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Evolving GHG Trading Systems Outside Its Borders: How Should California Respond?

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1. Introduction

With the passage of the Global Warming Solutions Act of 2006 ("AB 32"), California became one of a growing number of states, regions, and nations undertaking policy measures intended to reduce emissions of greenhouse gases ("GHGs"). An important element of these policies are cap-and-trade systems that achieve emission reductions by limiting total GHG emissions from covered sources and allowing these sources to trade emission obligations ("allowances") to achieve GHG reductions at the least cost.

It is important to recognize that California is not designing its cap-and-trade system and other AB 32 policies in isolation. Other jurisdictions, including the federal government, are simultaneously developing their own climate policies. As it finalizes the rules for its cap-and-trade system, California must decide how its system will "link" with these other allowance trading systems. It must consider how broader trading programs and climate policies, some of which have only been proposed, might affect California's climate policies. Further, it must decide whether and how its policies should be modified, or even abandoned, should those broader policies (especially a federal climate policy) emerge. These decisions will have implications not only for the success of California's system but also for the development of an effective global policy response to the climate problem.

As part of assessing the consequences of climate policies in other regions on the design of California's policies, it is important to consider opportunities and risks posed by linking a California cap-and-trade system with other GHG trading systems. Linkages represent any of several ways in which entities that are covered by California's cap could utilize GHG emission allowances arising from outside of a cap limited to California

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sources.[1] Given these opportunities, California has a number of policy decisions for how its cap-and-trade system might link with other systems:

- Should sources be allowed to use GHG credits (or "offsets") generated by in-state or out-of-state sources (or sinks) that accomplish GHG emission reductions through actions that are more stringent than required by existing regulatory requirements?

- Should California "link" its state cap-and-trade system with other cap-and-trade systems through either integration of California within a broader cap-and-trade system that operates under a single ("harmonized") system of rules and requirements, such as a Western Climate Initiative Agreement ("WCI"),[2] or mutual recognition of allowances between independent cap-and-trade systems, in which sources in either system are allowed to use allowances from either system, but the systems do not merge under one set of governing rules and requirements?[3]

CARB's Scoping Plan explicitly considers two types of linkages: (1) the use of offsets and (2) integration of California within the WCI, a group of seven U.S. states and four Canadian provinces considering coordinated policies to reduce GHG emissions.[4] However, in light of the evolving architecture of a global climate policy arising from international, national, and regional policy efforts, California regulators[5] should also plan for linkages between California and other regions in the U.S. and across the world. In particular, the growing likelihood that federal climate policy, including a national cap-

[1] For further details on many of the conclusions reached in this paper, *see*: Jaffe, Judson and Robert Stavins, *Linking Tradable Permit Systems for Greenhouse Gas Emissions: Opportunities, Implications and Challenges*, prepared for the International Emissions Trading Association, November 2007.

[2] "ARB will develop a cap-and-trade program for California that will link with the programs in the other WCI Partner jurisdictions to create a regional cap-and-trade program." CARB, *Climate Change Proposed Scoping Plan,* October 2008.

[3] Due to jurisdictional legal issues, linkages may potentially involve a mix of integration and delegation of regulatory authority to individual jurisdictions. For a discussion of the EU ETS, for example, see Kruger, Joseph, Wallace Oates, and William Pizer, "Decentralization in the EU Emissions Trading Scheme and Lessons for Global Policy," Resources for the Future, Discussion Paper 07-02, February 2007.

[4] Current participants include Arizona, British Columbia, California, Manitoba, Montana, New Mexico, Ontario, Oregon, Quebec, Utah, and Washington. Six U.S. states (Alaska, Colorado, Idaho, Kansas, Nevada, and Wyoming), two Canadian provinces (Nova Scotia and Saskatchewan), and six Mexican states are observers. See www.westernclimateinitiative.org.

[5] Although CARB has primary regulatory authority for the design of AB 32 policies, including a cap-and-trade system, it receives guidance from other regulatory agencies (whose actions may affect achievement of California's climate policy goals), and legislators can potentially revise AB 32's mandates.

and-trade system, will be enacted in the near future has important implications for other aspects of the design, timing and indeed necessity of AB 32 policies:

- What options does California have if Congress enacts a national cap-and-trade system? Should a California cap-and-trade system be pre-empted under these circumstances?

- What are the implications of the implementation of a national cap-and-trade system for California's non-cap-and-trade AB 32 policies?

Because multi-national participation will be necessary for a meaningful and effective response to the climate problem, decisions by California about linkage and the development of its program must be made within a framework that considers not only the narrow question of whether such choices are desirable for California in light of cost-effectiveness, environmental-effectiveness, and distributional impacts, but also the broader question of how the decisions affect the development of an effective international policy architecture for addressing climate change. Broadening the scope of policies through which California addresses climate change, whether through linkages or subsuming California into a federal system, can play an important role in both short- and long-run responses to the climate problem, particularly given the challenge of developing consensus on an integrated cap-and-trade system in which all nations agree to common rules and differentiated obligations for reducing GHGs.[6]

Broadening the available opportunities to reduce GHG emissions offers the opportunity to significantly lower the cost of achieving GHG emission reductions, both within California and globally. Because GHG emissions have the same effect on climate change regardless of where they occur, the flexibility to reduce emissions *where* they are least costly can significantly lower the cost of reducing global GHG emissions without jeopardizing the success of efforts to lower atmospheric GHG concentrations. Use of offsets, for example, allow low-cost emission reductions in developing countries that have not yet accepted GHG targets to be substituted for high-cost emission reductions in industrialized countries.

Along with reducing costs, a broader geographic scope can improve the environmental effectiveness of a cap-and-trade system. Because significant emissions leakage would thwart environmental gains from a California cap-and-trade system developed in the absence of a broad-based federal or Western states system, development of such systems becomes a prerequisite to the effective implementation of a cap-and-trade system in California. Once developed, California faces the question of whether its systems and policies require modification or are even necessary. In the event they remain, the many benefits created by linkage between California and these systems makes

[6] Aldy, Joseph and Robert Stavins, *Architectures for Agreement, Addressing Global Climate Change in a Post-Kyoto World*, Cambridge University Press. Aldy, Joseph and Robert Stavins, "Climate Policy Architectures for the Post-Kyoto World", *Environment* 50(3): 6-17, 2008.

such linkage both worthwhile and likely, but these linkages must be developed carefully to ensure that a sensible and well-designed cap-and-trade system emerges.

This paper provides guidance to California regulators on how to approach current and future decisions about how to link with GHG trading systems outside of California and the implications for the design of AB 32 policies. We begin with some general background on the types of impacts linkage can have on the economic and environmental performance of an AB 32 cap-and-trade system.

2. Policy Implications of Other GHG Trading Systems for California

Policy choices regarding whether and how to link with other cap-and-trade or GHG offset systems, including integration of California through a national cap-and-trade system that pre-empts California's state system, have potential implications for the economic, environmental, co-benefit and regulatory impacts of AB 32's cap-and-trade system.

