

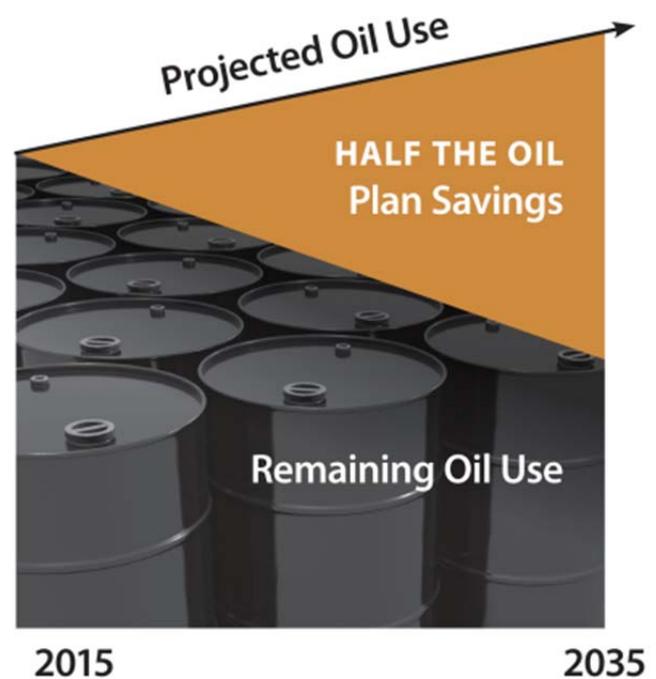
We can cut the United States' projected oil use in half over 20 years by relying on efficiency and innovation, and California is already leading the way. Smart policies and support for innovative technologies means that Californians—who use the most transportation fuel in the nation¹—are getting access to cleaner cars, better biofuels, more electric vehicles, and new transportation options. This progress means a future with more money in Californian's pockets, good jobs, less pollution, and leadership on transportation technology founded on a more secure energy supply.

These benefits are thanks in large part to the complimentary policies California has put in place over the past decade: California's low carbon fuel policy, advanced clean car standards, and sustainable communities strategy (SB375). Together these innovative clean energy policies are helping to put California on a path to cut our carbon emissions back to 1990 levels by 2020.

California's Low Carbon Fuel Standard

Oil and other petroleum products are the largest source of global warming pollution in the nation.² Because of that and the fact that California uses petroleum-based fuels for 96 percent of transportation needs, transportation accounts for around 40 percent of California's global warming pollution.³ Another of the state's largest polluters is its oil refineries, which emit 19–33 percent more global warming emissions per barrel of oil refined than those in any other major U.S. refining region, primarily because California's mix of crude oils is actually heavier and "dirtier" and requires more complex processing.⁴ The state's Low Carbon Fuel Standard (LCFS) will help address both of these major sources, and, along with cleaner cars and other solutions, can help put the state and the nation on a path to cut our projected oil use in half over the next 20 years.

The Low Carbon Fuel Standard gradually cuts global warming emissions from our transportation fuels over ten years, largely by cleaning up existing fuels and increasing California's use of cleaner alternative fuels. The policy focuses on reducing the carbon intensity of fuels by 10 percent by 2020, using a technology-neutral performance-



based approach. Each fuel is judged by its full life cycle—the total carbon emissions associated with the fuel's production, its transportation from its origin to consumers, and its tailpipe emissions. This means that fuel producers can comply in many ways. One approach is to sell greater amounts of cleaner fuels or buy credits from others who do so. Another approach is to clean up the production process for existing fuels, whether by reducing flaring during oil extraction, or reducing energy use at refineries and biofuel production plants.

Market-based mechanisms allow fuel suppliers to choose the most cost-effective mix of fuels that meet the standard's requirements for declining carbon intensity—these fuels include natural gas, electricity, biofuels, and can accommodate innovative new technologies as they become widely available, like "cellulosic" biofuels made from wastes and perennial grasses and hydrogen made from natural gas or renewable resources. The mix of these fuels is set by the marketplace, as the different clean fuels compete to cost-effectively meet the carbon intensity goals of the policy. California's LCFS also ensures that our petroleum-based fuels don't get dirtier over time and provides incentives for oil companies to adopt measures to

reduce pollution and enact best practices, both in and outside California.

