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California's Bold New Climate Policy: The Challenges Ahead

By Lawrence H. Goulder

With Governor Arnold Schwarzenegger's signing of the recently passed California Assembly Bill 32, the Golden State has committed itself to the first comprehensive greenhouse gas regulatory program in the United States. The bill requires the state to lower emissions to their 1990 levels by the year 2020, which represents a reduction of about 29 percent from "business as usual" emissions in that year.

The effort is being watched closely throughout the United States and indeed worldwide. California's initiative is a test case. If it succeeds, it could hasten the arrival of federal legislation for a nationwide program. If it fails, it could set back indefinitely further policy efforts in the United States.

The bill does not offer a specific plan for achieving its emissions target. The California Air Resources Board now has until January 2009 to develop a draft plan. The regulations will start taking effect in 2010 and will be in full force by 2012.

This policy brief discusses some major challenges faced by California as it prepares to implement this landmark climate change policy.

Is a State-Level Effort Misguided?

Despite the passage of the climate bill, many California policymakers and citizens question the desirability of California's plan. If skepticism builds, California's initiative could be halted by subsequent legislation. Many doubt the wisdom of imposing emissions restrictions at any level – state, national, or international – given the potential economic costs and the uncertainties as to whether the contemplated emissions reductions can significantly reduce climate

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About The Author

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Goulder's research examines the environmental and economic impacts of U.S. and international environmental policies, including policies to deal with climate change and pollution from power plants and automobiles. His work also explores the "sustainability" of consumption patterns in various countries.

Goulder has conducted analyses for several government agencies, business groups, and environmental organizations. At Stanford he teaches undergraduate and graduate courses in environmental economics and policy, and co-organizes a weekly seminar in public and environmental economics. He graduated from Harvard College with an A.B. in philosophy, and received his Ph.D. in Economics from Stanford.

change. Beyond this general skepticism, some argue that it is especially problematic to implement a *state-level* climate policy.

One objection is that California would enjoy very little environmental benefit from its actions. Carbon dioxide and other greenhouse gases tend to become dispersed nearly uniformly throughout the globe. Hence the beneficial impacts (avoided climate-change-related damages) from California's reductions in emissions would occur throughout the globe. The state would enjoy only a small fraction of the benefits attributable to its emissions reductions.

Proponents reply that even if most of the climate-related benefits occur outside the state, the benefits within California will be substantial. They point out that the reductions called for under the new California law will be significant – about 40 percent of the total emissions reductions required of all of Europe under the Kyoto Protocol – and thus the state's actions could noticeably influence global greenhouse gas concentrations and affect the climate in California and elsewhere. Proponents also emphasize that California is hoping its efforts will catalyze a broader, national effort. If California's initiative hastens the arrival of a national-level policy, it will stimulate additional benefits to the state, the nation, and the globe by expediting emissions reductions elsewhere.

A second major criticism is that unilateral action by California would cause *emissions leakage* – increases in out-of-state emissions that offset the California reductions. Emissions leakage could occur two ways. First, some firms experiencing cost increases as a result of California's regulations might move out of state. To the extent this happens, the regulations would simply cause the location of emissions to switch from California to other states or countries, rather than cause total emissions to decline – obviously in contradiction to the spirit of the effort. Second, the regulations could shift consumer demands in a way that undoes the intended impact on emissions. For example, if emissions by electric power generators are capped, this could lead to higher prices of California-generated electricity, which in turn might induce retailers to substitute imported electricity for the electricity generated within the state. While emissions from power generation within California would decline, the overall emissions associated with Californians' use of electricity wouldn't fall – thus defying the emission-reduction goals of recent legislation.

Proponents counter that emissions leakage can be kept minimal. They mention that the leakage problem related to imported electricity, in particular, can be addressed by requiring California's electricity retailers to be accountable for all of the emissions associated with the electricity they sell – whether or not it is generated by power plants within the state. This would reduce the ability to avoid the emissions cap through increased imports. At the same time, it would be difficult to account accurately for the emissions associated with imported electricity. Imported electricity comes from a variety of sources (hydropower, natural gas fired, coal fired) with very different emissions implications per megawatt-hour. It is not easy to determine what source meets California's demands at the margin – that is, what source would not be utilized if California did not import the electricity. Despite these difficulties, proponents argue that rough estimates of emissions associated with imported electricity would be sufficient to prevent serious import-related leakage.

Where Will the Emissions Reductions Take Place?

