Union of Concerned Scientists

FACT SHEET

Clean Fuels for Washington

Expanding production and use of clean fuels will deliver economic and climate benefits

HIGHLIGHTS

Washington is a leader in clean transportation, with a high rate of electric vehicle adoption and a clean electricity grid. Increasing its use of low-carbon fuels will help the state continue its legacy of developing innovative solutions to the problems caused by oil. Clean fuels can keep more of the money spent on fuel inside Washington, as locally produced electricity and low-carbon biofuels replace the oil that is imported into the state.

Stable long-term policies such as a clean fuel standard are critical to creating a steadily growing demand for clean fuels, which gives innovators and investors the certainty and clarity needed to scale up production. This will not only reduce Washington's carbon pollution and oil consumption, but also position Washington companies as global leaders in clean technology.

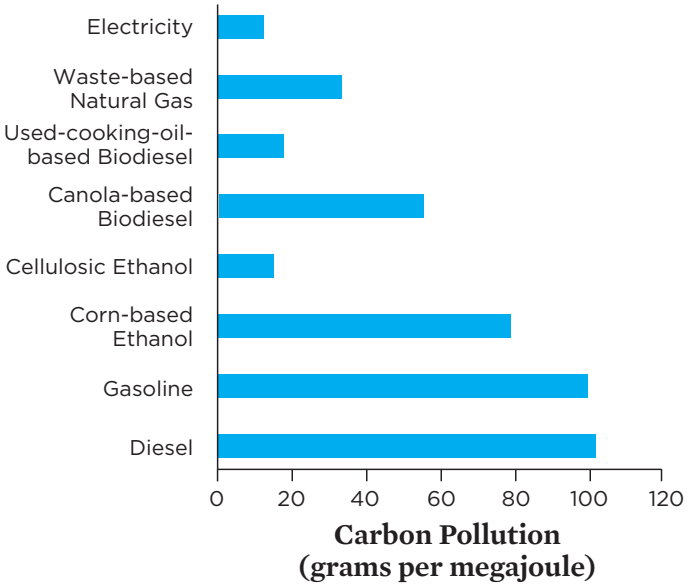
Washington has a proud heritage of technology leadership in aviation, clean energy, software, and e-commerce. This spirit of innovation is enabling Washington to become a leader in clean transportation as well, with one of the highest rates of electric vehicle (EV) adoption, a dedication to advanced composite materials used in aviation and advanced vehicles, and biofuel companies turning regionally suitable crops and used cooking oils into low-carbon biofuels.

Cutting oil use with efficient vehicles, clean fuels, and smarter ways of doing business is the straightforward way to help address climate change in Washington. In 2012, state residents and businesses consumed more than 5.8 billion gallons of petroleum products (EIA 2014a). With transportation responsible for nearly half of Washington's global warming pollution, and drivers spending $15 billion on petroleum and natural gas each year, encouraging the use of clean fuels is a smart solution for reducing the state's oil use (WSDE 2014; Inslee 2013).

Fortunately, Washington has tremendous potential to produce a variety of cleaner fuels that can reduce the overall carbon intensity of the state's fuel supply (see the figure, p. 2). In particular, Washington has the resources to produce biofuels made from non-food sources, which can achieve up to a 90 percent reduction in carbon emissions compared with gasoline. The state can also utilize clean electricity from hydropower and from renewable resources such as solar and wind. Scaling up the production and use of these clean fuels will benefit Washington's drivers and economy in many ways.

A canola field and wind turbines in southeastern Washington. Plant-based biofuels and renewable electricity are helping to reduce the state's transportation-related emissions.

The Carbon Intensity of Transportation Fuels in Washington State



Clean electricity and low-carbon biofuels can reduce the carbon intensity of Washington's fuel supply.

NOTE: Carbon pollution for electricity is based on the current generation mix for state utilities.

SOURCES: CARB 2014; LCA 2014.

Electricity

Electricity as a transportation fuel is a relatively new concept, but EVs have already gained impressive market share in Washington and are poised to play a huge role in the state's shift to clean fuels. When running on electricity, EVs produce zero tailpipe emissions. And with one of the cleanest electricity grids in the country (drawing heavily on wind and hydropower), the "upstream" emissions (i.e., the emissions associated with the generation of electricity used to charge an EV) are also very low.