A. Cost and Other Economic Consequences of Achieving GHG Reductions

Under most conditions, broadening a cap-and-trade system's geographic scope, whether through linking California's cap-and-trade system with other trading systems or by subsuming California within a federal system, will lower the total cost of achieving the *aggregate* GHG emission targets from the combined cap-and-trade systems.[7] A broader cap provides opportunities for emissions reductions in any of the (linked) geographic regions to be met by the lowest-cost activities, irrespective of *where* those activities occur. For example, if each of the WCI states and provinces chose to undertake its own GHG policy without any regional coordination, the marginal costs of achieving incremental GHG reductions would likely vary significantly across these jurisdictions. Linking these systems through a single regional cap-and-trade system would allow low-cost emission reductions in one state or province to be used in place of high-cost emission reductions in another state or province. This would lower the overall cost of achieving the aggregate emission target. Such cost reductions may make it feasible to increase the stringency of climate commitments.

Although linking California with other regions will reduce the aggregate costs of achieving GHG targets, it may have different economic consequences for the linked regions individually. Because linkage will tend to equalize allowance prices across the linked systems, allowance prices will rise in some systems and fall in others. These adjustments in allowance prices can have distributional consequences for the costs to regulated entities of purchasing allowances, the prices of energy and energy-intensive

[7] Linkages can potentially increase the cost of emission reductions under particular conditions, such as when allowances in one trading system are allocated depending on producers output (so-called updating allocations).

goods and services, government revenues from allowance auctions, and the value of allowances received through free allocations or purchased through allowance auctions.

B. GHG Emission Reduction

Broadening the geographic scope of a GHG trading system has the obvious benefit of increasing the amount of GHG emissions covered by the cap and thereby increasing the amount of emission reductions achieved. However, the question arises as to how GHG emissions would be affected by linking California's cap-and-trade system with a separate system covering either distinct or overlapping geographic regions. Such linkage may either increase or decrease GHG emissions compared to a policy in which California does not link with other systems and instead requires that in-state sources meet AB 32's emissions target.

One way linkage may affect GHG emissions is through its effects on emissions leakage. Emissions leakage may arise if the regulatory costs associated with AB 32's regulations and requirements cause economic activity to shift from California to other regions. Linkage can affect leakage in two ways, and the net effect is ambiguous.

First, by encouraging additional political jurisdictions to undertake climate commitments (such as through formation of the WCI), linkage can expand the geographic scope of regions where economic activity is covered by fixed emissions caps. Because leakage arises when businesses in trade-sensitive industries are subject to higher regulatory costs than competitors in other regions, expanding the scope of regions undertaking climate commitments will reduce leakage and thus decrease aggregate GHG emissions. Second, if linkage raises or lowers allowance prices in the linked regions relative to those that would prevailed under independent cap-and-trade systems, linkage may lead to either an increase or decrease in emissions leakage from those regions to regions outside the system. For example, if linkage *raises* allowance prices in one of the linked regions, the extent of emissions leakage from this region would likely increase. Because the shifts in each region's allowances prices arising from new linkages may vary in magnitude and direction, the net effect on emissions leakage is an empirical, case-by-case matter.

Another way linkage may affect emissions is if there are certain rule and institutional differences between linked trading systems. Such differences can either increase or decrease GHG emissions depending on the specific provisions involved and the change in allowance prices arising from linkage. For example, GHG emissions would decrease if linkage causes GHG allowance prices to fall below the trigger price for a safety valve (or similar borrowing) mechanism,[8] thus reducing the flow of additional allowances into the market. However, linking with a system in which ineffective monitoring and

[8] A safety valve allows for the purchase (or borrowing) of allowances at pre-determined prices.

enforcement lead to excess allowances allocations, may lead to such excess allowances flowing to a region with a well-enforced system.[9]

C. Co-Benefits Associated with GHG Reductions

Actions taken to reduce GHG emissions may provide benefits to local communities where such reductions occur, by, for example, reducing ambient concentrations of GHG co-pollutants, including toxic or criteria air pollutants. When designing rules for achieving AB 32's GHG emission targets, AB 32 requires that CARB consider such co-benefits both in aggregate and within communities with high pre-existing ambient co-pollutant concentrations or poor economic conditions, in particular.

To the extent that they shift the locations where GHG emissions reductions occur, broadening the cap-and-trade system could affect the location of any co-benefits that arise from those reductions. Some local communities may experience more GHG emissions reductions and co-benefits as a result of a broader cap, while other communities may experience fewer. However, as we describe below, limiting a cap's geographic scope, including limits on certain types of linkage, is unlikely to be an effective means of addressing GHG co-pollutant problems in California communities, because of the inherent uncertainty associated with the co-pollutant benefits from GHG emission reductions.

D. Regulatory Control of GHG Markets and Compliance

Linkage between GHG trading systems may also affect the type of control regulators can maintain over GHG allowance markets. Once systems have been linked directly or indirectly (through, for example, mutual linkage to a common source of GHG offsets), regulatory decisions in one system have potential implications for allowance markets in all other linked systems. For example, a safety value included in one cap-and-trade system's design becomes effectively available to all covered sources in any cap-and-trade system with which it links directly. Thus, regulators must carefully contemplate these effects when deciding when and how to link with other trading systems, particularly because such links may be difficult to reverse.

However, linkage may reduce need to modify the design of AB 32's cap-and-trade system to address unintended consequences arising from the limited geographic scope of California's system. For example, linkages that reduce opportunities for emission leakage also mitigate the need to design the AB 32 cap-and-trade system to prevent leakage. Provisions meant to address particular issues may introduce unwanted distortions or raise barriers to future integration with other trading systems.

3. GHG Emission Offsets

[9] This assumes that the weak enforcement environment depresses GHG allowance prices because of the supply of excess, illegitimate allowances.

Offsets (or emission credits) are generated when emission sources are credited for actions taken to reduce emissions beyond what is required by existing regulatory requirements. Offsets awarded through these actions can then be used by sources covered by a cap-and-trade system to meet their emissions obligations. In the context of AB 32, these potentially eligible actions include emission reductions from sources in California that are not included within the AB 32 cap-and-trade system as well as emission reductions in other states or countries that are incremental to existing regulatory requirements and are not covered by a GHG cap-and-trade system.

In designing the rules for offset use, California regulators should consider not only the effectiveness of the rules in the initial stages of the cap-and-trade system, but also the rules' ability to adapt to and promote the on-going development and evolution of effective offset systems.

