



Getting Biofuels Right: Eight Steps for Reaping Real Environmental Benefits from Biofuels

America's transportation sector is the key link between our ever-growing dependence on oil and global warming pollution. The oil that powers our cars and trucks accounts for two-thirds of our total oil use and generates one-third of the U.S. carbon dioxide emissions that cause global warming. Energy efficiency is the cleanest, cheapest, and fastest way to cut oil demand, but it is only a part of the package. NRDC research shows that liquid motor vehicle fuels made from plant matter, such as ethanol, butanol, and biodiesel, can be a large and important tool for ending our dependence on oil and stopping global warming—but only if we get them right.

Not All Biofuels Are Created Equal

Done right, these types of fuels—commonly known as biofuels—could lead to significant reductions in global warming pollution, save consumers money at the pump, and spur new jobs and industries. NRDC research shows that ethanol made from cellulose could reduce global warming pollution as much as 88 percent compared to a gallon of gasoline. Cellulosic and other advanced technologies also have the ability to increase total biofuel production capacity by unlocking new and more productive supplies of biomass.

Biofuels got a big boost from the Energy Policy Act of 2005, which authorized a variety of research, development, and deployment incentives. And now there are more than 20 new biofuels bills under consideration on Capitol Hill, the vast majority of which focus purely on driving *more* biofuels and pay little or no attention to driving *better* biofuels.

But simply using cellulose as a feedstock is no guarantee of good environmental performance. For example, cutting down our forests to create biofuels would increase global warming pollution and lead to a host of other



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environmental problems. Poorly managed, the cultivation of crops for biofuels threatens to deplete water tables; magnify pollution from fertilizers, pesticides, and herbicides; and undermine vital conservation programs like the Conservation Reserve Program. On farms and in forests across the country and abroad, imprudent biomass harvesting would cause soil erosion, water pollution, and habitat destruction. Advancing a biofuels policy that leads to land conversion and a subsequent loss in both stored carbon and carbon sequestration potential is a particularly perverse result for a policy that is intended to reduce global warming pollution.

Biofuels Have Great Potential to Reduce Global Warming Emissions

Much has been written (including NRDC's *Growing Energy* report) about the potential for biofuels made from cellulosic biomass to dramatically increase the amount of biofuels that can be produced sustainably. Advanced approaches to biofuels production in combination with greater conversion efficiency, lower fossil fuel use, and native perennial crops such as switchgrass can significantly reduce the environmental footprint of biofuels.

But just because advanced biofuels could be made with much smaller environmental impacts, does not mean that they will be, and just because today's biofuels have larger environmental footprints doesn't mean that they couldn't be made much better. For example, today's technologies have the potential to dramatically reduce their overall emissions of heat-trapping gases:

- On average, ethanol produced from corn in the United States today reduces global warming pollution by 18 percent for every gallon of gasoline displaced. But not all gallons are created equal. Many of the newest corn ethanol plants rely on much more efficient systems and natural gas for process heat, reducing emissions by about 35 percent.
- Most ethanol refineries produce distiller grains as a byproduct and use a significant amount of energy drying it so that the distiller grains can be shipped to livestock farms far away. Locating a new ethanol refinery near an existing livestock farm would allow selling the distiller grains

wet, saving the energy involved in drying and producing ethanol that reduced heat-trapping gases by about 45 percent per gallon.

- Better still is the growing handful of plants under development that will use renewable energy, such as biomass gasification, for heat and electricity. If these plants used corn grown with conservation tillage, they could cut emissions by more than 60 percent.

At the other end of the spectrum, if we grow corn in ways that drive up emissions of heat-trapping gases—such as using aggressive tilling, inefficient fertilizer application, and heavy irrigation—and then use coal to process that corn into fuel, we could actually increase global warming pollution compared to gasoline.

The example above looks at corn because it is the dominant crop in the United States for making ethanol, the dominant type of biofuel. Sugarcane is the dominant crop in Brazil, and the processing of sugarcane is generally powered by the leftover cane fiber, known as bagas. Just as using renewable energy can improve the performance of ethanol from corn, using the bagas allows ethanol made from sugarcane to cut heat-trapping gases by about 60 percent compared to gasoline. Furthermore, global warming pollution is only the most important of a number of metrics of sustainability, and while it overlaps with others such as soil erosion, water pollution, and water use, there are other concerns such as biodiversity and wildlife protection where the connection is less direct. So we must take a broad view to get biofuels right.

