UC experts detail new standard for cleaner transportation fuels

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University of California experts today released their much-anticipated blueprint for fighting global warming by reducing the amount of carbon emitted when transportation fuels are used in California.

This “Low Carbon Fuel Standard,” designed to stimulate improvements in transportation-fuel technologies, is expected to become the foundation for similar initiatives in other states, as well as nationally and internationally.

The new standard was commissioned in January by California Gov. Arnold Schwarzenegger. He asked the university’s top transportation-energy experts to design a standard that would reduce carbon emissions from fuels by 10 percent by 2020. Carbon and other greenhouse gases trap heat in the Earth's atmosphere and are a major cause of global climate change. In California, transportation fuels account for about 40 percent of all greenhouse-gas emissions.

The standard’s authors are Professor Alex Farrell, director of the Transportation Sustainability Research Center at UC Berkeley, and Professor Daniel Sperling, director of the Institute of Transportation Studies at UC Davis.

“This new policy is hugely important, and has never been done before,” said Sperling. “It will likely transform the energy industries. And the 10 percent reduction is just the beginning. We anticipate much greater reductions after 2020.”

In Part 1 of their report, completed in May, Farrell and Sperling evaluated the technical feasibility of achieving the 10 percent cut by 2020. They identified six scenarios based on a variety of different technologies that could meet or exceed this goal, and concluded that the goal was ambitious but attainable. At the end of June, the California Air Resources Board voted to start working toward that goal, with the new standard taking effect by January 2010.

Today, in Part 2, Sperling and Farrell examine many of the specific policy issues involved in designing a low carbon fuel standard. The LCFS, together with California's vehicle greenhouse-gas standards, will advance automobile technologies and contribute significantly to achieving California's climate change goals.

"Stabilizing the climate will require major changes in the coming years, and the new fuels that will come on the market in response to the low carbon fuel standard will be an important part of that change," said Farrell. "One of the key roles for the state agencies will be ensuring that the competition among the different fuels results in real carbon emission reductions, more consumer choice, and minimal costs."

Some highlights of the report:

-- Gasoline and diesel fuel refiners, blenders and importers: Gasoline makes up 70 percent of California's transportation energy, diesel 17 percent, and jet fuel 12 percent. (Included in the gasoline and diesel figures are biofuels blended with or substituting for fossil fuels.) The report recommends that the new LCFS cover all gasoline and diesel. (Aviation is exempt from regulation by international treaty, although the standard might allow emissions credits for cleaner jet fuels.) The point of regulation should be the refiners, blenders and importers of petroleum fuels.

All gasoline and diesel fuel providers would be required to track the life-cycle global warming intensity (GWI) of their products and reduce this value over time. (The term life cycle refers to all activities included in the production, transport, storage and use of the fuel.)

The report suggests that petrofuel providers would reduce their greenhouse-gas emissions in a variety of ways, including blending more biofuel with gasoline and diesel; buying low-carbon fuels and emissions credits from other producers; making refineries more efficient; and using lower-carbon sources of energy to run refineries.

The authors recommend that the new standard require only modest reductions in carbon intensity in the early years, and greater reductions later, as innovations reach the market.

-- Non-liquid fuel providers (electricity, natural gas, propane and hydrogen): These firms should be given the option to participate in the LCFS, most likely by selling emissions credits to petrofuel providers.

-- Low-carbon biofuel providers (fuels from plant and animal sources, such as corn, switchgrass and food waste): Revenue from selling emissions credits will help these firms recoup investments made in innovation and learning.

-- Passenger vehicle owners: The LCFS will bring a greater variety of fuels to the market. Fueling infrastructure will evolve (such as E85 filling stations, dedicated electric vehicle charging stations and meters in residences, and hydrogen delivery systems). The menu of fuel choices might vary regionally, depending on local availability, so that in some areas of the state, there would be more electric vehicles; in others more hydrogen, and in still others more biofuel.

Consumers will be able to keep the gasoline-powered cars they drive

today for many years, as fuel providers lower the global warming effects of gasoline. They will also have more options for new vehicles and fuels in the future.

-- Trucking, construction and farming vehicle owners: The standard should apply to all gasoline and diesel used in transportation, including freight trucks and trains, and off-road machinery such as construction and agriculture equipment. There are opportunities for double benefits here, such as switching to electricity for freight handling or for overnight truck use, which reduces carbon emissions, air pollution and noise.

-- Biofuel farmers and manufacturers: Growing more biofuel crops (feedstocks) will have mixed effects on greenhouse-gas emissions. If biofuels are to be cleaner than fossil fuels, they must: 1) use advanced production methods (some of which are available now), 2) be derived from feedstocks grown on degraded land, or 3) be produced from solid wastes or agricultural residues.

-- Administrators: The California Air Resources Board will require additional resources to develop and enforce the new standard. It is imperative that neither the state administration nor the Legislature expect LCFS administration to be a peripheral set of duties shoehorned into current operations without explicit funding. The California Board of Equalization may play a role. Certainly the California Energy Commission will; it already manages the Petroleum Industry Information Reporting Act (PIIRA) program, which requires firms that ship, receive, store, process and/and sell crude oil and petroleum products in California to submit detailed, frequent reports on their activities. And the California Public Utility Commission will have to grapple with tricky questions of how regulated local electricity providers should compete with the highly competitive global oil industry.

-- Scientists and policy analysts: The report identifies many questions

that require further study, and also recommends periodic reviews and assessments. They include: reviews of protocol and methods (but not, the authors emphasize, of emissions targets); study of the sustainability impacts and lifecycle emissions of existing and new fuels; and a cost analysis of the LCFS following the cost-effectiveness approach used in evaluating the U.S. Clean Air Act.

-- Environmentalists: In addition to climate change, the report recommends that fuel providers report on the sustainability and environmental justice implications of the LCFS. And it calls on the state to ensure that sensitive lands are protected from conversion to biofuel production.

Links to additional information:

Full text of “A Low Carbon Fuel Standard for California,” Parts 1 and 2
www.energy.ca.gov/low_carbon_fuel_standard/

UC Berkeley Transportation Sustainability Research Center
www.its.berkeley.edu/sustainabilitycenter/

UC Davis Institute of Transportation Studies (ITS-Davis)
www.its.ucdavis.edu

Governor's Executive Order S-1-07 gov.ca.gov/index.php?/executive-order/5172/

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https://phys.org/news/2007-08-uc-experts-standard-cleaner-fuels.html