Delivering low-carbon biofuels, minimizing competition with food

Just as some farmers are placing wind turbines on their land, others are selling their agricultural waste, like corn cobs and stalks, or growing perennial grasses on marginal land that is less suitable for food farming. These cellulosic biofuels can be a key part of cutting oil use and emissions, but the path from today's food-based fuels to better cellulosic biofuels is tricky. The widespread use of corn ethanol in the United States, biodiesel in Europe, and sugarcane ethanol in Brazil has created an economic link between prices for food and prices for fuel with profound consequences for agriculture, tropical forests, and the availability of food for the world's poor. While policies may have forged this link between food and fuel, simply ending these policies will not sever it.

California's LCFS is a leading example of how a carefully crafted policy, developed in consultation with stakeholders and experts, can move biofuels forward in the right direction while avoiding unanticipated consequences. Because a fuel's carbon intensity is based on its full lifecycle emissions, including indirect emissions that measure its impact on food markets and the extent to which it encourages deforestation, the LCFS guides the market, driving a technology evolution towards cleaner fuels, including biofuels that minimize competition with food.

The support that California's LCFS provides for the cleanest biofuels is essential to help the young cellulosic biofuels industry grow. There are real limits to the corn, sugar and vegetable oil that should be used to make biofuels, but the United States has vast non-food biomass resources that can be used to make very low-carbon fuels.⁵ Driving this technology out of the start-up companies in California's high tech centers and into widespread use is essential to cutting our nation's oil use in half over the next twenty years, as described in UCS's Half the Oil plan.⁶

California's LCFS also sets an example for other states and

the federal government. For example, the federal Renewable Fuels Standard (RFS) mandates larger quantities of biofuels, expanding demand for food-based fuels. The carbon focus of the LCFS helps steer California beyond food-based fuels within the volumes mandated by the RFS. The LCFS itself is not driving larger volumes of biofuels beyond what is required by the RFS, but it is shifting the RFS fuels in a cleaner direction without increasing pressure on food prices.

The rule's progress is also carefully tracked through a built-in regulatory review timeline. It was revised in 2011, and it continues to undergo technical review by land use change experts and agricultural economists so that it can be adjusted to further avoid unintended consequences as the science evolves.

Protecting forests by moving beyond food-based biofuels

Another advantage of the LCFS focus on lifecycle accounting is that it can help avoid deforestation from biofuels. All food-based fuels risk deforestation because they accelerate the expansion of agriculture. But the LCFS includes land use in its accounting, steering the market towards biofuels that minimize deforestation now, and ultimately toward those that avoid it altogether by relying on grasses that are grown on lands not suitable for agriculture or wastes, such as municipal solid wastes or corn stalks.

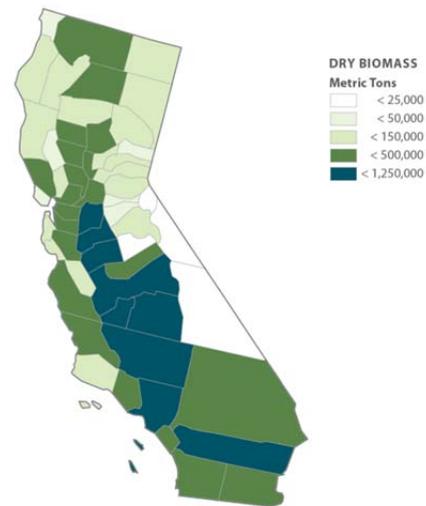


Figure 1: Biomass Resources in California

California has the potential to produce more than 15 million tons of biomass annually by 2030, primarily from wastes and agricultural residues. A million tons of biomass is enough to support an 80-100 million gallon a year cellulosic biofuel refinery.