Indeed, the environmental performance of EVs in Washington, compared with gasoline-powered vehicles, is impressive: An average EV charged in the state produces the carbon emissions equivalent to a gasoline-powered vehicle that achieves up to 170 miles per gallon (mpg), though this performance varies depending on where in the state an EV is charged. In Olympia, for example, an EV produces the emissions equivalent of a gasoline-powered vehicle achieving 78 mpg, while in Seattle—where the majority of electricity comes from hydroelectric dams—the same EV produces the equivalent emissions of a gasoline-powered vehicle that gets more than 500 mpg (Anair 2014; WSDC 2014; UCS 2012).[1] As the state ramps down use of electricity from coal power plants and continues ramping up the use of renewable energy resources, the electricity mix across the state will get even cleaner—and EVs' comparative emissions savings even greater.

Washington also has some of the lowest electricity costs in the country, making an EV cheap to drive. Driving an EV in Washington 100 miles in 2014 cost an average of $2.60, compared with an average cost of $12.70 for a comparable gasoline-powered vehicle (EIA 2014b, EIA 2014c).[2] Moreover, all the money spent on fueling an EV stays within the state of Washington, benefiting local economies and creating in-state jobs (EIA 2014d), whereas about two-thirds of the gasoline spending leaves the state to pay for the extraction of crude oil (EIA 2014e).

Biofuels

Washington is already producing significant quantities of biofuels from environmentally sustainable local resources, and is poised to produce much more, including:

Fuel from wastes. Washington has the potential to produce approximately 20 million gallons a year of low-carbon biodiesel made from used cooking oil or animal fat. Renewable natural gas (i.e., captured methane)

Washington has the potential to produce approximately 20 million gallons a year of low-carbon biodiesel made from used cooking oil or animal fat.

1 *Mile per gallon equivalent emissions estimates for the state average, Olympia, and Seattle are based on the average electricity grid mix for Washington, Puget Sound Energy, and Seattle City Light, respectively.*

2 *These figures assume a 29-mpg gasoline vehicle, and an electric car with an efficiency of 0.30 kilowatt-hour per mile (such as a 2014 Nissan Leaf). Fuel prices are 2014 averages for regional gasoline prices and residential electricity in Washington, as reported by the Energy Information Administration.*

Hybrid poplar is a promising source of sustainable biomass in Washington. It is one of the fastest-growing tree species and well-suited to the state's climate.

from wastewater treatment facilities, animal manure, landfills, and other wastes can replace fossil sources of natural gas used in buses, trucks, and other heavy-duty vehicles, cutting these vehicles' life-cycle emissions by half (LCA 2014). A recent study estimated that these natural gas sources could potentially replace the equivalent of more than 40 million gallons of diesel fuel (NREL 2013).

Canola-based biodiesel. Canola is a growing biofuel resource in Washington; it is one of the state's fastest growing agricultural crops, with acreage tripling from 2012 to 2014 (USDA 2014). Canola is typically grown in rotation with cereal crops such as wheat, replacing fallow periods so that it does not displace food production; it can help control weeds, break insect and disease cycles, and reduce the use of herbicides and insecticides. With Pacific Coast Canola operating the first commercial-scale canola crushing facility west of the Rocky Mountains in Warden, and Imperium Renewables running a 100-million-gallon-a-year biodiesel facility in Grays Harbor, Washington is a major regional player in the regional oilseed and biodiesel marketplace.

Cellulosic biofuels. While agricultural crops such as canola have significant potential for producing sustainable, low-carbon fuel in Washington, non-food (or cellulosic) biomass resources have even greater potential. The state's timber industry produces large amounts of woody wastes during tree harvest and forest management that go largely unused. The Washington Department of National Resources estimates that, by 2025, the state could produce between 1.2 million and 2 million dry tons of woody biomass, and more than 2 million tons of agricultural residues (primarily from wheat straw), each year (LCA 2014). Washington's climate is also well suited to fast-growing trees such as hybrid poplar, which are an ideal source of sustainable biomass. Taken together, Washington's cellulosic biomass resources are enough to produce 300 million gallons of cellulosic ethanol each year (LCA 2014).

