. for the third compliance period (2018-20), use the base period 2012-16.

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<sup>18</sup> As noted above, if the state determines that equitable considerations warrant providing certain generating units/deliverers a short “catch up” period, then it can allocate allowances during the first compliance period on an adjusted fuel- and unit-specific output basis, reflecting an individual unit’s relative performance and progress towards the sector’s 2020 intensity target. This approach is illustrated below.

- b. identify the sector average carbon intensity on a straight-line reduction path from 2006 to 2020 to achieve the sector's 2020 growth-loaded carbon intensity goals (hereafter Power Sector Performance Factor);
  - c. using the baseline approach specified in "a" above, identify the baseline generation (MWh) attributable to each deliverer for the each compliance period;
  - d. calculate each deliverer's allowances for the applicable compliance period by multiplying its applicable baseline generation level times the applicable Power Sector Performance Factor for each year of the compliance period and adding each year's total; and
  - e. adjust each deliverer's allowances by the applicable auction percentage, if any.
- (5) Potential Equity Adjustment During the First Compliance Period – based on the equity considerations noted above, the state can apply an equity adjustment during the first compliance period if it determines that such an adjustment is warranted. One way of making such an adjustment would be to allocate allowances according to unit- and fuel-specific output levels plotted along a progress line towards the sector's expected 2020 carbon intensity. The steps for such an approach are listed and illustrated below.
- a. identify generators and deliverers and their baseline generation levels applicable for the first compliance period (2012-14) as described in paragraph (4) above;
  - b. calculate the individual unit (or deliverer) straight-line carbon intensity from 2006 to 2020 that would be applicable for each year of the first compliance period for that unit (or deliverer) to achieve the sector's 2020 growth-loaded carbon intensity goals (hereafter Individual Unit/Deliverer Power Sector Performance Factor);
  - c. identify the baseline (i.e., 2006-10 average) generation (MWh) attributable to each unit/deliverer;
  - d. calculate each unit/deliverer's allowances for each year of the compliance period by multiplying its current generation level (MWh) times the Individual Deliverer Power Sector Performance Level for each year of the compliance period and adding the three years; and
  - e. adjust each unit's/deliverer's allowances by the applicable auction percentage, if any.

## ILLUSTRATION OF AN EQUITY-ADJUSTED FIRST COMPLIANCE PERIOD POWER SECTOR ALLOCATION<sup>19</sup>



<sup>19</sup> This chart illustrates how allowances could be allocated during the first compliance period *if* the state wishes to provide a limited catch-up period for more carbon intensive units.

