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CASE STUDY

California's climate and energy policy for transportation

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ABSTRACT

California has been a leader in advancing policy solutions to environmental and energy challenges since the 1960s. Many of those policy innovations have spread worldwide. Beginning with statutes passed by the California legislature starting in 2002 and continuing through today, California is adopting a comprehensive set of policies, regulations, and incentives to reduce greenhouse gas emissions, with particular emphasis on those associated with transportation—vehicles, fuels, and mobility. This paper reviews California's policy and regulatory approach related to transportation and highlights energy and climate policy lessons. The portfolio policy approach requires wise oversight, which will become more critical as California begins to adopt policies and rules to achieve more aggressive targets for 2030 and beyond. The shortcomings of a California-only policy approach will be overcome by expanding policy collaboration with other jurisdictions.

1. Introduction

California pioneered car-centric cities and lifestyles. By 1930, one of every five California residents owned a car, a level not reached in Western Europe until the 1970s, 40-years later. With motorization came increased mobility, economic activity, and suburban living. It also brought traffic congestion, high oil use, air pollution, and greenhouse gas (GHG) emissions. The downside of cars became visible, literally, by the mid-20th century, when brown smog started to blanket Los Angeles, heightening California residents' awareness of the health, economic, and esthetic problems of the car-dependent lifestyle.

Now as part of a larger effort to address climate change, California is building on earlier air pollution policies to devise broader approaches to tame motor vehicles, by reducing their energy use and GHG emissions. Whereas most of the international discussion of climate solutions until recently has focused on electricity and coal, in California greater emphasis has been given to transportation, where three-quarters of all oil consumed and over 40% of all greenhouse gases emitted are associated with the movement of goods and people. Because cars, oil, and environmental leadership are intertwined, any strategy to reduce oil consumption and greenhouse gas emissions must target transportation, especially in California.

A key agent in the design and implementation of climate policy is the California Air Resources Board (CARB), the agency most responsible for California's leadership in air pollution regulation and policy. Since its establishment in 1967 by Governor Ronald Reagan, CARB has been effective at regulating conventional air pollutants. Its clean air policies were imitated by the federal government and around the world, leading to the commercialization of catalytic converters, reformulated gasoline, zero emission vehicles, and many other technology innovations. As Daniel Yergin suggests *in The Quest: Energy, Security, and the Remaking of the Modern World*, CARB became the "de facto national authority" [1].[1] Now its mission is evolving and spreading as it extends this leadership to climate policy and regulation.

The agency oversees a budget of $300 million and a staff of over 1000 employees, and is governed by a 12-member board appointed by the governor and confirmed by the state Senate. The Board, with broad-ranging regulatory authority granted by the Legislature, operates in an independent manner through formal notice-and-comment rulemaking. Its decision-making is highly transparent, taking place in public at monthly board meetings, usually attended by hundreds of people and broadcast online.

CARB has adopted a far reaching set of climate rules and policies that cover virtually all aspects of the energy system, surpassing

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[1] As described later, CARB's authority emerged from the state's early and effective commitment to air pollution reduction.

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Europe in crafting the most comprehensive approach to climate policy in the world. Although the European Union adopted a carbon cap-and-trade program before California and has more aggressive greenhouse gas standards for vehicles, California's cap-and-trade covers more sectors, including transport, and the state has adopted a broad web of policies that range from deep energy efficiency standards for appliances and buildings, to reduced use of global warming gases by industry, to reduction of methane gases on farms.

Two political circumstances favor California's climate policy leadership. First, CARB has unique authority to regulate vehicles and fuels that are used within its borders. California suffered unusually severe air quality problems as early as the 1940s and adopted requirements for cleaner vehicles and fuels long before the federal government was moved to act. As a result of this leadership, the U.S. Congress has repeatedly preserved the state's authority to regulate vehicle emissions, as long as its rules are at least as strong as the federal ones. The California Legislature took advantage of this unique authority in 2002 when it directed CARB to pursue another first: to set standards on vehicular emissions of greenhouse gases.[2]

Second, California has more political space to maneuver than many other states. The Detroit car companies have relatively small investments in California and coal companies are absent. Plus, it benefits from a diverse resource base of solar, wind, ocean, and geothermal energy resources, which has created its own political constituencies. Lastly, the state is home to the largest high-tech venture capital industry in the world, which tends to favor clean energy and environmental policy. As a consequence, California politicians have greater public support to pursue aggressive energy and climate policies than their counterparts in many other states.

