Welcome to the EVolution

The *future* of cars is here.

Western WA CLEAN CITIES

wwcleancities.org

It's an electrifying age for cars...

Electric cars today:

- ☐ look like other vehicles
- ☐ perform like other vehicles
- ☐ travel greater distances
- ☐ are more affordable than ever
- ☐ are made by American manufacturers
- ☐ produce zero tailpipe pollution
- ☐ allow you to avoid gas stations and oil changes
- ☐ are fast and zippy
- ☐ come in all sizes and styles
- ☐ meet the safety standards of traditional vehicles

Join the EVolution.

This guide was created to make it easy for you to find answers and give you the facts on owning an electric vehicle.


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More auto manufacturers than ever are now making EVs, including BMW, Chevrolet, Ford, Honda, Hyundai, Kia, Toyota, Nissan, Mitsubishi, Volkswagen, and Tesla.

There is a major EVolution in personal transportation taking place. Your timing to jump in could not be better! You now have more options in more makes and models than ever before. No compromises necessary.

- EVs come in a variety of styles, from vans and SUVs to sporty roadsters and sedans. There's an EV for EVeryone.
- EVs now travel long distances thanks to rapid developments in electric battery technology.
- Charging stations installed along highways and in our communities make driving EVs, even for longer trips, more convenient.
- Many EVs are made by American manufacturers.
- EVs reduce pollution, making our communities healthier.
- EVs allow you to leave home with a "full tank" everyday.
- EVs don't have all that maintenance - no oil changes, spark plugs, air filters or mufflers.
- EVs have instant torque and acceleration, making them fun to drive.
- EVs drive quiet at all speeds, letting you listen to the radio at an easy volume.
- EVs meet or exceed all highway safety standards.

Multiple technologies mean multiple choices

(Though it is a bit of an acronym jungle)

Plug-In Vehicle Glossary

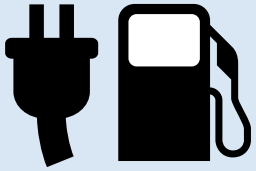
EVs or BEVs - Electric Vehicles or Battery Electric Vehicles

Electric vehicles use electricity stored in batteries to propel the vehicle. The battery can be charged by a variety of equipment ranging from a standard outlet to a sophisticated high voltage rapid charger. Like hybrids, some energy is recovered when using the brakes. There is no option to run the vehicle on gasoline.

Americans drive an average of

40 miles

per day -- easily covered by today's EVs.



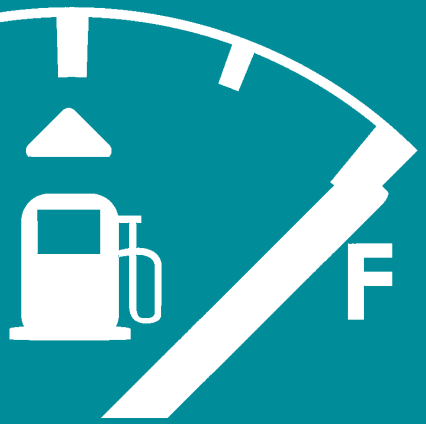
PHEVs - Plug-in Hybrids

A plug-in hybrid uses a combination of electricity and gasoline to propel itself. PHEVs have a battery system similar to an EV and can recharge using the same types of equipment. The batteries are smaller in PHEVs and therefore charge in less time.

A PHEV is also equipped with a small gasoline engine that can assist the wheels and provide electricity for the batteries and electric motor.

Charging has never been easier

EV drivers often say that one of the most convenient features of an EV is the ability to refuel at home and leave the house each day with a "full tank."



Here's the skinny on charging at home:

Currently there are three types (levels) of charging systems available:

Level 1: All plug-in cars come equipped to receive power from standard 110-volt outlets. The charge is delivered slowly, so it can take many hours to deliver a full charge to an all-electric car. Level 1 charging may be perfectly adequate for a plug-in hybrid, for topping off a battery, or for when the vehicle is sitting unused for long periods.

