



LPRO: LEGISLATIVE POLICY AND RESEARCH OFFICE

RENEWABLE FUELS

BACKGROUND BRIEF

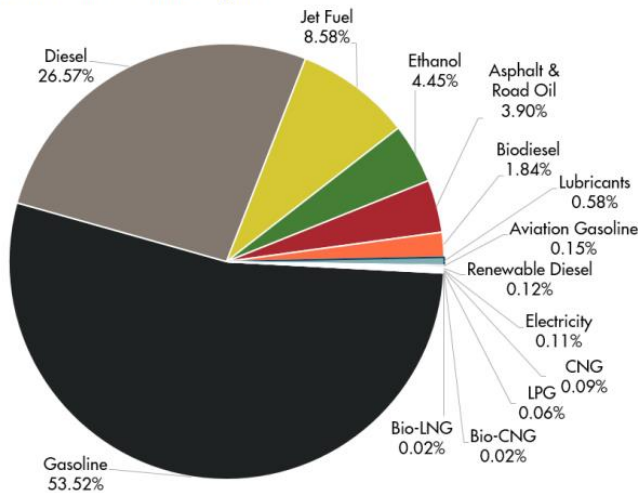
Transportation fuels represent the largest energy use in Oregon, accounting for 38 percent of the state’s total energy use.¹ This includes fuels used for cars, passenger trucks, SUVs, heavy duty vehicles used for transport and delivery, and fuels used in the aviation and marine industries.

In 2016, petroleum-based products (gasoline plus diesel) accounted for 93.3 percent of Oregon’s fuel consumption in the transportation sector. Biofuels such as ethanol, biodiesel, and renewable diesel accounted for 6.4 percent. The remaining use was made up of compressed natural gas (CNG) and liquid propane gas (LPG) (See Figure 1).

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Figure 1: Transportation Fuels Used in Oregon 2016

Transportation Fuels Used in Oregon 2016



In 2016, over 75 percent of the ethanol and 84 percent of the biodiesel consumed in Oregon was produced out-of-state, primarily in the Midwest. Ethanol

and biodiesel primarily travel to Oregon via rail. Roughly 23 percent of ethanol used in Oregon is produced in Boardman, and biodiesel is produced in Salem.

¹ Oregon Department of Energy, 2018 Biennial Energy Report: <https://www.oregon.gov/energy/Data-and-Reports/Documents/2018-Biennial-Energy-Report.PDF>

Factors such as energy security, fossil fuel emissions, and health effects of fossil fuels have increased attention on alternative fuels. A major advantage of using biofuels such as ethanol and biodiesel is that blending them with fossil fuels requires only minor adjustments in existing infrastructure. However, there are concerns that biofuels produced from crops, such as corn, may compete with food sources and that the energy intensity to produce this type of fuel is high.

ETHANOL

Ethanol is a renewable fuel made from various plant materials, primarily corn. More than 95 percent of United States gasoline contains ethanol at a ten percent blend, mostly due to the United States Renewable Fuel Standard that requires renewable fuel to be blended into transportation fuel in increasing amounts annually, reaching 36 billion gallons by 2022. Oregon's renewable fuel standard requires nearly all gasoline that is sold to be a ten percent ethanol blend.

Oregon has one commercial ethanol producer, the Columbia Pacific Ethanol production plant in Boardman. In 2017, the plant produced 37.5 million gallons of ethanol. Carbon emissions from the plant are used by a neighboring company, Kodiak Carbonic, to turn the emissions into a beverage-grade liquid used to carbonate soft drinks and make dry ice.

A higher blend of ethanol (known as E85) is also available in Oregon. This fuel can only be used in flexible fuel vehicles, which can use any combination of gasoline and ethanol blends. E85 is available at five public retail locations in Oregon. Additionally, five government entities dispense this fuel into their own fleet of vehicles: the Oregon Department of Administrative Services, Oregon Department of Transportation, Oregon Department of Forestry, Eugene Water and Electric Board, and Veterans Affairs Portland Campus.

Several steps are involved in making ethanol available as a vehicle fuel:

- Feedstocks are grown, collected, and transported to an ethanol production facility;
- Ethanol is made from these feedstocks at a production facility along with byproducts such as animal feed and corn oil;
- The fuel is transported to a blender/fuel supplier; and
- Ethanol is mixed with gasoline by the blender/fuel supplier and distributed to fueling stations.

