

Clean Fuels for Washington

How the State Benefits from Expanding Its Use of Locally Produced, Low-Carbon Transportation Fuels

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 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. A clean fuel standard is a key solution Washington can implement to support investment in clean fuels of all kinds, from renewable electricity powering cars and transit buses to low-carbon biofuels to power aviation.

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 personal electric vehicle (EV) adoption, transit agencies switching to electric buses, and companies producing low-carbon biofuels.

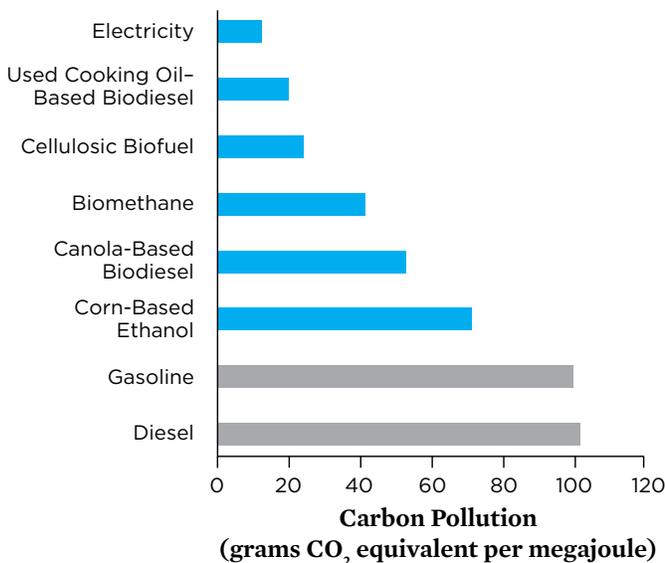
Transportation is responsible for the largest share (43 percent) of Washington's global warming pollution, almost all of it from gasoline, diesel, and other petroleum-based fuels (WSDE 2016). The only way to reduce these emissions is to dramatically cut oil use through improved vehicle efficiency, cleaner fuels, and electric drivetrains. These three strategies can be applied across the transportation sector, to passenger cars, freight trucks, public transit, aviation, and marine vessels. Cutting oil use will also reduce air pollution, protect public health, and save people money (Pont and Unnasch 2015). In 2016, state residents and businesses consumed more than 5 billion gallons of petroleum-based transportation fuels, at a cost of \$11 billion (WSDE 2016; EIA 2017).

Fortunately, Washington has tremendous potential to move to a variety of cleaner fuels that can reduce the overall carbon intensity of the state's fuel supply (see the figure, p. 2). Scaling up the production and use of these clean fuels will benefit Washington's drivers and economy in many ways.



Low-carbon fuels are important for the future of aviation, an industry with deep roots in Washington. The state has already made important contributions in this area, and has a major stake in its future. In 2016 the Northwest Advanced Renewables Alliance, led by Washington State University, produced a low-carbon alternative jet fuel made from forest residues, which was used for a cross-country flight.

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 projected 2020–2026 generation mix for state utilities using an energy efficiency ratio to adjust for the efficiency of electric vehicles.

SOURCES: CARB 2018 (EFFICIENCY RATIO); LCA 2014 (GENERATION MIX).

Electricity

Transportation fuels have been dominated by petroleum for so long that people think “fueling up” is limited to gas stations. But electricity is powering a growing number of cars on the road today, and moving from pump to plug is key to a clean fuel future. 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, so it is the emissions associated with generating electricity (for battery charging) that is the most important in measuring the pollution from EVs. Washington already has a relatively clean electricity grid—only a quarter of power generation comes from coal and gas, with the rest coming largely from hydropower and wind—so EVs are much less polluting than gasoline cars. An average EV charged in the state produces carbon emissions equivalent to a gasoline-powered vehicle that achieves up to 144 miles per gallon. And some utilities get almost no power from fossil sources—for example, Tacoma Power’s generation mix has only 2.5 percent fossil fuels (Reichmuth 2018; WSDC 2017; UCS 2012). As the

state ramps down use of electricity from coal power plants, it is important that utilities expand the use of renewable electricity and reduce the use of natural gas generation to ensure the grid gets even cleaner—and EVs’ comparative emissions savings even greater.

Charging an EV is also much less expensive than buying gasoline. Driving 12,000 miles in 2017 cost \$1,365 in Washington in a typical gasoline vehicle (25.6 mpg), compared with \$374 to charge an EV at the state average residential electricity rate, for a savings of \$990 (EIA 2018a, EIA 2018b, Reichmuth 2017). EVs also have lower maintenance costs than gasoline vehicles, for additional consumer savings. Moreover, most of the money spent fueling an EV stays within the state of Washington, benefiting local economies and creating in-state jobs, whereas more than half of the gasoline spending leaves the state to pay for the extraction of crude oil (EIA 2017, EIA 2018c).