	Level 1 charging	Level 2 charging	DC fast charge
Equipment	Mobile cord comes with the car; plugs into any 110V socket	Must be purchased (or bundled with car)	Not suitable for home use
Cost	Included with vehicle	$500-$1,500	$50,000
Installation	No installation required	Electrical circuit installation required for majority of consumers	Located on thoroughfares and select gas stations
Range per hour of charge	2-5 miles per hour	10-20 miles per hour	60-80 miles per 20 minutes
Time required to recharge an empty Nissan LEAF battery	17 hours	4-7 hours	80% in 15 minutes

Find links to learn more about charging equipment in our Resources section

Level 2: Most owners of all-electric cars will want to have access to a Level 2, 240-volt electricity supply (like what's used for a clothes dryer). This will recharge a vehicle in much less time. You will need a 240-volt circuit installed in your garage to charge at this level. Although an electrical permit is required for 240-volt circuit installation, these are inexpensive and simple to process (your electrician will handle that). Many EVs and chargers can be programmed to start and stop charging at a particular time, keeping track of how much electricity they are "pumping." Purchasing (if not included with the vehicle purchase) and installing home Level 2 charging equipment will cost $500 to $1,500 for most consumers.

Level 3 (DC fast charge): These chargers are super-high-speed and not currently intended for home use because of high costs and the requirement of a dedicated electrical service. Expect to find these along travel corridors and at select retailers.

Washington State has the oldest operating gas station in the world and now we are part of the nation's first "electric highway," a network of public-access electric vehicle recharging locations along Interstate 5. This is a key part of the **"West Coast Electric Highway,"** which provides charging facilities along all 1,350 miles of I-5 from Canada to Mexico.

The Puget Sound region emerges as one of the best places to own an electric vehicle

We live in a place surrounded by beauty with striking natural features, from the mountains to the Sound.

We also live in a place that promotes progress. Innovation is a part of our spirit. Starbucks, Boeing, Microsoft, UPS, Nordstrom, REI, Costco, and Amazon were all created in Washington.

We are leaders in creating green jobs and adopting new clean technologies and we are doing it again with electric vehicles.

Washington aims to have over 50,000 registered electric vehicles on the road by 2020. We are currently on pace to achieve that goal ahead of schedule.

Meanwhile, several hundred chargers have already been installed and more are coming on line almost daily. Soon there will be more charging stations than gas stations in the entire state.

Plus, EV drivers can explore our beautiful state while being powered by Washington's abundant, clean, and inexpensive electricity.

Image courtesy of Brian Henderson

13 truths about EVs

#1

Range anxiety
is the fear that a vehicle has insufficient range to reach its destination.

EVs go the distance – the truth about range anxiety

Transportation experts report that the typical American drives an average of 40 miles per day. Electric cars easily meet those needs. Seemingly every year, new EVs are released that can travel farther distances using battery power. So why all the talk about range anxiety?

Range anxiety comes from thinking a destination is beyond the fuel supply. You know the feeling: You suddenly need to hurry to an appointment, and then discover that you might not have enough gas to get there. That's range anxiety.

The best way to avoid range anxiety is to install car-charging equipment at home. It is like having your own fuel pump and you get to start every day with a full tank. You can also plan trips in advance, which will help match your available charge to the miles you plan to travel.

The rapidly expanding network of charging facilities makes topping off very convenient. Using any number of smart phone apps or the vehicle's computer, drivers can find chargers at locations such as Park-N-Ride lots, municipal buildings, public parking garages, car dealerships, shopping centers and malls, office buildings, and sports facilities.

But if you still worry about EV range you might want to consider a plug-in hybrid vehicle, which has battery capacity for most daily driving excursions, but includes a small gasoline engine for long-range driving.

distance

save money

"My husband wanted my next car to be an electric car because it was cool. I wanted a car that I felt comfortable driving. With our LEAF we have both, but to be honest I hardly think about the fact that my car is electric. I just think of it as my car."

Beth Carper, *Nissan LEAF Owner*

#2

EVs can save money

The price of a car isn't the true reflection of how much it will cost. A big economic fact to consider is the life of the car. Electricity is inexpensive compared to the high cost of gasoline or diesel, and Washington State enjoys some of the lowest electricity rates in the nation. EVs can deliver their passengers to destinations at a cost of about 2-3 cents per mile.

Another factor in the total cost of a vehicle is maintenance. An electric motor has fewer moving parts. It does not require oil changes, spark plug changes or filter changes. Manufacturers report that EVs eliminate more than two dozen mechanical components that would normally require maintenance during the life of the vehicle. No more noisy mufflers, broken radiator hoses or alternator belts.

Government incentives can make EVs even more financially attractive. For example, taxpayers may be eligible for a $7,500 federal tax credit for the first-time purchase of an electric car.

EVs only cost
2-3 cents per mile to drive.


NISSAN
Zero Emission

EVs are **fun** to drive.