Experts expect cellulosic (nonedible plant material) ethanol will become the dominant source of biofuel in the future. Cellulosic feedstock has several advantages over sugar and starch feedstock including: cellulose cannot be used as food, so there is no potential for conflicts with food resources; there are a wide variety of potential sources (i.e., trees, orchard clippings, corn stover, rice hulls, switchgrass, etc.); and one of the cellulosic components, lignin, has a high-energy content that, once separated, could

provide the energy required to convert the cellulosic material to a usable form of fuel. However, currently more energy-intensive processing is required to extract sugars from the cellulosic portions of plants.

By 2014, five cellulosic ethanol plants opened in the United States, yet just two plants currently manufacture cellulosic ethanol, both of which are located in Iowa. Production of this type of ethanol is trending upward. In 2015, the United States produced 2.2 million gallons of cellulosic ethanol. 2017 saw the biggest jump in production reaching 10 million gallons.

BIODIESEL

Biodiesel is produced from a diverse mix of feedstocks including recycled cooking oil, agricultural oils, and animal fats.² Biodiesel can replace diesel fuel entirely (100 percent biodiesel, “B99 or B100”) or it can be blended with diesel fuel in varying percentages. Biodiesel five (five percent biodiesel/95 percent diesel fuel) and Biodiesel 20 (20 percent biodiesel/80 percent diesel fuel) are the two most commonly used blends.³ The Oregon Renewable Fuel Standard requires that five percent of diesel consumed in the state be biodiesel, which accounts for just over 26 million gallons. The state produces nearly seven million gallons of B20, and the remainder is shipped by rail from the Midwest.

Most of the in-state production comes from SeSequential Biofuels in Salem, which has a production capacity of 15 million gallons per year. Currently, SeSequential sells their fuel at 62 locations in Oregon. Several fleets such as those operated by the Oregon Department of Forestry, Oregon Department of Transportation, Eugene Water and Electric Board, City of Portland, and Organically Grown, use high blends of biodiesel. SeSequential produces most of its fuel from waste vegetable oil feedstocks generated by regional restaurants and food processors.

RENEWABLE DIESEL

Hydrogenation-derived renewable diesel (HDRD), also known as green diesel, is the product of fats or vegetable oils—alone or blended with petroleum—refined by a process called hydrotreating. This fuel is cleaner and has a lower carbon footprint than petroleum-based diesel, and can also operate at colder temperatures than standard diesel or biodiesel. HDRD meets the petroleum diesel American Society for Testing and Materials specification, which makes it usable as a direct substitute for petroleum-based diesel without the blending limitations that apply to biodiesel. Several fleets in Oregon have used the fuel since September 2015. Most of the renewable diesel consumed in Oregon is imported and currently only available in limited quantities.

² Oregon Department of Energy, Renewable Fuels: <https://www.oregon.gov/energy/energy-oregon/Pages/Renewable-Fuels.aspx>

³ Oregon Department of Environmental Quality, Alternative Fuels/Biodiesel: <https://www.oregon.gov/deq/aq/programs/Pages/Diesel-Alternative-Fuels.aspx>

RENEWABLE NATURAL GAS/BIOGAS

Renewable natural gas consists of biogas (methane) from landfill recovery, wastewater treatment plants, anaerobic digesters at dairies, and food or waste processing facilities. Oregon currently has several facilities producing methane and converting it to electricity. Many facilities and entities, such as Clean Water Services in Washington County and Columbia Boulevard Wastewater Treatment Plant in Portland, are now considering converting their waste methane into a higher value transportation fuel instead of electricity. However, making biogas into a transportation grade fuel requires additional refining and processing of the biogas in order to meet U.S. Environmental Protection Agency transportation fuel standards. Additional challenges include price structures, access to pipelines, and standards for biogas quality.

Some Oregon facilities currently generating biogas simply flare the biogas, while others burn it in a special internal combustion engine that is connected to a generator that produces electricity. Those facilities either consume that electricity on-site or sell it onto the grid through a Power Purchase Agreement with an electric utility. Another option is emerging in Oregon: cleaning up biogas to meet natural gas pipeline quality standards – at which point it is called Renewable Natural Gas (RNG) – and then injecting it into an existing natural gas pipeline. The RNG can be sold as either a direct use stationary fuel or as a transportation fuel.

Oregon recently quantified opportunities to convert persistent, long-term waste streams into useful energy as biogas and RNG. Municipal waste streams — garbage, wastewater, and waste food — and agricultural waste streams like manure, all generate methane, a powerful greenhouse gas. Redirecting these waste streams into controlled processes can capture and use the methane, reducing greenhouse gas emissions and air pollutants when the resulting RNG is substituted for fossil fuels in our transportation and stationary fuels sectors. If Oregon's potential volume of RNG could be captured and used to displace fossil-based natural gas for stationary combustion, it would prevent the release of approximately two million metric tons of greenhouse gases into the atmosphere.