A. Implications of Offset Use for Economic Outcomes and GHG Emissions

Offsets can offer an important source of low-cost emission reductions by significantly expanding the scope of emission reduction opportunities available to meet GHG emission targets. Whereas an AB 32 cap-and-trade system will only provide direct incentives for sources within California to reduce GHG emissions, offsets can provide a financial incentive for in-state and out-of-state sources not covered by a cap-and-trade system to undertake emission reductions. By increasing the supply of low-cost emission reduction opportunities, the use of offsets can both lower the cost of achieving emission targets and lower market prices for GHG allowances. The economic benefits can be significant. For example, one study found that an offsets policy accounting for 22% of GHG emission reductions achieved in 2020 by a WCI cap-and-trade system would reduce allowance prices from $63 to $24.[10] Restrictions on offset use that raise the cost of achieving GHG goals may increase resistance to future, more stringent targets.

Expanding the pool of allowances through offset use can provide other economic benefits, including increased liquidity of allowance markets and reductions in allowance price volatility. However, linkages can potentially introduce new sources of volatility into California allowance markets by indirectly linking California with cap-and-trade systems that may be more susceptible to volatile market conditions.

[10] WCI estimated that an offsets policy would achieve 31.8 $MMTCO_2e$ of GHG emission reductions compared to 114.9 $MMTCO_2e$ of GHG reductions achieved in the WCI region. These figures do not account for use of banked allowances and electricity sector leakage. WCI, "Design Recommendations for the WCI Regional Cap-and-Trade Program," September 23, 2008. Other economic analyses of climate policies find similar potential reductions in allowance costs. For example, another study found that achieving 30 $MMTCO_2e$ of emission reductions through offsets (less than 20 percent of total reductions) would reduce the social cost (welfare loss) of a cap-and-trade system by more than 25%. Charles River Associates, "Economic Analysis of California Climate Initiatives: An Integrated Approach," prepared for the Electric Power Research Institute, November 1, 2006.

The use of offsets could increase or decrease the aggregate GHG emission reductions achieved by AB 32. There are two main effects to consider. Offset use could increase emissions if the rules for certifying offsets are insufficient to guarantee that they represent "additional" emission reductions. Determining offset "additionality" and measuring offset quantity is particularly challenging because of the so-called "baseline" problem – that is, it is difficult to know precisely the quantity of GHGs a source would have emitted absent actions undertaken to reduce those emissions. Thus, estimating emission reductions (i.e., baseline emissions minus actual emissions) necessarily involves some imprecision. If a source in California uses offsets to cover a portion of its emissions, but those offsets do not represent "additional" emission reductions, then overall GHG emissions can increase relative to the system without offsets.

Even if offsets represent legitimate emissions reductions, these reductions may be offset by emissions increases at other sources. For example, emission reductions that are achieved by reducing electricity generation from a coal-fired power plant may be partially or fully negated if the electric power that replaces this output has carbon emissions.

The use of offsets may lower aggregate GHG emissions by limiting leakage and increasing political acceptance of cap-and-trade systems. By lowering allowance prices in AB 32's cap-and-trade system, offset use can reduce differences in GHG abatement costs between California and other regions, and thereby increase the competitiveness of California producers relative to that of producers in other regions. As a result, offset use can reduce emission leakage.[11] In addition, by reducing allowance prices and the overall economic impact of AB 32, offsets may increase political acceptance of more stringent emission targets in the long run.[12]

The use of offsets potentially creates indirect links between a California cap-and-trade system and any other cap-and-trade system that relies on a common offset system. For example, allowing use of offsets generated through the Clean Development Mechanism (CDM) would create indirect links between a California cap-and-trade system and systems in other regions that use CDM offsets, such as the European Union Emissions Trading System (EU ETS). Thus, as California regulators consider potential direct linkages with these cap-and-trade systems, they should evaluate whether direct linkages create incremental costs and benefits beyond those already produced by mutual linkage with common offset systems.

B. Lessons for Offset Use in AB 32

[11] These reductions in leakage in California may be partially offset by an increase in leakage from other cap-and-trade systems if higher demand for offsets leads to an increase in the market-clearing price for allowances in these systems.

[12] Linkage may also decrease GHG emissions by reducing use of other cost containment provisions that reduce costs by relaxing cap stringency. For example, by lowering allowance prices, offsets may reduce the frequency with which a safety valve is triggered.

As CARB develops rules regarding offset use, it should consider certain key lessons that emerge from economic principles and prior experience with credit-based systems.

Offset use requires well-designed rules and effective institutions to ensure offset quality. By broadening the scope of low-cost emission reductions opportunities and engaging developing countries in addressing climate change, offsets can play an important role in a successful international climate policy architecture. However, fulfilling this promise requires the development of well-designed rules and effective institutions to ensure that offsets are – in the words of CARB's Proposed Scoping Plan – "real, permanent, quantifiable, verifiable, enforceable, and additional."[13] Achieving these goals will be challenging. Offsets available in today's growing GHG credit markets – which largely reflect voluntary commitments – are developed under a variety of rules and institutions that result in offsets of varying quality.[14] There is important work to be done to develop effective rules and institutions to achieve these goals for offset quality.

CARB should think carefully when developing its offset rules to consider how its rules are consistent with, build off, and potentially improve existing rules and institutions affecting offset use and markets. Harmonization of rules across cap-and-trade systems offers many potential benefits. It would reduce administrative costs, increase investor confidence, reduce variation in offsets awarded for otherwise similar projects (and potential gaming that might result from such differences), and reduce the resources needed to create institutions that can effectively measure, verify and enforce offset use.

The CDM represents a likely starting point for broader efforts to harmonize international credit-based systems because of its broad acceptance by the parties to the United Nations Framework Convention on Climate Change. Certified Emission Reductions (CERs) developed under the CDM of the Kyoto Protocol are already recognized by existing mandatory cap-and-trade systems, such as the EU ETS. However, the CDM may need significant modification before it can provide adequate assurances that CERs are of sufficient quality to form the primary basis for an international credit-based GHG system.[15] Thus, CARB need not simply accept the CDM system regardless of future regulatory changes. Rather, California may elect to impose additional standards on the use of CDM credits, and may use those additional standards as leverage to influence changes in international offsets policy.

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[13] CARB, Climate Change Proposed Scoping Plan, October 2008, p. 36.

[14] For example, see General Accounting Office, "Carbon Offsets, The U.S. Voluntary Market is Growing, but Quality Assurance Poses Challenges for Market Participants," GAO-08-1048.

[15] For example, Wara, Michael W. and David G. Victor, "A Realistic Policy On International Carbon Offsets," Stanford University Program on Energy and Sustainable Development Working Paper #74, April 2008.

Quantitative and geographic limits on offset use would raise the costs of achieving GHG targets, while failing to provide assurances regarding offset quality. Restrictions on offset use are often proposed as a way of attempting to address the risk that offsets do not lead to net reductions in GHG emissions. The two most common types of restrictions considered are geographic restrictions, which restrict the location of projects, and quantity restrictions, which limit the number of offsets that can be used to comply with cap-and-trade obligations. Both types of restrictions would raise the cost of achieving GHG targets by limiting the supply of offsets. In addition, both types of restrictions – but particularly quantity limits – potentially reduce the effectiveness of offsets at reducing allowance price volatility. By forcing firms to undertake high-cost emission reductions in the event of sudden shocks to market conditions, quantity limits – if they are binding – would effectively eliminate firms' ability to draw on a large pool of allowances to dampen increases in allowance prices.