As indicated in **Figure 1**, the transportation, electric power, and industrial sectors account for large and comparable shares of the greenhouse gas emissions in California, with agriculture and forestry contributing a smaller share. California's Air Resources Board will need to make crucial decisions regarding how responsibilities for emissions reductions will be distributed across sectors. Although no decisions have been made yet, it seems likely that the responsibilities for reductions will be distributed fairly widely. This is suggested by a March 2006 report by the Governor's Climate Action Team, which indicated that the opportunities for low-cost reductions are

dispersed widely across the California economy. **Table 1** indicates the sources of low-cost opportunities displayed in the Climate Action Team's report. To the extent that the Air Resources Board agrees with this assessment and aims to keep overall costs to a minimum, it will spread the responsibilities widely and thereby take advantage of the lowest-cost options.

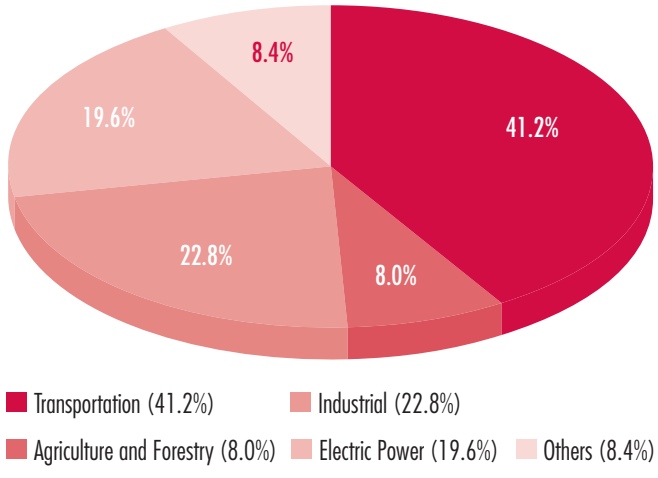
What Policies Should Be Invoked to Bring About the Emissions Reductions?

Another major task is to decide how to bring about the emissions cuts. This is largely left unspecified in the Assembly Bill. However, it is fairly clear that the effort will engage several policy approaches. Prior reports from the Climate Action Team refer to the potential for effective use of "conventional" regulatory tools such as efficiency standards on buildings and appliances and required technology improvements on light-duty vehicles. Many of these tools are already in place and could be made more aggressive under the new climate-policy effort. The effort almost certainly will also involve market-based approaches, such as tax-incentives toward the use of low-carbon fuels or toward land-use practices that promote greater CO_2 absorption, as well as a "cap-and-trade" program that enables emitters to trade emissions rights with one another. Governor Schwarzenegger recently issued an Executive Order that directs the California Environmental Protection Agency to form a Market Advisory Committee to provide input on how market-based policies can contribute to the overall emissions-reduction effort.

The potential smorgasbord of policies is more eleborate than what many economics textbooks might endorse. There is significant potential for redundancy, conflicting incentives, and associated inefficiencies. Yet the use of just one policy instrument to achieve emissions would not be ideal either. Monitoring and enforcement requirements differ across sectors and across greenhouse gases. A particular instrument might be better or worse than another, depending on the sector and the gas involved. Moreover, while one particular market failure is common to all sources of emissions of greenhouse gases – namely, the inability of the market to capture the externality related to damages from climate change – some sectors or activities involve other market failures and may require additional instruments to deal with those failures. No single instrument can address all of the market failures involved, and more than one policy tool may be justified.

That said, there appear to be major advantages to giving a significant role to a particular market-based tool – a cap-and-trade system for reducing emissions. (Cap and trade systems are already in place in the Los Angeles region to address local nitrogen oxide and sulfur dioxide emissions, and in the Midwest and Northeast to deal with sulfur dioxide emissions

Figure 1
Sources of California's Greenhouse Gas Emissions, 2002*



* Relative contributions in terms of CO2 equivalents.

Source: *Climate Action Team Report to Governor Schwarzenegger and the California Legislature,* California Environmental Protection Agency, March 2006.

