



# Low Carbon Fuel Standard

## Reducing Global Warming Pollution from California's Transportation Fuels

California Climate Choices

A Fact Sheet of the Union of Concerned Scientists

To avoid the worst consequences of global warming, California must not only make our cars and trucks more fuel-efficient and less polluting---we must also cut heat-trapping emissions from the transportation fuels that power our vehicles. The California Air Resources Board is developing a **Low Carbon Fuel Standard (LCFS)** with the potential to help meet our goals under the state's global warming plan.

**Transportation is the single largest source of California's global warming pollution, accounting for 38 percent of the state's emissions.** California's vanguard approach to controlling global warming pollution, including the Global Warming Solutions Act (AB32) and strong standards for new vehicles, is putting the state's fleet of vehicles on a low-carbon track. The Low Carbon Fuel Standard would, for the first time ever, hold fuel providers responsible for global warming pollution from the production and use of transportation fuels.

### Background

In January 2007, Governor Arnold Schwarzenegger established a statewide goal of reducing the global warming pollution from California's transportation fuels by at least ten percent by 2020. The LCFS will require California fuel providers to demonstrate continual cuts in global warming pollution for every unit of energy delivered to the vehicle. The California Air Resources Board is

developing regulations for the low carbon fuel standard as an early action under the Global Warming Solutions Act, with a final decision expected in April, 2009. The California standard will focus first on fuels used for cars, trucks, and buses.

Under a well-designed LCFS, fuel suppliers must reduce the life cycle emissions of the fuels they sell on an average per-gallon basis. Rather than promoting particular technologies or specific fuels, fuel suppliers are free to choose how they meet the emissions targets. For example, they could blend lower-carbon biofuels, such as cellulosic ethanol (ethanol made from a wide variety of plant materials including wood waste, corn stalks and grasses), into the gasoline they sell; sell low carbon biofuels as E85 for use in flex fuel vehicles; reduce emissions from the refining process; or sell natural gas for use as a transportation fuel. Market mechanisms allow for trading credits, which provides additional flexibility and lowers the cost of compliance. For example, fuel suppliers can purchase credits from electric utilities that supply low carbon electricity to plug-in hybrids or battery-powered electric vehicles.

By allowing compliance flexibility, the LCFS supports innovation in transportation fuels while contributing to both energy and climate security.

### Accurate Lifecycle Global Warming Pollution

A low carbon fuel standard is only as good as the regulations and measurements upon which it is based. A LCFS must be based on the



full lifecycle global warming pollution of the fuel in question, including emissions generated at the extraction source, through the refinery process and all the way to the tailpipe of the vehicle ("well-to-wheels"). For biofuels, this means all the emissions from tractors and fertilizer used to grow the crop, all the energy used to convert the crop to a fuel, and other indirect sources of pollution, including emissions generated from changes in land use resulting from increased biofuel production. For unconventional fossil fuels like tar sands or oil shale, the lifecycle will include all the extra processing that is required to make marketable fuels.

### Inclusion of Indirect Emissions is Essential

The world's agricultural economy is changing. Increased demand for crops to make fuel is contributing to the clearing of additional land for agriculture, and, by raising global commodity prices, inducing farmers in other countries to plow up sensitive ecosystems (including rain forests in South America and



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Southeast Asia that have a high degree of biodiversity). For some carbon-rich land types such as forests, a great deal of global warming pollution can be released from the soil and trees when this land is cleared and plowed. While there is no scientific consensus about the exact magnitude of indirect land-use effects, and details of the methodology used to measure these effects are still being developed, scientists generally agree that the impact is real and significant.<sup>1</sup> Any fuel policy that ignores these indirect consequences of biofuels production can lead to perverse outcomes that appear to decrease emissions in the US fuel sector, but actually increase global warming pollution worldwide. Biofuel life cycle analysis should account for emissions associated with indirect land-use changes based on the best available science.



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## Why Adopt an LCFS?

### *Promote Improvements in the Supply Chain*

Using full lifecycle accounting of emissions provides an incentive for improvements anywhere along the supply chain for fuels. For example,

<sup>1</sup> See: UCS. Land use changes and biofuels. Online at [http://www.ucsusa.org/clean\\_vehicles/technologies\\_and\\_fuels/biofuels/addressing-the-global-warming.html](http://www.ucsusa.org/clean_vehicles/technologies_and_fuels/biofuels/addressing-the-global-warming.html).

an ethanol production facility that uses coal for process heat creates much more global warming pollution than one that uses biomass. Under an LCFS, the ethanol from the biomass-based facility will have lower lifecycle emissions, and this will result in more credits for that ethanol supplier in the LCFS credit marketplace and ultimately a more profitable operation.

### *Protect against High-Carbon Fuels*

The LCFS creates an incentive to use clean fuels and a matched disincentive for the use of especially polluting fuels. Coal-to-liquids technology, for example, produces lifecycle global warming pollution almost twice that of gasoline. Under the LCFS, any fuel supplier that sells this fuel would increase their average emissions. They would need to use even more low-carbon fuels, or purchase credits from others to meet the standard. In this way, the dirty fuels would have to pay the price for their higher pollution. In effect, an LCFS creates a level playing field where all fuels can compete according to the overall benefits they provide and their cost.

### *Create Choices and Spur Innovation*

The LCFS does not rely upon assumptions about the technical or commercial feasibility of any particular technology. The standard provides regulatory certainty for the fuel suppliers and for innovators and investors in emerging low carbon fuel technologies without picking winners among these technologies. Whether or not cellulosic ethanol, plug in hybrids or hydrogen fuel cells prevail in the marketplace will depend on their ability to deliver cost-effective low-carbon fuel, rather than government mandates to use particular technologies or fuels. But as investors consider these technologies, they have the certainty

that there will be a steadily growing market for low-carbon fuels, regardless of the price of oil. This will spur investment and let the marketplace decide on the ultimate winners.

## **Avoiding Pitfalls: Crafting a Strong Low Carbon Fuel Standard**

### *Food security*

Concerns about the use of food crops such as corn and soybeans to make biofuels have been growing due to the sharp increase in food prices and the volatility of fuel prices, related in part to the same global market pressures described above regarding indirect emission. Based on current evidence, UCS supports moving away from corn- and soy-based fuels towards biofuels made from waste or other resources that can be obtained in a more responsible and sustainable manner.

### *Protect California's air quality and environment.*

For the combustion of the fuel, the LCFS should assure there is no increase in criteria pollutants or air toxics. The LCFS should also provide safeguards to promote safe, sustainable production and protect against serious adverse environmental or public health impacts. For example, liquid coal can level mountains and pollute land, water, and air. Intensive biofuel production can result in harmful impacts to soil quality, food supplies, water resources, and biodiversity. Marrying the low carbon fuel standard with protections for air quality and the environment will help steer production towards sustainable energy pathways.

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