These cars provide great **acceleration and handling.**

#3

EVs are fun to drive

It is often the first thing you hear from the owner of an EV. Go ahead, test drive one yourself. They are quiet, and they are peppy. Electric motors have instant power, whereas gasoline engines have to build up power. EVs also provide information in real time that will keep your passengers entertained and envious.

#4

EVs are safe

All vehicles, whether gasoline, electric, or hybrid, must meet the same federal safety requirements. Both the Chrysler Pacifica and the Toyota Prius Prime have gone above and beyond federal safety standards, earning the highest possible safety ratings from the Insurance Institute for Highway Safety for the higher level of protection they provide.

The unique design considerations of EVs provide additional safety benefits. The batteries are located in the base of the vehicle, lowering their center of gravity, and reducing the likelihood of rolling over. Similarly, the vehicle frame is reinforced to support the battery systems, further improving their collision performance.

Though EVs have high-voltage batteries on board, they also have extensive safety systems that turn off and isolate the power from battery packs when a collision or short circuit is detected. As an EV owner you can rest assured that you are not compromising safety when driving an electric vehicle.

EVs are safe

#5

Public vehicle charging makes driving EVs more convenient

Many businesses and communities are installing charging facilities at convenient locations allowing EV drivers to "top off" in the course of their day. Public charging equipment is easy to find, and fast chargers are springing up alongside major corridors seemingly everyday. Similar to the parking spaces reserved for handicapped drivers, chargers are installed at spaces set aside for plug-in vehicles.

Drivers are able to locate these chargers using phone apps, the car's GPS system, and through online tools such as the U.S. Department of Energy's Alternative Fueling Station Locator. See the Resource section for links to station locator tools.

convenient

"After 6 months of driving our Nissan LEAF the only complaint we have is that we didn't have one 20 years ago!"

– Dean West, *Nissan LEAF owner*

#6

EVs are efficient

EVs convert 75% of the energy from their batteries to power their wheels. The motor turns off at stops – no idling; and EVs use regenerative braking systems, so energy from braking is captured in the car's batteries to be used again.

Gasoline-powered engines waste a lot of energy. As little as 40% of the energy in gasoline actually moves the wheels, the rest is simply wasted as heat from the engine. Of the usable 40%, approximately 17% is wasted during engine idling, and roughly 6% is wasted through braking.

smart

#7

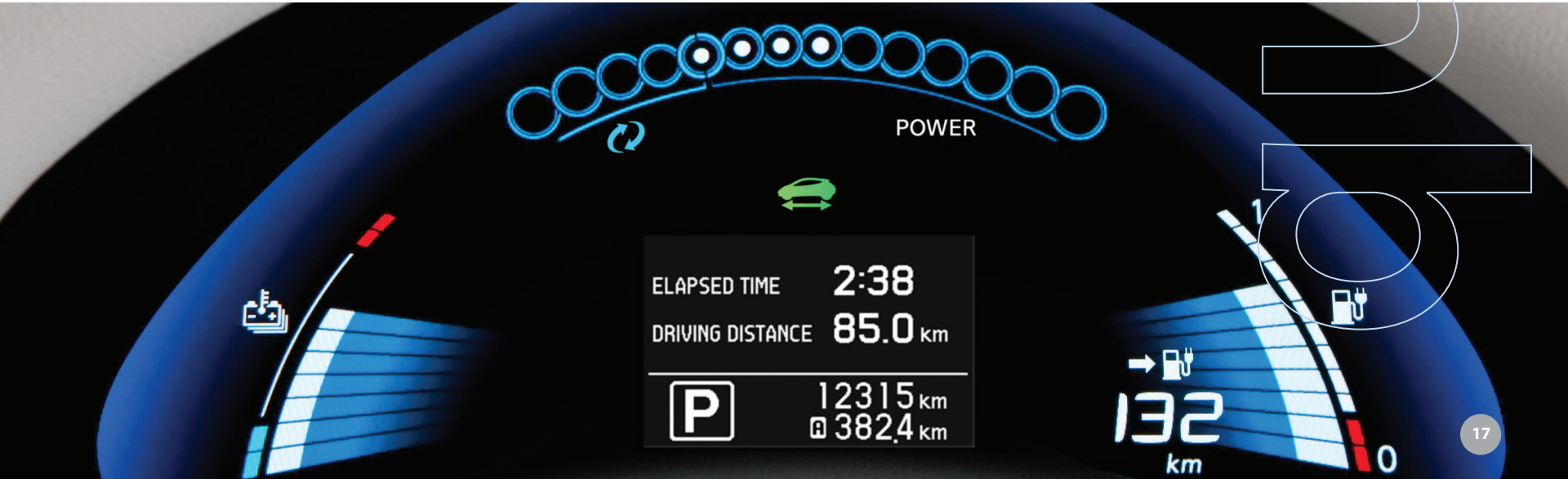
EVs are smart

EVs are among the smartest cars on the road. In addition to GPS systems that direct drivers to charging stations, they communicate with drivers about their charging state and driving efficiency. Many EVs can even start their cooling or heating systems by phone while still plugged in.