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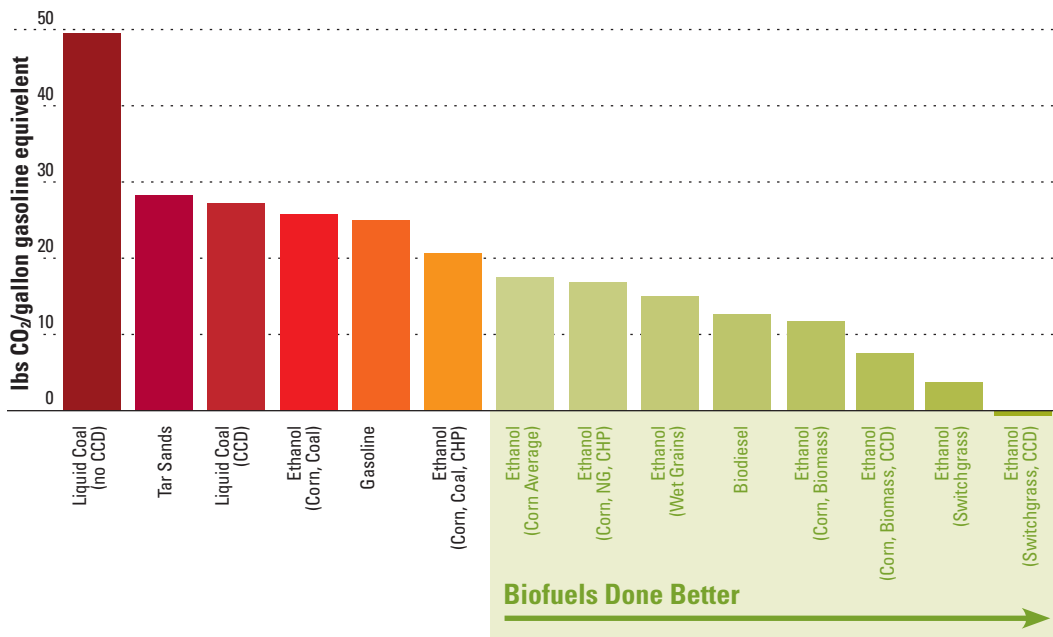
The bottom line is that there is no silver bullet technology that will fix our dependence on oil or eliminate global warming pollution from the transportation sector. That's why it's so important for policy to focus on the environmental performance we want from biofuels rather than picking technologies or simply requiring more gallons of production. The following combination of strategies, including energy efficiency and alternative fuels, can get the best out of biofuels without exacerbating other environmental challenges:

California's Low-Carbon Fuel Standard

In January, California announced its intention to adopt a low-carbon fuel standard that requires oil companies selling fuel in the state to reduce the average global warming pollution (including emissions for production and refining) of the motor vehicle fuels they sell by at least 10 percent by 2020. The California Air Resources Board will likely adopt the regulation implementing the standard by the end of 2008. The standard will likely start in 2010 and increase in stringency over time until it reaches the 10 percent reduction level in 2020.

The standard will be adopted as part of comprehensive package of measures to address global warming pollution from all sectors of the economy, authorized by the groundbreaking Global Warming Solutions Act of 2006 (AB 32 Nunez, Pavley). NRDC is working with regulators and other groups to ensure the standard is technology neutral and performance based, and does not result in biofuels production from unacceptable biomass feedstocks. In addition to the standard, we're also looking for opportunities to encourage best management practices through financial incentives.

"Well to Wheels" CO₂ Emissions from Alternative Fuels



1. Advance biofuels as part of a package of policies that starts with increased energy efficiency.

The starting point for any constructive bioenergy policy, from increasing the size of the renewable fuel standard to enhanced biofuels programs in the Farm Bill, has to be using and producing energy much more efficiently. Policies such as raising fuel economy standards for vehicles and promoting smart growth in our cities are essential to reduce oil demand and ensure that our lands are not put under excessive pressure to produce biofuel feedstocks or any other energy fuel.

2. Establish lifecycle emissions standards for biofuels.

The best way to make sure that biofuels deliver on their promise of reduced global warming pollution is to restructure the current renewable fuel standard into a low-carbon fuel standard similar to the one that California plans to adopt earlier this year. A low-carbon fuel standard requires oil companies to reduce the average global warming pollution rate of fuels they sell by also selling an increasing amount of fuels that have lower pollution rates (or "low-carbon" fuels) such as biofuels (if done right), electricity, hydrogen, or natural gas. In contrast to a low-carbon fuel standard, a renewable fuel standard simply focuses on the number of gallons of biofuels used. As a result, an increase in the renewable fuel standard is a less desirable policy and must include minimum pollution standards based on greenhouse gas emissions over their full lifecycle including growing, transporting, processing, and use, and these standards should promote improved performance over time.

3. Protect our wild places.

There are four types of land that simply should not be harvested for biomass to make energy due to the adverse impacts on climate, soil quality, water quality and quantity, wildlife habitat, and biodiversity:

- Native habitat converted for food, fiber, or energy production;
- Sensitive lands including old-growth forests, roadless areas on national forests, wilderness study areas, native grasslands, threatened and endangered species habitat, and intact, rare, threatened, or endangered ecosystems;
- Conservation Reserve or Wetland Reserve program lands, unless the biomass is produced in a manner consistent with current program guidelines and contracts;
- Federal lands, including national wildlife refuges, parks, monuments, forests, and grasslands, and Bureau of Land Management holdings, with limited exceptions on some national forest and BLM lands, such as vegetation removed from the immediate vicinity of homes and community infrastructure threatened by wildfire.