Although restrictions on offset use are often proposed as a solution to concerns about offset quality, geographic and quantity restrictions would do little to address quality. Such restrictions simply limit the supply of low-quality offsets. The only way to address offset quality effectively is to design and implement rules and institutions to reliably measure, verify, and enforce offset use. To the extent that regulators are concerned that unrestricted offset use would reduce their ability to ensure achievement of GHG targets, such control is best achieved through incremental requirements improving offset quality. Geographic or quantity limits provide a poor substitute for any incremental standards needed to ensure offset quality.

While current CARB (and WCI) proposals call for relatively few restrictions on the geographic location of offset projects, they do include limits on offset use "to no more than 49 percent of the required reductions in emissions measured from a 2012 baseline."[16] Simply maintaining emissions at 2012 levels through 2020 would represent a reduction in emissions below business-as-usual levels. Thus, based on CARB's projections, offsets would be limited to roughly one-third of total emission reductions needed to achieve AB 32's 2020 target.[17] Thus, these rules would impose a limit on offset use that may raise both the costs of achieving AB 32 GHG targets and allowance prices in California.

Limits on offset use are an imprecise and highly uncertain method for providing GHG co-benefits. Restrictions on offset use have also been proposed as a means of ensuring that Californians are the recipients of co-benefits arising from activities taken to achieve

[16] CARB, "Implementing a Quantitative Limit on the Use of Offsets in a Cap and Trade Program," March 23, 2009.

[17] For sectors covered by a cap-and-trade system, CARB reports that business-as-usual (BAU) emissions would be 512 $MMTCO_2e$ in 2020, while target 1990 emissions would be 365 MMTCO2e. Based on a straight-line interpolation of emissions between 1990 and 2020, BAU emissions in 2012 are 472 $MMTCO_2e$. Thus, CARB's offset rules would limit offset use to roughly 53 million $MTCO_2e$ (= 49% x (472 $MMTCO_2e$ – 365 $MMTCO_2e$)), or about 36% of total reductions required of capped sectors in 2020 relative to 2020 BAU emissions. CARB, October, 2008, p. 32.

GHG targets. By limiting opportunities to use offset projects, California sources would likely need to rely upon greater in-state GHG emission reductions in order to meet a California cap on GHG emissions. However, even if CARB's rules effectively mandate that AB 32's targets are achieved through in-state emission reductions, these emission reductions can be achieved anywhere in the state and through actions with widely varying co-pollutant impacts. Thus, the extent and location of co-benefits arising from restrictions on offset use would be highly uncertain, and regulators would have little ability to control these outcomes.

In contrast, a complementary policy that directly targets activities that produce GHG co-pollutants promises to be more effective than restrictions on offset use at addressing ambient air quality in the communities with the highest criteria and toxic ambient concentrations. By targeting such efforts on measures that can cost-effectively reduce co-pollutant in key locales, it would likely achieve these goals with the least economic impact. Consequently, altering the design of a GHG cap-and-trade system to achieve co-benefits would likely only raise the costs of achieving GHG targets while failing to achieve local objectives. Co-pollutant benefits could be achieved at lower cost by taking some of the economic savings achieved by the cap-and-trade system and using them to fund programs targeting ambient air quality problems in vulnerable communities.

It is also important to recognize that implementation of both AB 32 as a whole and the GHG cap-and-trade system as an element of AB 32 will likely lead to net reductions in toxic and criteria air pollutants throughout the state, even if the use of offsets is unrestricted.[18] Unless a GHG cap-and-trade system leads to dramatic shifts in the geographic location of activities that produce GHG emissions, ambient conditions in particular communities are unlikely to deteriorate as a result of the cap-and-trade system. Thus, while offset use may potentially decrease the extent to which local air quality improves as a consequence of AB 32, implementation of an AB 32 cap-and-trade system – with or without offset use – will improve, not harm, local air quality.

Just as it fails to provide an effective means of achieving co-pollutant benefits, limiting offsets is also unlikely to provide economic benefits to California. Forcing California to achieve GHG targets through in-state emission reductions would increase economic activity in certain types of businesses, such as energy service companies and renewable power suppliers. However, these economic co-benefits are only achieved by imposing costs on the rest of California's economy through higher prices for energy and energy-intensive goods.

The net impact of these local co-benefits and higher statewide costs will be detrimental to California's economy. This conclusion may appear to contradict certain claims that climate policy would be an economic boon to California's economy. While

[18] CARB estimates that non-cap-and-trade policies and programs included in its Proposed Scoping Plan would reduce 61 tons per day of NO_X emissions and 15 tons per day of $PM_{2.5}$ emissions. CARB, *Climate Change Proposed Scoping Plan*, October 2008, p. 88.

these claims have been vigorously debated,[19] it is important to recognize that the conclusion that climate policy would result in net economic benefits for California is only made with respect to particular policies that target certain energy-saving activities. None of these analyses have concluded that emission reductions achieved through a cap-and-trade system would lead to net economic benefits for California.[20] Thus, limiting offset use would have an adverse impact on California's economy.

Unrestricted use of offsets would also shift some of the incentives for development of advanced technologies from activities within California to those outside of California where offsets would be created. While this would potentially – as CARB notes – "delay transition to low-carbon energy systems that will be necessary to meet our long term climate goals,"[21] it would also hasten the development of such systems in regions outside of California. In fact, the incentives for technological change outside of California that are created by expanded offset use are consistent with CARB's stated goals regarding technological change: "California is committed to working at the international level to reduce greenhouse gas emissions globally and finding ways to support the adoption of low-carbon technologies and sustainable development in the developing world."[22]

4. Linkage with Other Cap-and-Trade Systems

As California designs its GHG cap-and-trade system, many other jurisdictions are simultaneously working toward the development of new or modified cap-and-trade systems. Uncertainty over the outcomes of these processes raises particular challenges for California in the design of an AB 32 cap-and-trade system that would be linked in some manner with these future and evolving systems or subsumed within a broader system.

[19] Stavins, Robert F, Judson Jaffe and Todd Schatzki. "Too Good to Be True? An Examination of Three Economic Assessments of California Climate Policy." AEI-Brookings Joint Center for Regulatory Studies, Related Publication 07-01, January 2007; "Peer Review of the Economic Modeling Analysis of the AB 32 Draft Scoping Plan, Major Peer Review Comments and Air Resource Board Staff Responses," November 2008.

