

How Oregon Can Benefit from Electric Vehicles

Expanded access to EVs would help consumers, the economy, and the climate

HIGHLIGHTS

Electric vehicles (EVs) in Oregon produce fewer global warming emissions than any gasoline-powered vehicles on the road, and because fueling with electricity is cheaper than gasoline, drivers save money that can be spent in economic sectors that create local jobs. Electricity prices are also remarkably stable compared with gasoline. Even with a higher sticker price, the total cost of owning an EV can be lower than owning a conventional gasoline vehicle. Yet despite these advantages, EVs still face barriers to their adoption, so policies are needed that will make EVs available and affordable for more Oregonians.

Thousands of Oregon drivers are already enjoying the benefits of driving on electricity, and automakers are introducing more plug-in electric vehicles (EVs) each year. EVs are cheap to operate, fun to drive, clean to fuel, and even cleaner when paired with renewable electricity. Based on an estimated 5,000 EVs currently on the road in Oregon, plug-in vehicles are saving Oregon drivers more than \$3 million a year in fuel costs and preventing the burning of 1.3 million gallons of gasoline and the emission of 9,000 tons of global warming pollution annually. These savings underscore the importance of policies that will help Oregon drivers buy or lease EVs.

The Economic Benefits of EVs

Driving on electricity is cheaper than driving on gasoline. In 2014, driving the average new gasoline-powered car 100 miles cost \$12.16 in Oregon. Driving that same distance on electricity cost an average of \$3.41 in the state. Compared with the owner of an average new gasoline car, an EV owner could save more than \$950 on fuel annually (Figure 1, p. 2). Even with the drop in gasoline prices at the end of 2014, electricity still comes out ahead.

The volatility of the global oil market makes it difficult for Oregon consumers to predict the cost of driving on gasoline. The price of electricity, in contrast, has remained remarkably stable and less costly than gasoline over time (Figure 2, p. 2).

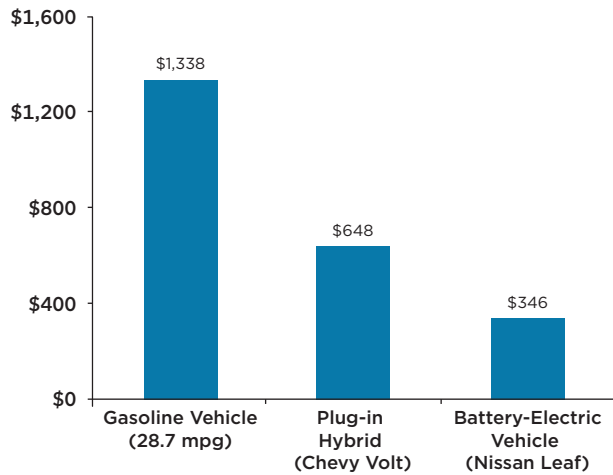
Spending less on fuel frees up households to spend more in economic sectors that create more jobs than the oil and gas industry (Anair 2011). EVs thus provide



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Driving on electricity benefits Oregon consumers. In 2014, the average EV driver in Oregon saved more than \$950 on fuel compared with a driver of an average gasoline-powered vehicle. Here, EVs charge at Mount Hood Skibowl.

FIGURE 1. Annual Fuel Costs in Oregon (2014)



EVs are cheaper to fuel than gasoline-powered vehicles. The fuel prices used in these calculations—which assumed 11,000 annual miles driven—were 2014 averages for Oregon gasoline and residential electricity: the price of regular gasoline (for the average new gasoline car) was \$3.49 per gallon; premium gasoline (for the Chevy Volt gasoline-electric hybrid) was \$3.78 per gallon; electricity (for the Chevy Volt plug-in hybrid and Nissan Leaf electric-only vehicle) was 10.5 cents/kWh.

SOURCES: EIA 2014A; EIA 2014B.