California's foundational climate law (AB32, the Global Solutions Act of 2006) set a specific target for annual state-wide emissions — to return to 1990 levels by the year 2020 and gave the Air Resources Board broad legal authority to set policy to achieve the target.

In this article we assess policies adopted by California and their effectiveness in stimulating innovation, encouraging changes in consumer behavior, and achieving large reductions in oil use and greenhouse gas emissions. The intent is to document California's policy innovations and explore its role as a policy model for the rest of the country and the world, recognizing that the next iteration of policies and rules will be more challenging in all ways.

2. Elements of the California transportation policy model

Good policy generally encompasses the following attributes: addresses both the short and long term, harnesses market forces, is performance based, equitable (across geographical regions, socioeconomic groups, and companies), transparent to all stakeholders, easy to administer, and economically efficient.[3]

Because climate change is a global problem, the solutions must eventually be pursued globally. No single country or state by itself can hope to stabilize the climate on its own. The international community, at past meetings of the United Nations Conference of Parties, has not yet succeeded in creating comprehensive climate protocols, financing programs, and binding mitigation policies.[4] Thus, California leadership is not only appropriate, but potentially of great value to the nation and the world.

Another widely held view is that the solution to our energy and climate problems is getting the prices right—sending the correct price signals to industry and consumers. In a general sense, internalizing the cost of climate change across the economy is essential and will make many of the other policies more efficient and less costly. But, at least for the foreseeable future, prices that are anticipated from existing or proposed carbon taxes, fuel taxes, or carbon cap and trade programs would not put us on a path toward deep reductions in transportation emissions without complementary policies. The explanation is behavioral and political: while the transport sector does respond to changes in fuel prices, especially over the long term, the response is insufficient to achieve large changes in vehicles, fuels, and driving behavior, at least in the range of prices that are politically acceptable. As we will see, California's initiatives are based on a broad set of policy instruments, with regulatory instruments expected to have a far greater effect in the near term in reducing energy use and GHG emissions than market instruments.

Europe provides an example of why pure market instruments are inadequate for the foreseeable future. It has gasoline taxes almost twice those of the US, and still finds the need to adopt aggressive performance standards for cars to reduce greenhouse gases and oil use. Europe's high fuel taxes certainly have an effect— on average vehicles are smaller, lighter, and people drive significantly less—but the resulting reductions in fuel use and greenhouse gases still fall far short of the climate goals of the European Union (and California). Large carbon (and fuel) taxes are efficient in an economic sense, but because consumer purchase and driving behavior is only moderately sensitive to fuel prices, the effect on vehicles, fuels, and driving are modest. The European experience suggests that, absent other policy, very large taxes would be needed to motivate changes in investments and consumer behavior consistent with climate goals. Economic research supports this finding [2]. Moreover, the effectiveness of taxes and other market instruments in reducing oil use and emissions are further inhibited by a long list of market failures and market conditions—new technology risk, technology spill-over and long development times, risk aversion by buyers who are not sure they will actually accrue the savings from more efficient vehicles, and more. As a result, a variety of policies are needed to overcome these various market failures and barriers.

In summary, the California policy model is a comprehensive mix of rules, incentives, and market instruments. Some economists would describe this approach as second best, since it does not rely on pure market instruments. Getting the prices right and adopting international climate agreements are clearly important, and will be instrumental in reducing GHG emissions, but progress can and will, be made within the transport sector in the next decade with regulatory instruments.

To describe and critique California's GHG policy model, the complexity of the transportation system is simplified into a three legged stool, with each leg representing a critical area of transformation: vehicles, fuels, and mobility (with mobility encompassing land use and infrastructure). The three legs are addressed below, beginning with the strategy that has the greatest potential for emissions reduction over the next few decades (for the US).

3. The first leg: vehicles

American vehicles stand apart from those of other major industrialized countries. They are much larger, more powerful, and driven further, and therefore consume much more

[2] In 2002, the legislature passed, and Governor Davis signed, AB1493, known as the Pavley Act. CARB adopted implementing regulations in 2004, but they were blocked until 2009 by lawsuits, as described later.

[3] For overview of policy options and strategies to reduce greenhouse gas emissions from transportation, see National Research Council, *Policy Options for Reducing Energy Use and Greenhouse Gas Emissions from U.S. Transportation*. Transportation Research Board of the National Academies, Special Report 307, Washington, DC, 2011.

[4] The two transportation activities where international agreements are needed and modest progress is being made are maritime and air transport, though these activities represent a small share of total transport emissions and energy use.