#8

EVs are quiet

So quiet in fact, that starting the car will be a daily reminder of just how much noise you are leaving behind with your new car. You may at first miss that initial vroom-vroom reminder of the gas engine, but you will quickly prefer the peace and quiet or the full sound of the car stereo without background engine noise.



EVs give drivers

real-time data

about energy use and expected range.

#9

EVs work well in all kinds of conditions

Pacific Northwest drivers want cars that can safely tackle hills, wet roads, and snowy conditions. With a low center of gravity, balanced weight distribution and traction control, EVs have demonstrated excellent adverse-weather handling. Some EVs even come equipped with a special winter driving low gear that decreases the torque from the electric motor to prevent spin-out when accelerating in slippery conditions.

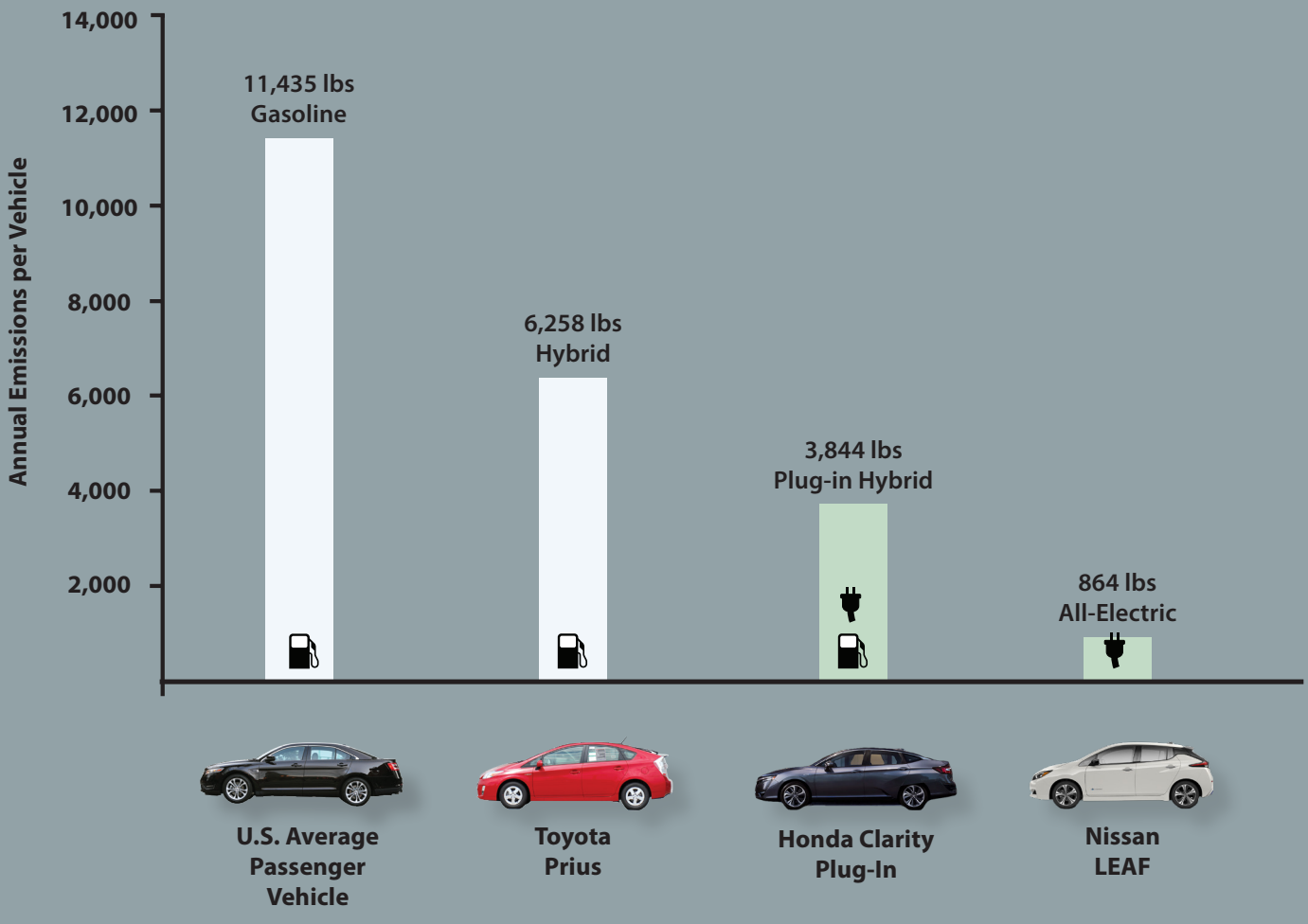
Advanced, on-board computers give you real-time data about energy use and expected range. And, as an extra benefit, you can program your EV to warm up or cool down the interior temperature of the car before you even leave home, using your household electricity and without drawing any charge from your battery.