4. Set minimum management standards if the renewable fuel standard is increased.

NRDC prefers a low-carbon fuel standard. But if the renewable fuel standard—which exclusively mandates the use of biofuels—is increased instead, then there should be minimum management standards that require practices that protect the ecological values of the landscape used to produce feedstock, including water, soil, and biological diversity. As the amount of biofuels



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The High Cost of Getting Biofuels Wrong

Evidence is mounting of the high environmental price associated with the production of vegetable oil for biodiesel. Scientists have estimated that Indonesia would be only the 21st largest source of anthropogenic global warming pollution if not for the clearing, draining, and burning of its rainforests, which puts it third on the list of global warming polluters.¹ In addition to contributing to global warming, this clearing is also destroying critical wildlife habitat for animals such as the orangutan. These concerns are not limited to Indonesia or to biodiesel; demand for soy oil and soy meal have driven clearing of Amazonian rainforest. This destructive trend is likely to continue if domestic soy oil is diverted for biodiesel, or if corn outcompetes soy for land due to the demand for corn to make ethanol. We need standards in place that exclude biofuels produced on recently clear forest lands and policies that encourage much greater fuel efficiency, the most efficient use of our agricultural lands, and diversity in our feedstocks.

required goes up, these standards should get stricter. They should also draw on measurement and modeling of actual performance wherever accurate and affordable. In contrast to a renewable fuel standard, under a low-carbon fuel standard, which encourages electricity, hydrogen, and natural gas along with biofuels, the goals of these standards are best addressed through incentives that encourage sustainable management of all low-carbon fuel sources.

5. Use incentives to drive the adoption of the best voluntary management practices.

Current federal incentives for biofuels entirely ignore the actual environmental benefits or costs of the biofuels. These incentives should be linked to adopting the best voluntary management practices. Assuming that global warming pollution has been addressed either through a low-carbon fuel standard or minimum standards in a renewable fuel standard, then incentives should focus on increasing protection for other ecological values.

6. Safeguard public health by updating fuel and vehicle regulations and using biofuels in ways that minimize air pollution.

The way that we use ethanol today—mixing small amounts with large amounts of gasoline—can increase smog, and our current fuel regulations were not developed with the use of large amounts of biofuels in mind. For ethanol, using it in high blends as an alternative to gasoline rather than as an additive is the best way to minimize air pollution. This should be encouraged by mandating that a growing percentage of biofuels be used in high blends. A policy supporting blends would also drive investments in the distribution infrastructure needed to move us away from petroleum. Also, the loophole that allows regular gasoline mixed with small amounts of ethanol to have higher evaporative emissions than pure gasoline should simply be eliminated. Vehicle and fuel regulations should be updated to minimize toxics and other air pollutants, and EPA funding for testing of biofuels in modern vehicles should be increased to ensure, for example, that biodiesel blends are compatible with new diesel engines.

7. Establish a biofuels labeling system that shows the global warming pollution and management practices of biofuels, and reports their feedstock source.

To verify compliance with a low-carbon fuel standard—and to help consumers, marketers, and state policy makers better understand biofuels—we need accurate and reliable labels that report the critical environmental characteristics of each gallon of biofuels. This must include the lifecycle greenhouse gas emissions, verification that the biomass is not from an excluded source, and information on the level of management achieved in the cultivation and conversion of the feedstock. The EPA's "Renewable Identification Number" tracking systems must be expanded so that all the essential information can be tracked and verified.

8. Be technology neutral and performance based.

To the greatest extent possible, biofuels policies should be technology neutral. The industry is undergoing such rapid development that new technologies and new types of fuel molecules are moving quickly from the lab into pilot projects. Setting policies around "ethanol" or "biodiesel" will only stifle innovation. To the extent possible, fuel standards, feedstock management requirements, and biofuels incentives should all be focused on performance, and should not pick winners or losers. An independent science panel should identify where quantitative measures of performance are accurate and affordable.

There's a gold rush mentality around biofuels these days, but there's more than money at stake. Our current technologies, agricultural practices, and patterns of energy use are not sustainable. Will they improve fast enough to stave off irreparable damage to the global environment? We need to harness the competitive forces behind the gold-rush—encourage competition between today's technologies and tomorrow's—while also maintaining clear environmental performance standards so that we don't end up with a lot of fool's gold.

¹ <http://www.nature.com/nature/journal/v420/n6911/abs/nature01131.html>, <http://www.wetlands.org/getfilefromdb.aspx?ID=13fcb591-a8e4-4b95-8a50-d01e94620019> pg. 5