

Testimony of Daniel Sperling

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Low Carbon Fuel Standards

Chairman Markey and distinguished members of the committee, thank you for inviting me to testify before you today. My name is Dan Sperling. I am professor of engineering and environmental science and policy and Director of the Institute of Transportation Studies at the University of California, Davis. I also serve on the California Air Resources Board, which I was appointed to by Governor Arnold Schwarzenegger in February 2007.

I have spent most of my professional life studying alternative transportation fuels. I have authored or edited 11 books and over 200 technical papers, most of them on transportation energy (see <http://www.its.ucdavis.edu/people/faculty/sperling>). My most recent book is *Two Billion Cars* (Oxford University Press, 2009), co-authored with Deborah Gordon. I was founding chair of the Alternative Fuels Committee of the Transportation Research Board of the National Academies, have served on 11 National Academies committees in recent years, have testified numerous times to U.S. House and Senate committees on transport energy issues, was lead author of the transportation chapter for the Intergovernmental Panel on Climate Change (IPCC), and currently chair the Davos World Economic Forum committee on transportation.

Perhaps most relevant to this testimony, two years ago Governor Schwarzenegger asked the late Professor Alex Farrell of UC Berkeley and me to develop the initial design of a low carbon fuel standard (LCFS). We headed a team of 20 professors and graduate students from UC Berkeley and UC Davis that spent six intensive months meeting with oil companies, electricity companies, environmental groups, biofuel producers, and various experts on WTO rules, environmental impacts, fuel costs, and lifecycle analysis. I accepted Governor Schwarzenegger's request to develop the initial design of an LCFS because I believed at the time that the LCFS promised to be the most important alternative fuel policy ever adopted. I believe it now more than ever.

This week, the California Air Resources Board is voting to adopt the Low Carbon Fuel Standard, largely the way we proposed it two years ago. It requires a 10% reduction in greenhouse gas emissions per unit of energy (gCO₂-eq/MJ) for gasoline and diesel fuel. Eleven other states have signed MOUs to also adopt the LCFS, and the European Union is moving toward adoption of policies that closely resemble a low carbon fuel standard.

Key features of a low carbon fuel standard (LCFS)

- **All transportation fuel alternatives included.** It is best to create a policy that gives producers maximum flexibility to select from a suite of low carbon alternatives. California was obligated to target only gasoline and diesel fuel, because it has limited jurisdiction over national (and international) modes of travel. The US government can regulate national activities, and has the standing to work with other governments to regulate international air and maritime activities.
- **Emissions measured on a lifecycle basis.** The scientifically correct way is to include all emissions from the source to the end use. If one does not follow this method, regulations and policy become arbitrary, redundant, and/or defective. The science of lifecycle analysis is well established and the data are, for the most part, well understood. Improvements will be needed, especially regarding land use effects of fuels. Much research is now underway to create a stronger scientific foundation. The challenge is to put in place a regulatory process that handles scientific uncertainty in a responsible fashion and updates the land use impacts as the science improves. California is doing just that.
- **Market forces are harnessed to stimulate innovation.** Almost all vehicles operate on gasoline and diesel and almost all transport energy is made from oil. Considerable investment and innovation is needed to create commercial alternatives. The LCFS allows energy providers to buy and sell credits amongst each other, creating a market for LCFS credits and reducing the overall cost of developing low carbon fuels. The LCFS will encourage oil companies to become energy companies. The ultimate goal is to use creative capitalism to break our dependence on the dirty fuels of the past in order to accelerate the transition to a low-carbon future. An important complementary policy, to facilitate technological progress, is enhanced federal investment in R&D—particularly at colleges and universities—to find new cost-effective, low-carbon energy alternatives.
- **Creates durable framework** for orchestrating the near and long term transition to low-carbon alternative fuels. The history of alternative fuels is one of *ad hoc* and short-lived policy actions. A *fuel du jour* phenomenon has been created with the media and policymakers jumping from one solution to another, from synfuels in the 1970s, to methanol in the '80s, battery electric vehicles in the '90s, hydrogen in the early years of this decade, corn ethanol a few years ago, and now plug-in hybrids. We need a more permanent policy framework that sends consistent signals to industry and consumers.
- **Government does not pick winners (or losers).** It is not mandating any particular fuel. It is deferring to industry and consumers to determine the best way to meet oil and GHG reduction targets. Because all fuel and vehicle options are included, the most cost-effective solutions are chosen. The mechanism that makes this policy work is the use of performance standards based on lifecycle measurements. Politics does not intervene. The market determines the best way of meeting the targets.
- **Achieves both energy security and climate goals.** Producers of oil sands complain that they will be put out of business. This is not true. The LCFS does not preclude any fuel. Rather it provides an incentive for producers of high carbon fuels to produce the fuel more efficiently and with less carbon. Thus oil sands producers are already learning to improve their efficiencies, to use less fossil energy as process energy, and to explore ways to sequester carbon emissions. Gasoline could be made from oil sands with as much as 10% less GHG emissions than gasoline made from conventional oil. Importantly, most of the truly low carbon fuels will be home grown—cellulosic biofuel made from waste or on marginal lands, and electricity and hydrogen made in the U.S.
- **Reduces oil price volatility and caps petroleum price increases.** The LCFS, combined with tightening fuel economy (and GHG) standards for vehicles, will be highly effective at reducing demand for oil.