RENEWABLE FUEL STANDARDS

A Renewable Fuel Standard (RFS) requires a certain percentage of renewable fuels be used in the transportation fuel mix by a specific date. The federal RFS, included in the federal Energy Independence and Security Act of 2007, requires at least 36 billion gallons of renewable fuels in the national transportation fuels mix by 2022. Advanced biofuels (i.e., biofuels not produced from corn starch and that achieve 50 percent reduction in greenhouse gas emissions) must constitute 60 percent of the fuel mix. It is not certain if the United States is on track to achieve this goal.

Oregon also adopted a RFS in 2007 (House Bill 2210) for ethanol, biodiesel, and renewable diesel. The Oregon RFS required all motor gasoline (with some exceptions) be E10 (10 percent ethanol, 90 percent gasoline) as soon as Oregon's production capacity for ethanol reached 40 million gallons per year. This capacity was met in

September 2007 when Pacific Ethanol opened its ethanol production facility in Boardman. The diesel portion of the standard was implemented in two phases. By 2009, all diesel sold in Oregon had to be B2 (two percent biodiesel, 98 percent diesel), with a few exceptions. Once Oregon production capacity reached 15 million gallons, the standard increased to B5 (five percent biodiesel, 95 percent diesel). In August 2010, SeSequential-Pacific Biodiesel in Salem reached that capacity and the B5 standard was implemented in April 2011.

CLEAN FUELS PROGRAM

The 2009 Oregon Legislative Assembly passed House Bill 2186 establishing a low carbon fuel standard to reduce carbon emissions by ten percent in the transportation sector over a ten-year period. The bill contained a provision that included a 2015 sunset of the program. Senate Bill 324 (2015) extended the timeline for achieving the ten percent reduction to 2025 and removed the sunset. The following table describes Oregon renewable fuels legislation since 2005.

Figure 4: Renewable Fuels Legislation in Oregon

Legislation	Year Enacted	Summary
Biofuels Production Property Tax Exemption	2005	Property used to produce biofuels, including ethanol and biodiesel, may be eligible for a property tax exemption if located in a designated Renewable Energy Development Zone. The Oregon Business Development Department must receive and approve an application from a qualified rural area to designate the area as a Rural Renewable Energy Development Zone. (Reference ORS 285C.350 through 285C.370)
Renewable Fuel Standard (RFS)	2007	Established minimum requirements for biodiesel, ethanol, and other renewable diesel to be included in Oregon's diesel and gasoline supplies.
Biomass Collector Credit	2007	Tax credits for producers and collectors of biofuel raw materials to encourage production and use of alternative fuels. This program is scheduled to sunset with the 2017 tax year, with the exception of animal manure used in a biodigester, which will sunset with the 2021 tax year.
Ethanol Exemptions	2008	Exempted fuel for certain nonroad uses, including fuel for airplanes, water craft, Class I and Class III off-road vehicles, antique vehicles, racing vehicles, snowmobiles, and tools, from ethanol blending requirements established in the RFS.

Diesel Additives	2010	Allowed addition of diesel additives between October 1 and February 28 to prevent congealing.
Energy Incentive Program Alternative Fuel Infrastructure	2011	Business owners and others may be eligible for a tax credit of 35 percent of eligible costs for qualified alternative fuel infrastructure projects. Qualified infrastructure includes facilities for mixing, storing, compressing, or dispensing fuels for vehicles operating on alternative fuels. Qualified alternative fuels include electricity, natural gas, gasoline blended with at least 85 percent ethanol (E85), propane, and other fuels that the Oregon Department of Energy approves. The credit is available through December 31, 2017 when the program is scheduled to sunset. (Reference ORS 315.336, 469B.320, and 469B.323)
Biodiesel Tax Exemption	2013	Biodiesel blends containing at least 20 percent biodiesel derived from used cooking oil are exempt from the \$0.30 per gallon state fuel excise tax. The exemption does not apply to fuel used in vehicles with a gross vehicle weight rating of 26,001 pounds or more, fuel not sold in retail operations, or fuel sold in operations involving fleet fueling or bulk sales. The exemption expires after December 31, 2019. (Reference ORS 319.530)
Clean Fuels Program	2009 – 2016	HB 2186 (2009) required the Oregon Department of Environmental Quality to implement a low carbon fuel standard if the program was technically and financially feasible. The bill included a sunset provision. The legislature removed the sunset in 2015 (SB 324) and the program began January 1, 2016. The program is meant to lower carbon emissions in the transportation sector over a ten-year period.

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