As with any car, the more experience you have driving the vehicle, the more attuned you will be to the impact of weather, terrain, and climate control on your battery range.

performance


San Juan Islands
CONSERVATION
DISTRICT
NISSAN
WASHINGTON
B1856C
EVERGREEN STATE

Annual Greenhouse Gas Emissions



Graph is from http://www.afdc.energy.gov/vehicles/electric_emissions.php

#10

EVs tap into clean, Northwest power

Most electricity in Washington State comes from cleaner hydroelectric power and an increasing supply of renewable resources, such as wind and biomass. So plugging your EV into the Pacific Northwest power grid doesn't generate as much upstream pollution as it does in other parts of the country that rely heavily on fossil fuels to generate electricity. The chart at left from the U.S. Department of Energy compares the difference in greenhouse gas emissions from the average U.S. passenger vehicle, the Toyota Prius hybrid, Honda Clarity plug-in hybrid, and the Nissan LEAF powered by the average mix of Northwest power. EVs such as the LEAF drawing electricity from the Northwest power grid are climate friendly relative to even the most efficient gasoline-fueled vehicles.

sustainable

"My car can travel 80-100 miles on pure American electrons, no tailpipe. I can drive 40 miles on the same amount of electricity used to manufacture one gallon of gasoline. I love being able to plug in my car when I get home – it's like plugging in my phone. And I honestly have no idea how much gas costs anymore!"

– Michael Foster, *electric car owner*

emissions friendly

#11

EVs = zero tailpipe emissions

EVs don't even have tailpipes! They emit no air pollution or greenhouse gases. Compare that with a conventional gasoline vehicle, which emits 20 pounds of pollution per gallon burned. With roughly two-thirds of the region's air pollution coming from motor vehicles, EVs are a breath of fresh air to our communities.

"Combining electric and gas mode, the Volt's trip computer said I was seeing over 150 mpg at times!"

– Ben Lewis, automedia.com

70%
of oil consumed in the United States is used for transportation.

#12

EVs reduce reliance on gas & electricity

Drilling and refining oil for gasoline is much more energy-intensive than the energy required to power an EV. Refining gasoline from petroleum requires electricity, as much as 4 to 7.5 kWh per gallon. For every gallon of gasoline we do not need to produce, we save enough energy to power the average EV for 16 to 20 miles.

Our dependence on oil weakens the U.S. economy by sending hundreds of billions of dollars per year out of the country and represents more than half of our trade deficit. Consumers and businesses are impacted through volatile price hikes and the use of so much fossil fuel emits large amounts of air pollution and greenhouse gases.

Reduce demand for oil

#13

EV batteries are better than ever

Batteries used in modern electric vehicles are more powerful than those used in hybrid vehicles, and they're easier on the environment. Modern electric vehicles like the Nissan LEAF and Chevrolet Bolt use the most efficient batteries on the market, known as lithium-ion. These hold three times the energy and generate twice the power of batteries used in today's hybrids, and are less toxic than lead or nickel. Though lithium is a valuable earth metal, industry observers report that there is a sufficient supply (including in the U.S.) to support the emerging EV market. Because of their value, the incentive to reuse and recycle these batteries is very high.

Electric vehicle batteries have a much longer life than those used in mobile phones and laptops. EV manufacturers estimate up to 70% of the battery capacity will remain after 10 years of regular use. In fact, battery warranties from EV manufacturers are more competitive than those offered for gasoline engines (for example, the Nissan LEAF has a 100,000 mile battery warranty).

efficient

Local governments are choosing EVs.