[20] While CARB found that many elements of its AB 32 Scoping Plan would achieve emission reductions at negative cost, it assumed a carbon price of less than $10 per ton in its macroeconomic analysis. CARB, Climate Change Draft Scoping Plant, Economic Analysis Supplement, n.d., p. 14 and Appendix I. Likewise, while finding that certain policies that are a part of CARB's AB 32 Scoping Plan would provide California with net economic benefits, David Roland-Holst concludes that a cap-and-trade system to achieve incremental GHG emission reductions needed to meet AB 32's GHG targets would impose incremental costs on California's economy. Roland-Holst, David, "Economic Assessment of some California Greenhouse Gas Control Policies: Applications of the BEAR Model," in *Managing Greenhouse Gas Emissions in California*, California Climate Change Center at Berkeley, January 2006. Roland-Holst, David, "Cap and Trade Scenarios for California," Center for Energy, Resources and Economic Sustainability, Research Paper No. 0711112, November 2007.

[21] CARB, October 2008, p. 37.

[22] CARB Proposed Scoping Plan Appendices, p. C-23.

Thus, CARB must consider not only linkages with other systems that may be present at the outset, but also future linkages as these systems evolve.

The need to address both present and future cap-and-trade linkages imposes two types of questions on California decision-makers. The first is whether and how California should link with other cap-and-trade systems. Such linkages could include integration of California's GHG cap-and-trade system within the U.S. federal system or within a broader regional system, such as the Western Climate Initiative. Or, it could involve mutual recognition of allowances with other regional systems, such as the EU ETS or the Regional Greenhouse Gas Initiative ("RGGI").

The second question is how California's decisions about its cap-and-trade system should be affected by on-going procedures to develop broader or linked cap-and-trade systems. Such processes include on-going discussions among Western states and provinces in the WCI and continued efforts in Washington, D.C. to develop a federal climate policy. How do these on-going processes affect the design elements to be incorporated in California's cap-and-trade system? Do they affect interim targets and timetables leading up to the 2020 legislative targets? Can California's decisions encourage or create incentives for other states of nations to take on joint commitments to reduce GHGs?

In addressing these questions, it is important to distinguish between the costs and benefits to California arising from other states' and nations' willingness to take on GHG commitments and those arising from the incremental decision to link with other GHG trading systems. Commitments by neighboring or distant regions to GHG targets not only increase the effectiveness of California's actions for addressing climate change (by, for example, reducing leakage), but also reduce the economic impacts to California's economy. However, the incremental costs and benefits of linking two pre-existing cap-and-trade systems can be more subtle. Our assessment focuses largely on these incremental decisions, while recognizing the possibility that California's decisions may affect the likelihood that other states and nations undertake commitments to reduce GHGs.

A. Implications of Linkages with Other Cap-and-Trade Systems for Economic Outcomes and GHG Emissions

Under most circumstances, linking separate cap-and-trade systems will reduce the costs of achieving the aggregate GHG emission targets taken on by these systems.[23] By broadening the scope of low-cost emission reduction opportunities that can be used to achieve reductions in each region and by allowing the greatest flexibility in *where* those

[23] Linkage between two cap-and-trade systems could potentially increase the aggregate cost of achieving GHG targets under certain, very limited circumstances. For example, use of so-called "updating" allocations to distribute allowances based on industry output may act as a subsidy to producers that lower incentives to reduce consumption of GHG-intensive goods and thereby increase emission reduction efforts required in the production of those goods. Jaffe, Judson and Robert Stavins, November 2007.

emission reductions occur, integration at the regional and global level offers the potential to reduce the costs of achieving reductions in GHG emissions significantly. Integration can also greatly improve the performance of trading systems by increasing allowance liquidity and mitigating allowance price volatility.

While likely to reduce the aggregate costs of achieving reductions, broadening the geographic scope of a cap-and-trade system through linkage may have uneven impacts on GHG allowance prices compared with the prices that would prevail under separate systems confined to individual states, provinces, or nations. For example, under a federal cap-and-trade system, covered sectors would pursue GHG emissions reductions where they can be achieved at least cost. Thus, a single market clearing price for GHG allowances would emerge across the United States, with this allowance price greater or less than those that would prevail under systems limited to individual states or regions. Such differences in allowance prices – and the underlying shifts in regional emissions – have a number of potential consequences.

Changes in allowance prices will have consequences for the distribution of economic impacts across states and provinces. Because the price of GHG allowances affects prices of energy and energy-intensive goods and services, as well as the competitiveness of businesses within each region, increases or decreases in these prices will have corresponding adverse or beneficial consequences for state and provincial economies. Changes in GHG allowance prices will also affect entities directly regulated by the cap-and-trade system, depending on whether they are net buyers or net sellers of allowances, after accounting for any freely allocated allowances. For example, increases in allowance prices would benefit net sellers of allowances.

Such distributional consequences are an inevitable outcome of linking cap-and-trade systems, given likely differences in GHG allowance prices between independent systems. However, these differences in prices suggest important opportunities to achieve cost savings by reducing GHG emissions in the region with low allowance prices and selling allowances to the region with high allowance prices.

Linkage will also have implications for emissions leakage. To the extent that the opportunity for linkage encourages regions to undertake climate obligations, it will unambiguously reduce emissions leakage. Thus, for example, California's participation in the WCI may reduce emissions leakage if it leads other states or provinces to commit to GHG targets and join the WCI.

By contrast, linkage between two pre-existing cap-and-trade systems could either increase or decrease total leakage. On the one hand, leakage will increase in systems in which allowance prices rise compared with the price absent linkage. On the other hand, leakage will fall in systems in which allowance prices decrease relative to prices absent linkage. The net impact will depend on the relative change in allowance prices between regions and the relative sensitivity of leakage to allowance prices in each region.

B. Lessons for Linkages with Other Cap-and-Trade Systems

These tradeoffs suggest several lessons for decisions regarding whether and how to link with other GHG cap-and-trade systems and how California's decisions might be adjusted in light of the simultaneous development of new and modified cap-and-and-trade systems.

Linkage offers significant opportunities to reduce the aggregate costs of achieving GHG targets and achieve sufficient geographic scale to create efficient allowance markets. The cost savings offered by linkage are significant, particularly when viewed on a global scale. Thus, the real question is not whether linkage is beneficial, but rather which linkages are most advisable, what market size is needed to achieve sufficient trading liquidity and sufficient scale to reduce volatility, and whether linkages through offset markets are sufficient to take advantage of the opportunity for significant cost savings for achieving GHG reductions between the industrialized and the developing world.

While providing many economic benefits, linkages potentially create distributional impacts that are difficult to mitigate fully. Development of an integrated (or tightly linked) cap-and-trade system across several regions offers the opportunity to enter into differentiated but joint commitments to reduce GHG emissions. Under such joint commitments, the primary mechanism for addressing differences in stringency across regions is through the allocation of allowance "budgets" to each independent jurisdiction in the system. These allocations can mitigate some, but not all, distributional impacts that may arise from linkage.

Linkage decisions must carefully consider the implications for emissions leakage. The impact of linkage of existing cap-and-trade systems for emissions leakage will depend greatly on the characteristics of the regions being linked. For example, if linkage leads to large increases in allowances prices in a region in which leakage is very sensitive to changes in allowances prices, then overall leakage may increase as a consequence of linkage. Thus, expanding linkages can potentially, but not always, increase leakage. A federal cap-and-trade program, while potentially subject to leakage with other nations, would eliminate emissions or economic leakage across regions of the United States.