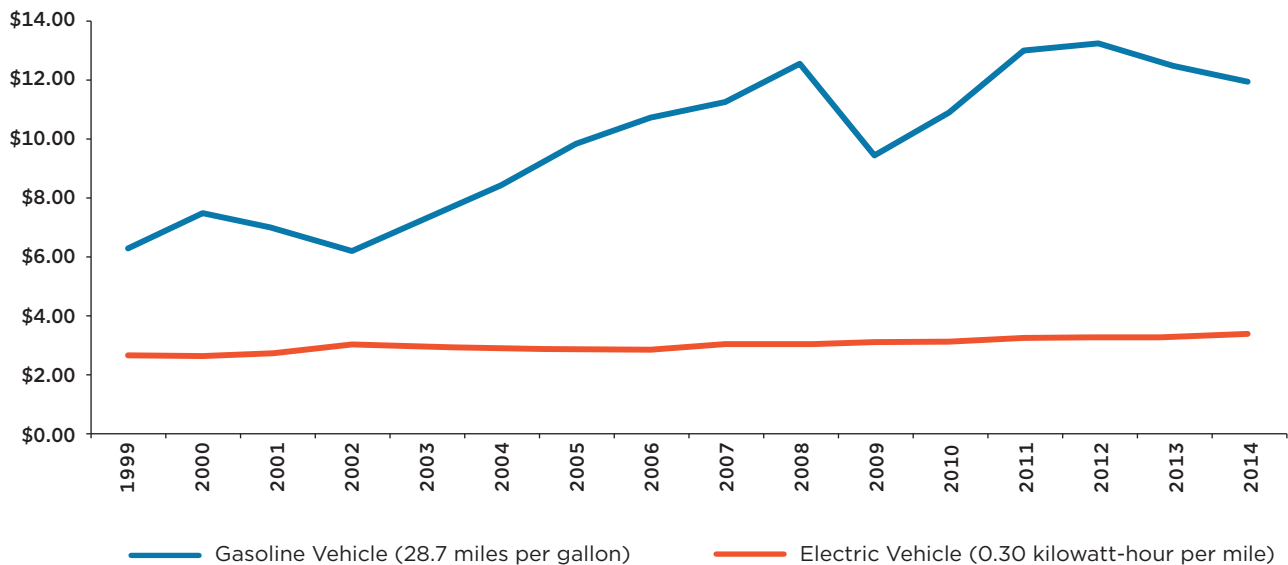
economic benefits to Oregon by enabling owners to direct some of their fuel savings to businesses that help the local job market.

The money that EV drivers do spend on fuel goes to power companies that employ Oregonians, pay local taxes, and have a stake in the state economy. In contrast, a majority of the money drivers spend to fill up conventional vehicles pays for crude oil, which is extracted and refined outside the state. For every dollar spent on gasoline in the United States in the past five years, 71 cents went to extracting and refining crude oil, while less than a dime went to the local gas station (EIA 2014c; NACS 2014).

EVs also save drivers money due to lower maintenance costs. Although EVs are an advanced technology, they are remarkably simple to maintain because they have fewer moving parts than conventional gasoline-powered vehicles. Battery-electric EV drivers never have to worry about changing the oil, for example. EV brake pads require less periodic maintenance because drivers use them less often, thanks to regenerative braking that slows the vehicle while producing electricity. One study found that maintaining an EV can cost 60 percent less than maintaining a conventional vehicle (EPRI 2014).

Thanks to savings from fuel and maintenance costs, the total cost of owning some EVs can be less than owning an average gasoline car. For example, one study found that the

FIGURE 2. Cost to Drive 100 Miles



The volatility of gasoline prices compared with electricity has a clear impact on the cost to drive 100 miles. Between 1998 and 2014, the cost to drive 100 miles in a 28.7 mpg gasoline vehicle (2014 average for new cars) more than doubled (adjusted for inflation), while the cost to drive 100 miles on electricity would have been much lower and more stable.

SOURCES: EIA 2014A; EIA 2014B.

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Nissan Leaf, a best-selling battery-electric vehicle, will save its owner more than \$7,000 over the life of the vehicle compared with an average conventional car (EPRI 2014).

Although consumers can benefit substantially over the long term when purchasing an EV, higher up-front costs and unfamiliar technology can deter buyers. Policy support such as incentives and rebates helps to address these barriers, allowing consumers to save over time.

The Climate Benefits of EVs

If Oregonians are committed to reducing global warming emissions, the state's transportation sector is an obvious place to start. Transportation accounts for about one-third of Oregon's total emissions (Oregon Department of Environmental Quality, Oregon Department of Energy, and Oregon Department of Transportation 2013). And because EVs produce no tailpipe emissions, transitioning from gasoline vehicles to EVs is a key strategy for minimizing the transportation sector's contribution to climate change. Of course, producing the electricity used to charge an EV can create global warming emissions. The amount of these "upstream" emissions depends on what electricity sources are used in a given region. However, no matter where in the United States a driver plugs in an EV, it will ultimately be associated with fewer global warming emissions than an average compact conventional vehicle (UCS 2012). Based on Oregon's electricity mix, an average battery-electric EV in the state will result in global warming emissions comparable to a conventional gasoline-powered vehicle that gets 75 miles per gallon (Anair 2014; UCS 2012).