Proposed National LCFS

The proposed national LCFS is modeled on the California LCFS, with the same general attractions—but with two important differences.

First, it does not include biofuels until 2023. It assumes the Renewable Fuel Standard (RFS) enacted in the EISA of 2007 will handle biofuels until then. The result is that the national LCFS only targets petroleum and non-biofuel options (mostly electricity, natural gas, and hydrogen). Failure to integrate the RFS into the LCFS until 2023 is problematic. Keeping biofuels separate from other alternative transportation fuels reduces the flexibility of the market to respond to the LCFS targets. More importantly, the RFS fails to incentivize the production of very low-carbon fuels. That is because the RFS allows some fuels to be only 20% better than gasoline, others 50% better, and some 60% better. There is no incentive to produce very low-carbon fuels, such as fuels made from crop residues, forestry thinnings, and urban waste—that emit over 80% fewer emissions. And yet, the very low carbon biofuels are exactly the ones desired as the mainstay of a large future biofuels industry. The LCFS is superior. It does not create artificial categories, and thus provides incentives for continuous improvement.

A second major difference is lower targets. The California LCFS sets a target of 10% reduction in greenhouse gases (per unit of energy) by 2020, with further reductions to follow. The national LCFS sets a target of 0% by 2022, anticipating that increasing use of oil sands and very heavy oil will be offset by increasing use of electricity, natural gas and hydrogen. The target increases to 5% in 2023, when biofuels shift over from the RFS program, and then 10% in 2030. The national standards could be a bit higher, but are probably sufficient to incentivize new investments and new behaviors by energy companies.

Recommendations

1) The Renewable Fuel Standard should be integrated into the national LCFS as soon as possible.

We will get very low-carbon fuels sooner with the LCFS. The LCFS provides more certainty and more incentive to biofuel providers.

2) Targets should be aggressive, but there is no scientific way to determine the correct target. It depends in part upon the urgency of oil import and greenhouse gas reduction goals, and in part upon highly uncertain forecasts of future oil prices and technological progress in improving biofuels, electric-powered vehicles, and hydrogen fuel cell vehicles. If one believes the goals are urgent, that oil prices will hover above \$80 per barrel or so, and that technological progress will be swift, then the targets are too low—and should be a few percentage points higher. I lean toward higher targets, but the top priority should be to implement the LCFS.

The top priority is to implement the LCFS. Inclusion of the LCFS in a national energy and climate bill, even in its limited form, should be central to any strategy to reduce oil use and GHG emissions. The LCFS provides a durable policy framework that will guide the transition to low-carbon alternative fuels. It responds to both energy security and climate goals. It does not pick winners, is based in science, and harnesses market forces. It is a model of good policy.