For example, it is widely recognized that, absent climate commitments by neighboring Western states, significant emissions leakage will arise from California's electricity sector due to significant heterogeneity in the GHG content of power supply and the tight

integration of electricity markets across the Western portion of North America.[24] Because relatively little electricity is transmitted between North America's Western and Eastern grids, a cap-and-trade system covering all western states and provinces – or even limited to WCI members – would greatly limit leakage from the electricity sector.[25] However, because the WCI includes some eastern Canadian provinces that are interconnected with other U.S. states, and because other Canadian provinces may not take on corresponding GHG emission obligations, including these provinces in a WCI cap could introduce new opportunities for emissions leakage should allowance prices increase in them. Thus, careful consideration should be given to leakage risks when considering links to new regions potentially susceptible to emissions leakage.[26]

Harmonization of key cap-and-trade design elements between linked cap-and-trade systems can potentially mitigate uneven impacts to industry competitiveness and emissions leakage. Further, harmonization may be a necessary pre-condition for linkage, given implications for regulatory control of environmental performance. Minor differences between the rules and requirements faced by sources in different cap-and-trade systems are often inevitable and can have limited effects on important outcomes, so long as the rules and institutions for monitoring and enforcing GHG allowances are sufficient to guarantee allowance quality and prevent propagation of excess allowances. However, differences in certain cap-and-trade design elements can have important economic and environmental consequences.

Linkage offers the opportunity to eliminate differences in regulatory requirements faced by competitors in different regions that otherwise would lead to uneven impacts on industry competitiveness and, under some circumstances, emissions leakage. Non-uniform regulatory requirements can arise if, for example, particular industries in a region are excluded from or subject to alternative regulations in lieu of coverage under that region's cap-and-trade system. To the extent that such exemptions or alternative regulations were motivated by initial concerns about economic or emissions leakage, by reducing these impacts, linkage provides an opportunity to bring such sectors into the

[24] In the electricity sector, emissions leakage could occur through "contract reshuffling" in which GHG emissions reductions are achieved on paper – but not in reality – by swapping contracts for power with high GHG emissions for those with low GHG emissions. Contract shuffling could potentially allow California's electricity purchasers to meet a 1990 emissions target for the sector through contract reshuffling alone. Bushnell, James, Carla Peterman, and Catherine Wolfram, "California's Greenhouse Gas Policies: Local Solutions to a Global Problem?" Center for the Study of Energy Markets, Working Paper 166, April 2007. *See also,* Wolak, Frank, James Bushnell, and Benjamin Hobbs, Opinion on "Load-Based and Source-Based Trading of Carbon Dioxide in California", Market Surveillance Committee of the California ISO, November 27, 2007.

[25] Bushnell, James and Yihsu Chen, "Regulation, Allocation and Leakage in Cap-and-Trade Market for CO2," Center for the Study of Energy Markets, Working Paper 183, March 2009.

[26] Some of these neighboring states are also involved in similar regional GHG efforts, such as the Midwestern Greenhouse Gas Accord.

cap-and-trade regime. Thus, harmonization of regulatory requirements can eliminate imbalances in competitiveness created by non-uniform regulation, and potentially reduce emissions leakage to the extent that harmonization brings previously exempt sectors into the cap-and-trade system.[27]

Linkages may affect regulators' control over certain aspects of cap-and-trade design typically associated with "cost containment" policies, including offsets policy, banking and borrowing, safety valve, and pre-existing linkages with other cap-and-trade systems. When a new link is formed between two cap-and-trade systems, the link effectively "pools" the two allowance markets. If certain provisions are available to participants in one cap-and-trade system, they effectively become available to participants in the other. While potentially affecting regulators' ability to control policy, the effects on emissions from such design differences is often ambiguous. For example, if California's system did not include a safety valve, but linked with a system that did, the effect on emissions would depend on whether the link increased or decreased the likelihood that allowances prices would rise enough to trigger the safety valve. Thus, if linkage reduces allowance prices in the region with a safety valve, the likelihood that the safety valve would be triggered would fall. Because of these potential implications for environmental performance, harmonization of certain cap-and-trade design features may be seen by some regulators as a pre-condition to linkage.

Given the importance of harmonization to the design of effective cap-and-trade systems, California should avoid incorporating design features that will be inconsistent or incompatible with participation in or linkage with broader cap-and-trade systems. Regional, federal, and international cap-and-trade systems are rapidly evolving. Because of the need to link with (or integrate with) systems developed in other regions, California should carefully assess whether the key design elements of California's system are consistent with those in existing cap-and-trade systems or those likely to be developed in the future.

Given the potential for future regional or federal climate policy, CARB should judiciously use its flexibility to set intermediate (pre-2020) targets, determine the timing of AB 32 policy implementation, and choose which policies to implement. By proceeding cautiously while regional and federal policies are developed, CARB can avoid implementing policies that may pose barriers to the smooth linkage of California into broader regional or federal systems.

Such caution may also allow California to avoid actions that become unnecessary (and excessively costly) in the context of future regional or federal systems. Under an economy-wide federal cap-and-trade system, all state policies targeting activities under the cap, including a cap-and-trade system, would become redundant. Emission

[27] Leakage may arise even if firms excluded from the cap face other GHG regulations. For example, GHG emission standards that limit GHG emission rates (i.e., GHG emissions per quantity of output) would not cap total GHG emissions, because total emissions could grow depending upon the level of production.

reductions achieved in California due to more stringent state regulations would be offset by increases in emissions in other regions. As a result, these state policies would result in few (or no) additional emission reductions, while imposing additional costs by limiting the market's flexibility to achieve emission reductions in the least costly way possible.

Likewise, a complementary state policy that imposes overlapping requirements to those mandated by a federal policy also creates few (or no) incremental emission reductions, but may impose additional costs. CARB's Scoping Plan includes several policies that would operate in the same manner as existing federal policies. The Pavley Standards, for example, operate through the same mechanism as existing federal Corporate Average Fuel Economy (CAFE) standards. One study suggests that emissions leakage arising from this overlap may be up to 100% in the short-run, and over 80% in the long-run.[28]

Proceeding cautiously would also provide CARB with an opportunity to review its preliminary decisions regarding which of the policies in the AB 32 Scoping Plan will be pursued, and the stringency and timing of these policies. Although CARB's economic analyses claim that many state policies would produce net economic benefits, there is much debate about these findings[29] and even CARB finds that certain AB 32 measures would impose economic costs.[30] The likelihood of significant domestic climate policy provides CARB with all the more reason to revisit these earlier decisions.