Table 1
Low-Cost Reduction Opportunities Identified by the Governor's Climate Action Team

Source	Potential Reductions in 2020*
Vehicle Greenhouse Gas Emissions Standards**	30
Incentives to Reduce Vehicle Miles Traveled and Encourage Use of Low-Carbon Fuels in Vehicles	39
Policies to Reduce Emissions of Hydrofluorocarbons and Perfluorocarbons (two greenhouse gases)	11
Waste Reduction and Landfill Methane Capture Programs	6
Forest Management, Aforestation, Fuels Management, and Related Measures	34
Statewide Building, Appliance, and Tire Efficiency Standards	11
Municipal Utilities: Increasing Efficiency and Renewable Energy Programs, Reducing Coal Imports	19
Public Utilities Commission: Renewable Energy Programs	14
Public Utilities Commission: Efficiency, Combined Heat and Power, and Carbon Programs	22
Other	4
Total	**190**
Estimated Required Reduction under AB32	**174**

* Units are millions of metric tons of carbon dioxide equivalents.

** These standards were imposed in Assembly Bill 1493, which passed in 2002. This bill is currently facing a court challenge.

Adapted from *Climate Action Team Report to Governor Schwarzenegger and the California Legislature,* California Environmental Protection Agency, March 2006.

from coal-fired power plants.) Under cap and trade, emitters are given "emissions allowances," with each allowance entitling the owner to a certain quantity of emissions in a specified period (often one year). Emission sources that can reduce their emissions below their entitlement relatively cheaply have the option of selling some of their allowances to other emitters. For such sources, the revenues from the sale will more than offset the costs associated with the additional emissions reductions necessitated by giving up some allowances. Similarly, the sources that face especially high costs of meeting their initial entitlement have the option of purchasing additional allowances rather than installing expensive new pollution-reduction equipment; this reduces their costs of compliance. Thus the system rewards both sellers and buyers, while keeping total emissions within the limit implied by the total number of allowances initially given out. Importantly, it lowers the overall cost to California of achieving that limit by harnessing market forces to bring about emissions reductions where they can be accomplished most cheaply.

The Air Resources Board will face several challenges in deciding how to design and implement a cap and trade system. To begin with, it will need to decide the scope of the system. The greater the share of the economy covered, the greater the potential for cost-savings through allowance trades.

However, monitoring and enforcement issues can recommend a narrower system. Many discussions suggest that the electric power sector and other large point-source emitters, such as cement plants and oil refineries, would be covered under a cap and trade system. Whether the system's coverage is broader than that remains to be seen.

A second hurdle will be to design a system that keeps under control the potential emissions leakage problems described above. Third, it will be important to decide whether it would be useful to integrate a California cap and trade system with emissions-trading systems elsewhere. The European Union now has an active greenhouse gas emissions market. Should California's market be linked to that one? On the one hand, this could promote greater global cost-savings. On the other, it could lead to California emitters' purchasing a significant number of allowances from European emitters in order to avoid cutting back emissions within the state. Many would find this objectionable.

A final important issue is the potential for "hot spots" – a clustering of pollution in some areas. Although a cap and trade system limits aggregate emissions, the trades can potentially cause pollution to concentrate in some locations. Trades might affect the geographical distribution not only of carbon dioxide emissions but of other "local" pollutants that get bundled with CO_2 emissions. Because of adverse health effects associated with local pollutants, the possibility that trades could cause a clustering of these pollutants raises important ethical concerns. A cap and trade system would need to be designed in such a way as to prevent serious hot spots.

What Will It Cost?

The potential costs of California's effort are subject to disagreement. Some recent studies have suggested that the required emissions reductions can be achieved at no overall cost to the California economy. According to two computer models – the Environmental Dynamic Action Review Model commissioned by the Climate Action Team and the Berkeley Energy and Resources Model funded by the non-profit Energy Foundation – California's new regulations would trigger technological innovation that lowers long-run costs and fully offsets the initial costs of reducing emissions. A basis for this result is the models' treatment of pre-existing market failures according to which producers fail to invest sufficiently in profitable technological innovation and according to which consumers fail to choose energy-efficiency durable products that could save them money overall. Policies that correct such market failures can reduce greenhouse gas emissions at no cost. At the same time, recent modeling by the consulting firm CRA International challenges the assumptions of these earlier studies and suggests that the state would face significant costs from the new initiative. The Air Resources Board will be holding at least one conference in the near future to examine the different assumptions and structures of the various models in hopes of providing greater clarity as to the potential economic impacts.

The Future

In launching this bold initiative on climate change policy, California continues its tradition of being a first-mover among U.S. states on environmental policies. No one knows for certain what the ultimate impacts of this effort will be. But provisions of AB32, a recent Executive Order, and subsequent discussions reveal serious attention to important design issues such as sector coverage, the choice of policy instruments, and monitoring and enforcement – as well as to striking a good balance between cost-effectiveness and a fair distribution of the regulatory burden. These are encouraging signs.

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