## ILLUSTRATION OF AN EQUITY-ADJUSTED FIRST COMPLIANCE PERIOD ALLOCATION

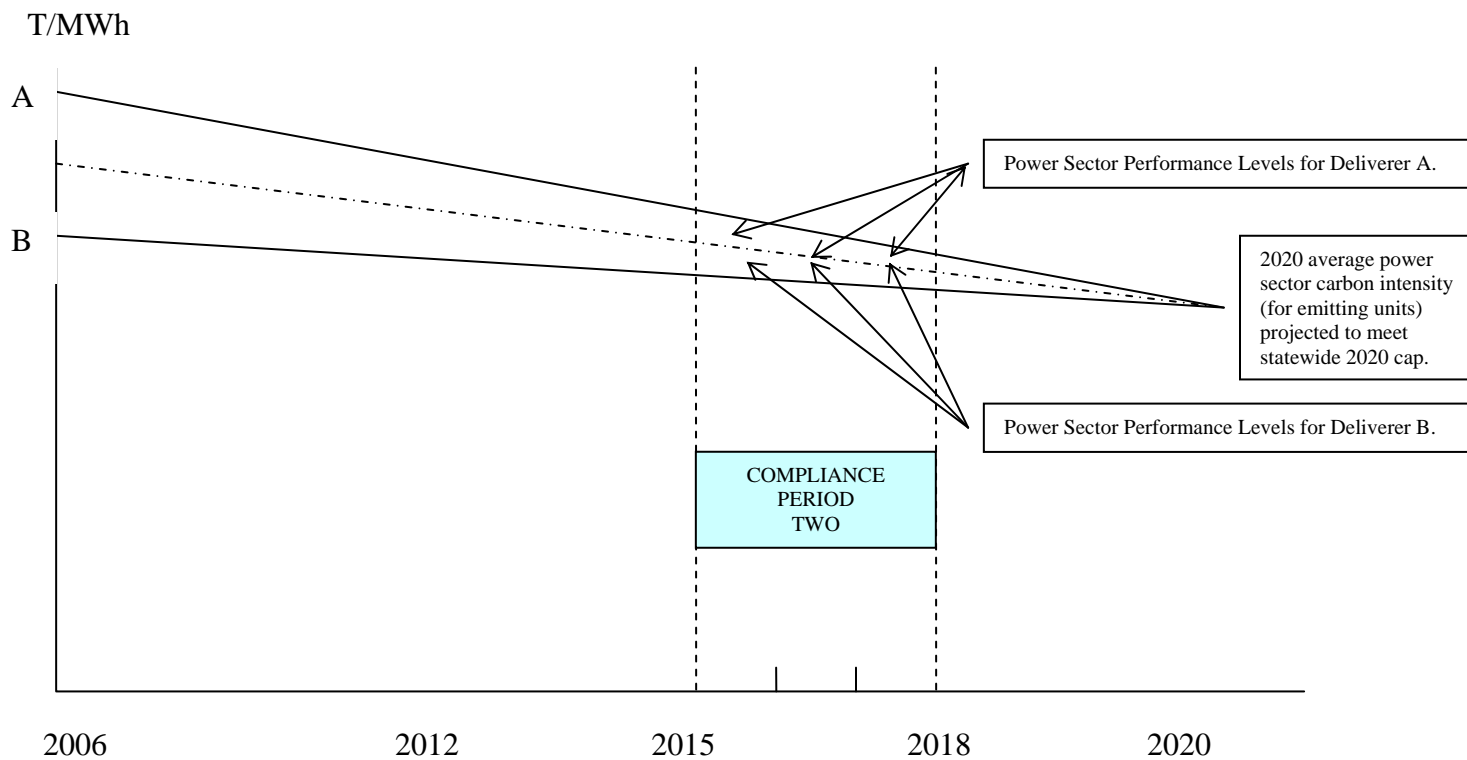
**NOTE – THE FOLLOWING NUMBERS ARE USED FOR ILLUSTRATION ONLY**

<b>Deliverer</b>	<b>A</b>	<b>B</b>
Individual Unit/Deliverer Recent (~2006-2010) Average Annual Generation	4,000,000 MWh	4,000,000 MWh
Individual Unit/Deliverer Baseline (~2006) Carbon Intensity (metric tons/MWh)	1.09	0.4
Power Sector Average Carbon Intensity for Emitting Units (~2006)	0.7	0.7
2020 Sector Target Carbon Intensity (among emitting units) To Achieve Statewide Cap	0.39	0.39
Individual Unit/Deliverer Power Sector Performance Level – 2012 ( <i>equals unit/deliverer baseline carbon intensity - ((6/14) x (baseline CI - 2020 target sector intensity))</i> )	0.79	0.396
Individual Unit/Deliverer Power Sector Performance Level – 2013 ( <i>same as above except that an adjustment factor of 7/14 applies</i> )	0.74	0.395
Individual Unit/Deliverer Power Sector Performance Level – 2014 ( <i>same as above except that an adjustment factor of 8/14 applies</i> )	0.69	0.394
Net 2012 Allowance Allocation (MT)*	3,160,000	1,582,857
Net 2013 Allowance Allocation (MT)*	2,960,000	1,580,000
Net 2014 Allowance Allocation (MT)*	2,760,000	1,577,143
Total Allowances for 1 <sup>st</sup> Compliance Period*	8,880,000	4,740,000
Total Allowances Needed if Unit/Deliverer Operates at Base Year Carbon Intensity*	13,080,000	4,800,000
Potential Allowance Demand (Unit Shortfall) for 1 <sup>st</sup> Compliance Period*	4,200,000	60,000

\* These numbers would be adjusted to the extent allowances are auctioned.



## ILLUSTRATION OF SECOND COMPLIANCE PERIOD POWER SECTOR ALLOCATION



## ILLUSTRATION OF SECOND COMPLIANCE PERIOD ALLOCATION

**NOTE – THESE FOLLOWING NUMBERS ARE USED FOR ILLUSTRATION PURPOSES ONLY**

<b>Deliverer</b>	<b>A</b>	<b>B</b>
Individual Unit/Deliverer Recent (~2011-2013) Average Annual Generation	4,000,000 MWh	4,000,000 MWh
Individual Unit/Deliverer Baseline (~2006) Carbon Intensity (metric tons/MWh)	1.09	0.4
Power Sector Average Carbon Intensity for Emitting Units (~2006)	0.7	0.7
2020 Sector Target Carbon Intensity (among emitting units) To Achieve Statewide Cap	0.39	0.39
Power Sector Performance Level – 2015 <i>(equals sector-wide baseline carbon intensity – ((9/14) x (baseline CI-sector 2020 CI target))</i>	0.501	0.501
Power Sector Performance Level – 2016 <i>(same as above, but applying a 10/14 factor)</i>	0.479	0.479
Power Sector Performance Level – 2017 <i>(same as above, but applying an 11/14 factor)</i>	0.446	0.456
Net 2015 Allowance Allocation (MT)*	2,002,857	2,002,857
Net 2016 Allowance Allocation (MT)*	1,914,286	1,914,286
Net 2017 Allowance Allocation (MT)*	1,825,714	1,825,714
Total Allowances for 2 <sup>nd</sup> Compliance Period*	5,742,857	5,742,857
Total Allowances Needed if Unit/Deliverer Operates at Base Year Carbon Intensity*	13,080,000	4,800,000
Potential Allowance Demand (Unit Shortfall or Surplus Allowances) for 2 <sup>nd</sup> Compliance Period*	7,337,143	-942,857

\*These numbers would be adjusted to the extent allowances are auctioned.