Limiting linkages with other systems does not guarantee additional GHG co-pollutant emissions reductions or co-benefits in California. Linkage of California's cap-and-trade system with other cap-and-trade systems could either increase or decrease in-state GHG emission reductions. Consequently, limits to linkage provide no guarantee that in-state GHG co-benefits would increase and even raise the risk they might fall. Further, as discussed in prior sections, to the extent that GHG co-benefits increase through such restrictions, they would be highly uncertain and regulators would have little control over the location or nature of these co-benefits.

C. *Implications of a Federal Cap-and-Trade System for California Cap-and-Trade System*

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[28] Goulder, Lawrence et al. "Impacts on State-Level Limits Greenhouse Gases Per Mile in the Presence of National CAFE Standards," April 2009.

[29] For example, *see* Stavins, Jaffe and Schatzki, January 2007; and "Peer Review of the Economic Modeling Analysis of the AB 32 Draft Scoping Plan, Major Peer Review Comments and Air Resource Board Staff Responses," November 2008.

[30] Three proposed programs (the Renewable Portfolio Standard and two High GWP programs) have estimated costs greater than $84 per $MTCO_2e$, while five programs under evaluation have estimated costs greater than $77 per ton $MTCO_2e$. These cost figures are averages. To compare directly with the costs of a cap-and-trade program, one would need to examine the marginal costs of reductions, which are almost certainly greater than the average costs. CARB, n.d., Appendix I, pp. I-7 – I-9.

A federal cap-and-trade system for GHG emissions is being actively debated within the U.S. Congress, and it is likely that a national system will emerge. In the meantime, some basic lessons are available to help guide California regulators.

Integration of California's cap-and-trade system into a federal system offers California many benefits. A national cap-and-trade system would provide the most cost-effective framework in which domestic GHG emission reductions could be achieved. By eliminating barriers that restrict where emission reductions could occur, a federal cap-and-trade system that includes all states would achieve domestic emission reductions in the most cost-effective fashion. A national cap-and-trade systems would also reduce economic and emissions leakage by harmonizing the regulations faced by industries in different regions of the country. Further, by integrating GHG allowance markets, a federal program would increase market liquidity and reduce price volatility.

Overlapping state and federal cap-and-trade systems would impose incremental costs on California without achieving any additional emission reductions. California regulators may want to achieve more stringent GHG emissions targets than those imposed by a federal system. However, a system in which California is covered by both federal and state requirements will not achieve this goal. Because a federal cap would include GHG from all domestic sources, including those in California, any incremental reductions in GHG emission achieved by sources in California will simply be offset by increases in GHG emission by sources outside of California. National emissions would not change. What would change is the distribution of costs: sources within California would bear the additional costs of California's more stringent GHG targets, while sources outside of California – which would need to achieve fewer emissions reductions – would incur lower costs to comply with cap-and-trade obligations. Thus, such a policy would adversely impact California's economy, help the economies of other states, and provide no additional GHG emission reductions.

"Carving out" California from a federal system would allow California to achieve incremental GHG emission reductions but would reduce the cost-effectiveness of achieving GHG emission reductions, impose incremental economic impacts on California, and lead to fragmentation of domestic climate policy. To avoid overlapping federal and state regulatory requirements for sources in California, a federal program could exempt – or "carve out" – California sources from compliance with a federal program. In other words, sources outside of California would be covered by the federal program, while sources within California would be covered only by the state program. With this modification, California could achieve incremental emission reductions by lowering GHG emission targets on sources within California.

The economic impact of any changes in GHG targets would depend on whether the carved-out California system was linked in any other way to the federal system. If the California system were not linked to the federal system in any way, the cost of incremental GHG reductions would depend on the cost of GHG reductions in California. As a result, differences in allowance prices between California and the rest of the country would emerge, reflecting the greater stringency of California's cap. While such differences

in allowance prices would not lead to emission leakage, as total emissions in both systems would be capped, it could lead to economic leakage if producers shift operations from California to other parts of the country.

If a carved-out California system were linked with a federal system, then the nation-wide cap would effectively become the combination of the California and federal caps. In this case, lowering California's cap would lead to a corresponding reduction in the effective nationwide cap. Consequently, California's actions would increase costs and allowances prices nationwide. The primary impact on California – aside from these shared economic consequences – would be the reductions in GHG emission allowances California would be able to distribute through either auctions or free allocations.

A decision by California to seek an independent "carve out" for its state program may set an example that other regions – such as the RGGI states – might choose to follow. This could potentially lead to the fragmentation of domestic U.S. climate policy, which would have undesirable political and economic consequences by establishing new obstacles to political consensus on U.S. climate policy and promoting non-uniformity of climate policy across regions.

Permitting states to "retire" allowances under a federal program would allow them to achieve incremental emission reductions while imposing incremental costs on the state. Under a federal cap-and-trade system, states wishing to achieve additional emission reductions beyond the federal cap could do so by "retiring" allowances allocated to them.[31] Such an approach would require that some portion of allowances be allocated to the states, as is done in the multi-jurisdictional RGGI and EU ETS programs and the federally operated NO_X trading program.

However, state "retirement" of GHG allowances would have consequences for all states. The state retiring allowances would sacrifice the economic benefits of these allowances to the state's citizens, whether they are realized through government revenues collected from allowance auctions or through private benefits from freely allocated allowances. Moreover, retirements would impose some additional costs on other states as well, since allowances prices would rise in all states as a result of a reduction in the total number of allowances nationwide.

The transition from regional to federal programs raises issues for the conversion of California allowances to the federal system. If California's cap-and-trade program (or any regional system) were to be pre-empted by a federal program, an important transitional issue is whether allowances already allocated under California's program could be used for compliance under a federal system. Allowing any banked California allowances to be converted to federal allowances would preserve the value of allowances

[31] By contrast, if California or any other state were to impose additional surcharges or fees on in-state emissions, they would achieve no incremental emission reductions nationwide, although they might shift emission from the state imposing the surcharge to other states covered by the federal cap.

held by California sources, including those purchased through auctions or secondary markets. Preserving the value of banked allowances also encourages sources to use banking cost-effectively in light of the stringency of the current California and future federal cap.

However, if not properly designed, policies regulating the transfer of allowances from a state system to a federal system can create perverse incentives that can distort market prices for allowances and, as a consequence, distort decisions regarding GHG reductions. This can drive up the costs of achieving GHG targets. For example, provisions in the most recent Waxman-Markey bill would encourage speculation in state allowance markets that could unintentionally elevate market prices for these allowances. These provisions would allow holders of state allowances to trade those allowances for federal allowances based not on the quantity of state allowances held (i.e., a swap of one state allowance for one federal allowance) but rather on the average price paid for state allowances (i.e., a swap of $100 worth of state allowances for $100 worth of federal allowances).[32] This mechanism would provide an incentive for sources in California to bid up the price of state allowances in the initial phase of California's program to reap greater benefits from future allowance swaps once a federal program is in place. By driving up the allowance prices, such provisions could unintentionally encourage excessive near term, costly GHG emission reductions and increase the supply of GHG allowances at the outset of the federal program.