Biofuels

Washington is already producing significant quantities of biofuels, 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 (LCA 2014). Biomethane from landfills, wastewater treatment facilities, and animal manure can replace fossil sources of natural gas used in buses, trucks, and other heavy-duty vehicles; it can also replace natural gas used in the production of other fuels, from ethanol and gasoline to electricity. On average, biomethane life cycle emissions are about 60 percent lower than gasoline, but biomethane from manure at dairies and other agricultural sources can deliver even bigger benefits, because methane is a heat-trapping gas more potent than carbon dioxide and burning it has less global warming impact than letting it escape into the atmosphere. A recent study estimated that biomethane could potentially replace up to 8 percent of the state’s total natural gas use (WSUEP 2017).

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Clean fuel standards generate substantial revenue for transit agencies that operate electric buses, which are better for the climate and substantially reduce air pollution and public health impacts in the neighborhoods where they operate.

Canola-based biodiesel. Canola is one of the state’s fastest-growing agricultural crops, with acreage tripling from 2012 to 2017 (USDA 2018). 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. Washington is a major regional player in the regional oilseed and biodiesel marketplace with Pacific Coast Canola operating the first commercial-scale canola crushing facility west of the Rocky Mountains in Warden, and Renewable Energy Group running the West Coast’s largest biodiesel facility in Grays Harbor.

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 Washington Department of National Resources estimates that, by 2025, the state could produce between 1.2 million and 2 million dry tons of biomass from woody wastes (from the state’s timber industry), and more than 2 million tons from 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 biofuel each year (LCA 2014). Despite this potential, the state currently lacks commercial-scale cellulosic biofuel production capacity. Stable policy support is critical to realize this untapped potential.

Reducing Emissions from Petroleum-Fuel Production

Oil’s carbon footprint is not limited to tailpipe emissions; extracting oil and refining it into gasoline and diesel also play a significant role. Indeed, these upstream emissions comprise 25 percent of gasoline’s life cycle emissions (CARB 2014). Oil companies can cut production-related emissions by making upgrades to improve efficiency, blending low-carbon bio-oils into petroleum at the refinery, using biomethane in place of natural gas, and using renewable electricity to power refineries. Capturing carbon dioxide and sequestering it securely underground can also be implemented at oil refineries or in oil fields. Reducing emissions from the production of petroleum-based fuels is no substitute for shifting from fossil fuels to low-carbon renewable fuels, but by reducing emissions in their supply chains, oil companies can shoulder part of the load to clean up transportation fuels.

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A Clean Fuel Standard for Washington

A clean fuel standard is one important way Washington can support the development of lower-carbon fuels. This policy requires transportation fuel to get steadily cleaner over time, based on life cycle carbon emissions per unit of fuel produced. Lower-carbon fuels get more emissions-reduction credit than higher-carbon fuels, encouraging all fuel producers to reduce emissions in their supply chain. A clean fuel standard is a technology-neutral performance standard, allowing all fuel types—advanced biofuels, electricity, biomethane, petroleum-based fuels, and 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.

By providing direct financial support for the use of clean fuels, this policy can make vehicles that use clean fuels more cost-effective, especially for vehicles that use a lot of fuel. This support makes it easier for transit agencies to move to

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.

- The Port of Seattle, which runs Seattle-Tacoma International Airport, has partnered with 13 airlines to develop a plan for providing access to a low-carbon and sustainably produced biofuel alternative to jet fuel (Port of Seattle 2018).
- Washington-based companies and universities have provided key leadership in the development of an advanced aviation fuel industry, including the Northwest Advanced Renewables Alliance, led by Washington State University–Pullman, and Advanced Hardwood Biofuels Northwest, led by the University of Washington.
- 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).

electric buses, and could encourage ride-hailing companies to make EVs available to their drivers (and someday soon, use autonomous EVs as part of their fleets). Clean electricity used to power residential EV charging can also qualify for credit under a clean fuel standard, generating revenue that can be used to fund purchase rebates and support deployment of EV charging infrastructure that make EVs an attractive choice for even more people.

A clean fuel standard would also help retain technology innovation in the state. For example, several innovative aviation fuel partnerships have been created in recent years in Washington (see box), but one prominent project shifted to California because of that state's Low Carbon Fuel Standard (SABW 2018). A clean fuel policy in Washington would help drive demand for these projects at home. At the same time, by joining California, Oregon, and British Columbia in implementing a clean fuel standard, Washington could help create a regional market for clean fuels equivalent to the world's fourth-largest economy (BEA 2018; The World Bank 2018; Government of British Columbia n.d.), and set an example for others states—and ultimately, our federal government—to follow.

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