Municipal fleet managers must balance the needs of their drivers while ensuring their fleets are as efficient, safe, and reliable as possible. So it's no surprise that municipalities like the City of Seattle, City of Tacoma, King County and Snohomish County all jumped at the opportunity to replace gasoline vehicles with electric. The City of Seattle sees significant savings -- often over $1,000 per year -- from reduced fuel and maintenance costs for each electric vehicle they add to their fleet compared to a gasoline-powered car.


PUBLIC
MARKET
FARMERS MARKET
YOUR CHANGE CHANGES LIVES!
DONATE HERE!
WATERFRONT VIEWPOINT
ROTARY GROCERY
34403
Seattle
Parks & Recreation
For Official Use Only


EVERETT TRANSIT
7 TO MALL STATION
B0701

"Perhaps the most impressive thing about the Bolt EV is there are no caveats, no "for an electric car" qualifiers needed in any discussion. It is, simply, a world-class small car, and that's before you factor in the benefits inherent in the smoothness, silence, and instant-on torque provided by the electric motor."

– Angus MacKenzie, *Motor Trend*

Fleets and businesses embrace EVs

A national survey found that the top concern of fleet managers was rising, volatile fuel prices. As a result, 28% of the fleet managers questioned said they would add EVs to their fleets within a year. These may include plug-in cars, trucks, and specialized vehicles.

- FedEx and UPS have already added a variety of electric cars and delivery trucks to their fleets.
- Staples and Frito-Lay use electric trucks for in-city stop-and-go driving with a top speed of 55 mph. These trucks can carry as much as 16,000 pounds and travel 50 to 120 miles on a single charge.
- Waste management and recovery company Recology CleanScapes will use two all-electric refuse trucks in the Seattle area starting in 2019.
- Fleets such as MacDonald-Miller and Potelco, Inc., have integrated plug-in vehicles into their Washington operations with great success.
- Washington transit agencies are embracing battery electric buses.
    - King County Metro has committed to integrating 120 all-electric buses into their transit fleet by 2020.
    - Everett Transit, Kitsap Transit and Pierce Transit all have purchased battery electric buses, with plans to add more over the next several years.
    - All-electric buses can travel 20-200+ miles, depending on their drivetrain and vehicle configuration. Some of these buses can fully charge in just ten minutes.

EVs currently available or coming soon

Battery Electric Vehicles

Audi e-tron
BMW i3
Chevrolet Bolt
Fiat 500e
Ford Focus EV
Honda Clarity Electric
Hyundai Ioniq Electric
Hyundai Kona Electric
Jaguar I-Pace
Kia Niro Electric
Kia Soul EV
Mercedes-Benz EQC
Nissan LEAF
Porsche Taycan
Smart ForTwo Electric Drive
Tesla Model 3
Tesla Model S
Tesla Model X
Tesla Model Y
Volkswagen e-Golf

Plug-in Hybrid Vehicles

Audi A3 Sportback e-tron
BMW 330e
BMW 530e
BMW 740e xDrive
BMW i8
BMW X5 xDrive 40e
Cadillac CT6
Chevrolet Volt
Chrysler Pacifica Plug-In Hybrid
Ford Fusion Energi
Honda Clarity Plug-In Hybrid
Hyundai Ioniq Plug-In Hybrid
Hyundai Sonata Plug-in Hybrid
Kia Niro Plug-In Hybrid
Kia Optima Plug-In Hybrid
Mercedes-Benz C350e Plug-in Hybrid
Mercedes-Benz GLC350e
Mercedes-Benz GLE 550e
Mercedes-Benz S550 Plug-In Hybrid
Mini Cooper S E Countryman ALL4
Mitsubishi Outlander PHEV
Porsche Cayenne S E-Hybrid
Porsche Panamera Plug-In Hybrid
Subaru Crosstrek Plug-In Hybrid
Toyota Prius Prime
Volvo S90 T8 Plug-In Hybrid
Volvo XC60 T8 Plug-In Hybrid
Volvo XC90 T8 Plug-In Hybrid

Resources

Learn more about electric vehicles and charging options:

afdc.energy.gov/fuels/electricity
goelectricdrive.com
pluginamerica.org
evrater.com/evs
wwcleancities.org

Find charging stations:

Visit the U.S. Department of Energy's Alternative Fueling Station Locator:
afdc.energy.gov/stations

Learn about the fast-charging available along the West Coast Green Highway:

westcoastgreenhighway.com

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What's not to get amped up about?

- Save money
- Fun to drive
- Cleaner air
- Quiet
- High tech
- Reduces demand for oil