D. Implications of a Federal Cap-and-Trade System for Other Elements of the AB 32 Scoping Plan

While federal climate legislation may preclude California from implementing its own cap-and-trade system, California could be given discretion to implement other elements of its AB 32 Scoping Plan under federal legislation.[33] If California regulators are given this authority, they should carefully scrutinize the value provided by any state climate policies they seek to retain after implementation of the national cap-and-trade system.

Just as overlap between state and federal cap-and-trade systems would lead to few (or no) incremental environmental benefits from a more aggressive state system, while

[32] Provisions regulating the exchange of state for federal allowances state that "… a person exchanging State allowances under this section receive emission allowances established under section 721(a) in the amount that is sufficient to compensate for the cost of obtaining and holding such State allowances", where "the cost of obtaining a State allowance shall be the average auction price, for emission allowances issued in the year in which the State allowance was issued, under the program under which the State allowance was issued." Sec. 790, Exchange for State-Issued Allowances, H.R. 2454.

[33] For example, while the proposed Waxman-Markey legislation would prohibit states from implementing a cap-and-trade system from 2012 to 2017, it would allow states to implement other GHG policies. Sec. 334. States, H.R. 2454.

imposing additional costs, the same can be said of other types of state policies, such as conventional standards, that target sources already covered by a national (or state) cap-and-trade system. If conventional standards or other mandatory regulations are not binding, then they are irrelevant and neither achieve additional emission reductions nor impose additional costs. However, if these additional policies are binding and affect sources under the umbrella of a state or national cap-and-trade system, then their major effect will be to drive up costs of compliance by requiring more stringent action by California sources. However, these policies will achieve little (to no) incremental environmental benefits because, as with overlapping cap-and-trade systems, additional GHG reductions due to the binding regulations will relax the stringency of the cap for other sources.

For example, implementation of California's 33% RPS alongside a national cap-and-trade system would not achieve any additional GHG emission reductions, because any emission reductions achieved in California would be offset by increased emissions from other sources under the national cap (either inside or outside of California).[34] By contrast, state policies targeting sources (or sinks) outside the national cap, such as in the agricultural and forestry sectors, could potentially achieve greater GHG emission reductions (or sequester additional carbon).

Along with being ineffective at increasing the stringency of state or national climate policy, state GHG policies that overlap with a national GHG cap can raise the costs of achieving GHG targets by reducing the flexibility offered by the national cap-and-trade system to determine *when, where and how* emissions reductions can be achieved. This flexibility ordinarily allows sources subject to the cap to choose the least costly options for achieving GHG targets. State GHG policies can reduce this flexibility by forcing sources to take certain actions to reduce GHG emissions, despite the fact that less costly alternatives may be available in other sectors or other regions of the U.S.

While many state GHG policies would raise costs, certain state GHG policies could lower the cost of achieving GHG reductions if they identify and succeed in eliminating

[34] The proposed Waxman-Markey legislation appears to give state regulators the authority to impose additional requirements regarding federal allowances on sources subject to state regulations. *See* Sec. 334. States. H.R. 2454. Some suggest that such authority provides a mechanism for allowing states to achieve incremental GHG emission reductions from state regulations. For example, such authority could be used to impose additional allowance requirements on sources targeted by state GHG policies to ensure that these policies achieve incremental reductions. However, this proposal would, in effect, penalize targeted sources twice – once for complying with the more stringent regulation and a second time for offsetting the increase in emissions under the national cap.

market failures preventing implementation of cost-effective GHG reduction opportunities.[35] For example, market failures in decisions about investments in energy efficiency can arise due to poor or insufficient information about the financial benefit of undertaking actions that potentially reduce emissions, or due to circumstances when the individuals making emission reduction decisions differ from the individuals who may reap potential benefits from those decision (e.g., through energy savings).[36] Policies might complement a cap-and-trade system by targeting these market failures. For such interventions to be cost-effective, however, they must avoid introducing new policy costs or market distortions that offset the promised gains from addressing the market failures.

Up until this time, CARB's economic analyses of its proposed regulations have failed to take this approach when identifying which policies to include in its AB 32 Scoping Plan and how such policies should be designed. Instead, in the words of one of the peer reviewers of CARB's economic analysis, the analysis "gives the appearance of justifying the chosen package of regulatory measures rather than evaluating it or looking at policy options."[37] The emergence of a national cap-and-trade system places a greater onus on CARB to ensure that its state GHG policies complement a federal cap-and-trade system, rather than simply imposing additional costs on California's economy for little environmental benefit. Because a national cap-and-trade system will reduce emissions leakage and lower the cost of achieving GHG targets relative to a cap-and-trade system limited to California, the net impact of these state policies will be even less favorable when implemented under a national cap-and-trade system.

5. Conclusion

The limited geographic scope of a cap-and-trade system for California sources makes it vastly inferior to a federal system on both economic and environmental grounds. For this reason, California regulators have long recognized the need for a nationwide cap-and-trade system, accompanied by commitments from other countries, to achieve meaningful reductions in GHG emissions. Now that a federal system appears on the horizon, California regulators face a number of important decisions. A federal policy will

[35] For further discussion of the implications of market failures for the design of cost-effective climate policies *see,* Stavins, Robert F., Judson Jaffe, and Todd Schatzki, "*Too Good to Be True? An Examination of Three Economic Assessments of California Climate Policy*, AEI-Brookings Joint Center for Regulatory Studies, Related Publication 07-01, January 2007.

[36] An example of such a principal-agent problem is when a landlord fails to invest in building insulation because the landlord's tenants, not the landlord, would realize the benefits through reduced energy costs for heating and cooling.

[37] Peace, Janet and Liwayway Adkins, Pew Center on Global Climate Change, Letter regarding Review of Economic Modeling Analysis, Peer Review of the Economic Supplement to the AB 32 Draft Scoping Plan, November 2008.

have important implications for California's climate policy. How should California respond?

First and foremost, California regulators should consider whether the development of a federal cap-and-trade system should signal the end of their own. While such a decision poses various tradeoffs, a federal system – absent the complications of overlapping state systems – represents the most cost-effective, environmentally effective, and simplest approach to achieving economy-wide reductions in GHG emissions. The simplicity and uniformity of such a system also encourages the long-run development of effective global institutions for managing GHG emissions. If California does choose to retain its state cap-and-trade system, it faces various challenges in effectively linking its system with other GHG trading programs to take advantage of the potential benefits offered by such linkages.

The implications of the development of federal climate policy for other elements of the AB 32 Scoping Plan are equally significant. While CARB appears to be working hard to maintain its authority to implement state climate policies other than its cap-and-trade system, it should subject these programs to significant scrutiny to be sure they will provide Californian's with value given the additional costs and lack of incremental emission reductions such policies would provide.

Having helped spur movement on a federal cap-and-trade system, California regulators might consider simply declaring victory and focusing on potential contributions they can make to the development of effective national and global institutions for addressing climate change.