Thanks to Oregon's energy policies, the emissions associated with driving an EV in Oregon are set to drop even further as the state obtains more of its power from clean, renewable energy resources such as solar and wind power while reducing its reliance on coal-fired power plants. By 2025, large utilities (which provide most of Oregon's energy) must ensure that at least 25 percent of the energy they sell to consumers comes from renewable sources (Office of

Legislative Counsel 2013). As Oregon's electricity mix gets cleaner, so will EVs. Specifically, EVs charged with renewable electricity result in global warming emissions equivalent to those of a gasoline-powered vehicle that gets more than 500 miles per gallon (UCS 2012).

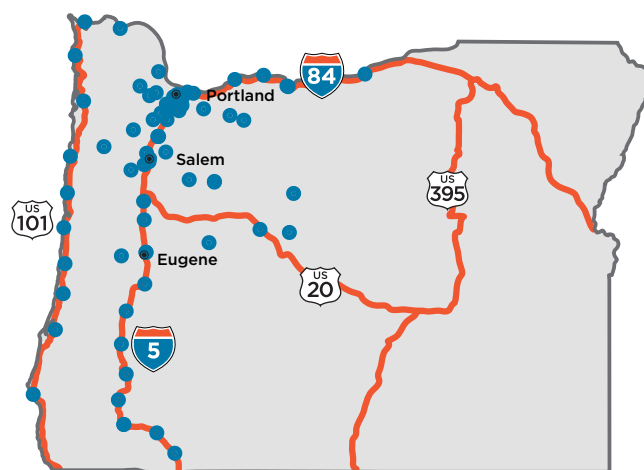
Charging Ahead with EVs

Thousands of Oregon drivers are already saving money, reducing oil use, and cutting global warming pollution with EVs. Thanks to the West Coast Electric Highway along Interstate 5, Oregon has a robust statewide network of more than 70 DC Fast Chargers, which can provide a nearly full charge in less than 30 minutes (Figure 3). Oregon is also one of 10 states that have adopted the Zero Emission Vehicle (ZEV) program, which requires automakers to increase their EV sales in these states over time, and is a partner in the Multi-State ZEV Action Plan, which provides a coordinated approach to increasing EV usage.

Although EVs now account for only a small fraction of total vehicle sales in Oregon and the United States, the potential market is huge. A 2013 survey by UCS and Consumers Union found that 42 percent of U.S. households with a vehicle could use one of today's EVs (UCS 2013).

However, smart policies will be needed to continue Oregon's progress. Policies that reduce the up-front cost of EVs,

FIGURE 3. EV Fast Charging Stations in Oregon



Thanks to Oregon's EV charging infrastructure—including a robust network of more than 70 DC Fast Chargers that can provide a nearly full charge in less than 30 minutes—drivers can traverse the state on electricity.

SOURCE: U.S. DEPARTMENT OF ENERGY 2014.



Electric vehicles can reduce global warming emissions even further when they are charged by solar power, as at this refueling station in Portland. The station was built by a local company with locally manufactured solar panels, creating clean jobs for Oregonians.

increase access to home and workplace charging, and incentivize the use of clean fuels will make EVs accessible to more Oregonians. These policies can also save drivers money in fuel costs, cut oil use, and reduce emissions. By bolstering the market for EVs, policy makers will help the economy and cement Oregon's reputation as a pioneer in transforming transportation to meet the challenges of the twenty-first century.

ENDNOTES

- 1 Fuel savings are based on the sales-weighted fuel economy of electric vehicles sold in Oregon compared with a 28.7 mile-per-gallon (mpg) average new gasoline car (excludes trucks such as SUVs and pickups), as reported by the U.S. Environmental Protection Agency (EPA). Fuel savings are also based on average 2014 prices for West Coast (minus California) regular gasoline and Oregon residential electricity as reported by the U.S. Department of Energy's Energy Information Administration. Emissions savings are based on average emissions from the electricity grid, expressed as carbon dioxide equivalent.
- 2 Ibid.
- 3 Annual and total fuel savings assume 11,000 annual miles driven. Total fuel savings are based on the sales-weighted fuel economy of electric vehicles sold in Oregon compared with a 28.7 mpg gasoline car, as reported by the EPA.
- 4 The purchase price of the Nissan Leaf assumes a federal tax credit of \$7,500.

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