SCALING UP CELLULOSIC BIOFUEL PRODUCTION

Although Washington has significant cellulosic biomass potential, the state currently lacks the production capacity to convert that biomass into clean fuels at a commercial scale. The first commercial-scale cellulosic biofuel refineries have recently started production across the United States and around the world. Facilities with capacity of 20 million gallons a year or more are operating in Iowa and Kansas (using agricultural residues such as corn stalks), in Brazil (sugarcane stalks), and in Italy (straw from rice, wheat, and perennial grasses). Just across the Columbia River in Boardman, OR, ZeaChem has developed a process to produce cellulosic ethanol, and its demonstration-scale facility has a production capacity of 250,000 gallons a year. A recent study found that building three 30-million gallon cellulosic biofuel facilities in Washington would boost gross state product and personal income by a total of more than $1 billion, and create more jobs compared with importing the same amount of fuel (LCA 2014).

A Clean Fuel Standard for Washington

Climate change is already being felt in the Evergreen State. Record-breaking wildfires are destroying communities and forests, and declining snowpack and earlier snowmelt in the mountains are jeopardizing water supplies. Moreover, sea level rise and ocean acidification could affect the state's valuable and iconic fisheries (Mote et al. 2014). With transportation accounting for nearly half of the state's total global warming pollution, it is critical to reduce emissions from Washington's fuel supply (WSDE 2014).

Washington has the resources to be a leader in the clean fuels industry and inspire other states to produce and utilize clean fuels too, but transitioning from oil to cleaner fuel will take time and long-term policy support. A stable policy environment that creates a growing demand for clean fuels over a multiyear timeframe is essential to support the near-term investment in clean fuels and the associated infrastructure.

The state is exploring the implementation of a clean fuel standard, which sets an ambitious but realistic goal of steadily increasing the use of clean fuels over a 10-year period. It requires transportation fuel to get steadily cleaner on average, ultimately achieving a 10 percent reduction in carbon emissions per unit of fuel. Rather than specifying a certain number of gallons of any particular fuel type, as the federal Renewable Fuel Standard does, the policy is technology-neutral. This allows all fuel types—advanced biofuels, electricity, natural gas, propane, petroleum-based fuels, and those fuels yet to be developed—to compete based on their carbon benefits and cost, providing flexibility for the market to adjust as the clean fuels industry develops.

A Washington clean fuel standard would align with existing policies in California, Oregon, and British Columbia, creating a regional market for clean fuels equivalent to the world's fifth-largest economy. This will allow for economies of scale that will rapidly bring down the cost of clean fuels, while supporting regional investment and enabling Washington to become a leader in the growing global marketplace for clean transportation technologies. Recent analysis has highlighted the large potential for many different clean fuels to supply this growing regional market (Malins et al. 2015). By implementing a clean fuel standard, Washington can build on its established reputation for technology innovation, invest in a clean energy future, and set an example for other states—and ultimately, our federal government—to follow.

Washington Leading the Way on Sustainable Aviation Fuels

Aviation has long been a major part of Washington's economy, and Washington is poised to be a leader in producing the clean fuels needed to bring aviation into a low-carbon transportation future. Universities, innovative companies, and other partnerships across the state are playing a key role in developing renewable aviation fuels, with three major efforts already under way:

- In 2012 the Washington legislature established the Aviation Biofuels Working Group, a public-private partnership developing policy recommendations to support Washington's sustainable aviation biofuels industry (IWA 2013).
- The University of Washington received a $40 million grant from the U.S. Department of Agriculture to lead the Advanced Hardwood Biofuels Northwest collaborative research project, which has the goal of producing renewable jet fuel that is fully compatible with existing infrastructure. The target is to produce 400 million gallons of biofuels per year from 400,000 acres of hybrid poplar plantations around the Pacific Northwest.
- Washington State University–Pullman is leading the Northwest Advanced Renewables Alliance, a $40 million, five-year effort to develop wood-based fuels and chemicals, with a focus on the technology needed to create a sustainable aviation biofuels industry (Hines 2014).

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