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Sugarcane ethanol will play a role in the LCFS in the short term, as its overall emissions are lower than corn ethanol. Like corn, sugarcane has an indirect impact on land use, as expansion of sugarcane displaces pasture and other crops. But the sugar-producing regions of Brazil are far away from the Amazon, so there is not a direct impact on forests. Beef and soy production are the primary threats to Brazil's forests. Globally, tropical forests and primates are threatened by palm oil, which is not supported by the LCFS.⁷

But longer term, the incentive structure of the LCFS will not reward sugar ethanol or any food based fuel because of the significant land use emissions assigned to corn ethanol, sugarcane, biodiesel, and vegetable oil biodiesel. Instead the LCFS will accelerate the transition beyond today's food-based biofuels to cellulosic biofuels, renewable electricity, and other sources with the fewest lifecycle emissions.

Clean Cars and Sustainable Communities in California

Low-carbon fuels are an essential part of the solution, but they are no silver bullet. That's why California has a portfolio of policies to cut emissions and oil use.

Cleaner cars that use less oil

California's advanced clean car standards reduce air pollution and the adverse public health impacts of cars and trucks by relying on today's technology and accelerating the market for electric cars.

Compared to vehicles on the road today, California's global warming standards for cars and light trucks will cut new vehicle emissions 25 percent by 2016 and in half by 2025. The global warming pollution standards were established as part of a coordinated effort between California and federal agencies to establish a single, nationwide set of pollution and fuel efficiency requirements for automakers. This effort is a consequence of California's first in the nation standards established by the legislature in 2002 and will also help double the fuel efficiency of cars and trucks.

California is also making sure consumers can choose the most advanced clean car technologies through its Zero Emissions Vehicles (ZEV) program. The ZEV program requires battery, fuel cell, and plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle sales by 2025. Overall, the program will result in more than 1 million such vehicles being sold in the state between 2018 and 2025.



Transportation options to cut oil use

Through the implementation of SB 375, California regional planners are coordinating efforts to develop more sustainable communities and reduce emissions from transportation. Good planning can lead to a better balance where jobs, shops, and housing are located to minimize or avoid travel. And when travel is essential, improved planning can provide a wider range of transportation options besides fighting traffic alone in a car. Together, these steps will foster further cuts in oil use and global warming emissions.

The Solution to High Gas Prices: Use Less Oil

The LCFS, California's clean cars standards, and SB375 reduce the impact of gas price spikes, which are all too common in the state and largely driven by growing global demand, volatility in world crude oil prices, and both planned and unplanned refinery outages. The high price of gasoline means that a typical American driver will spend more than \$22,000 on gas over the lifetime of a vehicle purchased in 2011 with average fuel efficiency (22.8 mpg)—two thirds of which will go to the oil industry.⁸ But, if we use oil more efficiently, support better transportation options, and encourage greater investments in cleaner, alternative fuels that help diversify our fuel supply we will dramatically reduce the amount of money we spend on oil.

For example, according to CARB analysis of rules in place for 2017 through 2025, the package of advanced clean car standards will save Californians \$22 billion through 2025. Compared to today's cars, individual consumers would save \$8,000 over the life of the typical car sold in 2025, even after paying for clean car technology.⁹ The added cost of the technology improvements would be fully recovered from fuel savings within the first 3 years.

Further, many clean fuels are already less expensive than gasoline. Based on electricity rates available in major cities

in California, UCS analysis found drivers using electricity as a fuel can save about \$1,000 dollars a year compared to operating an average new compact vehicle on gasoline at \$3.50 per gallon.¹⁰

Less oil means a stronger economy and more jobs

Clean car, clean fuel, and sustainable community policies will help California's economy, keeping more of our money in the state and attracting new jobs and in the growing clean fuels and vehicles industries.

California residents and businesses spend \$65 billion annually at the pump, and the majority of this money leaves the state.¹¹ Since many cleaner fuel sources, such as electricity and lower carbon biofuels are already being produced or developed in the state, more of our money will stay in California as we shift to those resources.

Cleaning up our vehicles and fuels will also create new jobs. CARB estimates that in 2025 the advanced clean car program would create 21,000 new jobs across the state as consumers spend less money on gasoline and shift that money to more productive parts of the economy. A separate analysis indicates that expanding the use of plug-in electric cars and trucks would contribute to economic growth, creating up to 100,000 new jobs for California alone.¹²

California leadership on clean cars is also benefitting the nation as a whole. The combined Federal-California global warming emissions and fuel efficiency standards are estimated to create 570,000 jobs (full-time equivalent) throughout the U.S economy, including 50,000 in light-duty vehicle manufacturing (parts and vehicle assembly) by the year 2030.¹³

Less oil and more diverse fuel sources increase energy security

The only way to truly reduce the security risks posed by oil is to reduce the role of oil in our economy. That is the conclusion of a group of retired U.S. military leaders and executives of major companies who highlight that because oil and other petroleum products are traded in a world

market, even increased domestic supply will not insulate our nation from the influence of rising global demand for oil and political instability in oil-producing nations.¹⁴

The combination of transportation policies being pursued in California will cut both emissions and oil use, thus improving energy security. For example, a recent LCFS study conducted by six universities, research institutes, and a national lab found that adopting a national LCFS policy would increase energy security by providing consumers more fuel choices and reducing our oil use from all sources.¹⁵

Oil Companies Can Help or Hinder Solutions

Many industries in California and around the nation are stepping up to be part of the solution to climate change and oil use. Car companies have signed up to cut pollution and improve fuel efficiency. Utilities have agreed to cut carbon emissions, support more efficient use of electricity, and have been required to accelerate the transition from fossil fuels to clean, renewable sources such as the wind and sun, which will supply more than a third of the state's electricity by 2020. In contrast, some in the oil industry are fighting to weaken or dismantle California's climate laws and have even filed suit in federal court to block progress on clean cars.¹⁶

It's time for oil industry leaders to cease their efforts to block innovation and efficiency and instead become investors in the promising technologies that will enable us to cut fuel use and transition to cleaner fuels.

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The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with citizens across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

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REFERENCES

¹ <http://www.eia.gov/beta/state/?sid=CA>

² Environmental Protection Agency. 2012. "US Greenhouse gas Inventory, 2012, Table 3-5." Online at <http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2012-Chapter-3-Energy.pdf> accessed February 14, 2013.

³ <http://www.arb.ca.gov/fuels/lcfs/eos0107.pdf>

⁴ http://www.ucsusa.org/assets/documents/global_warming/California-Refineries-The-Most-Carbon-Intensive-in-the-Nation.pdf

⁵ <http://www.ucsusa.org/biomassresources>

⁶ <http://www.ucsusa.org/halftheoil>

⁷ For more on the real drivers of deforestation, see UCS's report: www.ucsusa.org/whatsdrivingdeforestation.

⁸ <http://www.ucsusa.org/gasmoney>

⁹ Based on UCS analysis

¹⁰ <http://www.ucsusa.org/EVfacts>

¹¹ State Board of Equalization. Assuming latest year figures and average prices over October 2011 through September 2011.

<http://www.boe.ca.gov/news/2011/65-11-R.pdf>

¹² http://are.berkeley.edu/~dwrh/CERES_Web/Docs/ETC_PEV_RH_Final120920.pdf

¹³ http://www.bluegreenalliance.org/news/publications/document/AutoReport_Final.pdf

¹⁴ Energy Security Leadership Council, "The New American Oil Boom: Implications for Energy Security," available at

http://www.secureenergy.org/sites/default/files/SAFE_Oil_Boom_Report.pdf

¹⁵ <http://nationallcfsproject.ucdavis.edu/files/pdf/2012-07-nlcs-technical-analysis-report.pdf>

¹⁶ [insert reference on AB32 fight and LCFS suit], Oil industry federal lawsuit:

http://www.nam.org/~media/3B45A5ED2A1D4ADAA8FABC2EAC3188D5/American_Petroleum_Institute_v_EPA_DC_Cir_12142012.pdf