



Frequently Asked Questions About Electric Companies and Plug-in Electric Vehicles

Plug-in electric vehicles (PEVs) are an exciting electric technology that will help boost our nation's energy security by reducing our dependence on foreign oil. Electrifying our transportation system also will help create new, high-quality jobs and reduce emissions.

The electric power industry is committed to making PEVs a success by addressing the infrastructure needed for widescale deployment of PEVs and educating consumers about their charging options. And, electric companies are currently using PEVs in their own fleets.

PEVs are available in many markets today. As with any new technology, PEVs present consumers with a few more questions beyond the typical ones about a car's make, model, and color. These frequently asked questions and answers about PEVs should help consumers better understand this new electric technology and the electric power industry's role in electrifying our nation's transportation system.

VEHICLE AND CHARGING BASICS

Q: What is the difference between an “all-electric,” a “plug-in hybrid,” and a “hybrid” vehicle?

A: An “all-electric” vehicle (also “pure electric” or “battery electric” vehicle) uses only an electric motor and rechargeable battery pack to move and power the vehicle.

A “plug-in hybrid” (or “extended range electric vehicle”) has both an electric motor and internal combustion engine for movement, along with a rechargeable battery pack and gasoline tank for fuel.

A “hybrid” has both systems, like a plug-in hybrid, but unlike a plug-in hybrid and an all-electric vehicle, its battery pack is not recharged by plugging into the electric grid.

Beyond passenger vehicles, many rail and subway systems, forklifts, cranes, airport vehicles, and other types of vehicles have been electrified. More applications are on their way as battery technology continues to improve.



Q: Should I be concerned about a PEV's range?

A: That depends on your driving needs and the PEV you choose. Most Americans drive less than 35 miles a day. All of the new all-electrics and many plug-in hybrids can cover that distance between charges. If you typically don't go on longer trips, or if you have another vehicle available, an all-electric vehicle with a range of 80 to 100 miles could meet your daily needs. If you need the flexibility to go on longer trips, then a plug-in hybrid would be a good choice. The plug-in hybrid also will be able to handle most daily commutes on electricity only.

Q: How do PEV charging stations work? What is a "fast charger"?

A: There are three levels of charging the car's battery pack: Level 1, Level 2, and DC "fast charging."

- Level 1 refers to charging the battery with a standard 120-volt (V) outlet. Every new mass-market PEV will have a cord that can connect the car to any standard outlet.
- Level 2 refers to 220V/240V charging, using an outlet similar to the one used for clothes dryers. Every new mass-market PEV will have a standard connector for these charging stations.
- DC fast charging refers to a high-voltage device that can recharge vehicle batteries at a much faster rate. For example, a 100-mile range battery recharges from 0 percent to 80 percent in less than 30 minutes. These devices will be used mainly in fleet operations, in some city centers, and along some major highways, as they require special installation and a large amount of power. Currently, there is no U.S. technical standard for this connection, so only Nissan and Mitsubishi models will support the connectors on the devices currently being installed in the United States. Unfortunately, frequent use of DC fast charging may degrade a vehicle's battery life.

Q: How will I charge my PEV at home?

A: All PEVs come with a standardized cable that can be plugged into a wall outlet, allowing you to easily charge your PEV at home. This Level 1 charger will fully recharge your PEV in five to 20 hours, depending on the battery size. A Level 2 charger can recharge a PEV in four to eight hours. The Level 2 charger uses 220 volts or 240 volts and requires an electric outlet similar to the one used for clothes dryers. Typically, the cost to buy and install a Level 2 outlet is between \$1,000 and \$2,000. Currently, there are federal tax credits to help offset these costs, and many states also offer incentives.

Q: How can I charge my PEV away from home?

A: Many electric utilities are involved in initiatives to create a public charging infrastructure, as well as electrified corridors along major interstate highways. For example, The EV Project is installing nearly 15,000 residential and commercial chargers in 13 cities across five states and the District of Columbia. Also, many office buildings and retailers in the states that are receiving the first round of PEVs are installing chargers in their parking garages. Keep in mind that most people drive less than 35 miles a day, well within the range of a fully-charged PEV. Therefore, for the vast majority of PEV owners, public charging will not be necessary.

For more information about The EV Project, visit www.theevproject.com.

Q: How will the cost of charging my PEV compare with filling up my old car at the gas station?

A: Charging your PEV is comparable to paying \$1.00 per gallon of gasoline.¹ In addition to the relatively lower cost to 'fill up,' you may qualify for federal and state tax credits, as well as other financial incentives, to help reduce the purchase price of a PEV. Many utilities also are offering incentives to help their customers purchase a home charger, as well as special rates to encourage even cheaper, overnight charging at home.

Q: How do the maintenance costs of a PEV compare to traditional vehicles?

A: Driving an all-electric PEV means that you no longer have to worry about exhaust and transmission systems, oil changes, and most of the moving parts found in internal combustion engines. This means fewer tune-ups, lower maintenance costs, and a smoother drive (with no gear shifting). As a PEV driver, you also may be able to enjoy HOV lane access² and preferential or free parking.³

Q: Does the weather affect the performance of PEVs?

A: Just like with traditional vehicles, extreme temperatures will affect the mileage and operation of a PEV. Extensive use of climate control systems and other electronics will decrease a PEV's all-electric range.

However, PEVs offer several new advantages to mitigate these weather effects. PEV batteries are temperature-controlled by either advanced air-cooling or liquid-cooling systems that keep them operating at optimal temperatures, regardless of the weather. Most PEVs offer the ability for owners to start cooling or heating the cabin from a smartphone before unplugging the vehicle, which maximizes its range. And, rather than heating the whole vehicle, advanced heated seats in many PEVs offer a more efficient way to keep passengers comfortable in cold weather. Also, because electric motors produce little to no heat, PEVs are easier to cool than gasoline vehicles.

Q: Compared to traditional vehicles, how do PEVs rank in terms of reliability?

A: As this new generation of PEVs starts to arrive in the marketplace, their long-term reliability is difficult to judge. Anecdotal evidence from many PEV owners over the last decade suggests that these cars are incredibly reliable, simple, and inexpensive to maintain. The technical evidence also supports this: electric-drive trains have

far fewer moving parts and produce far less heat than internal combustion engine systems, therefore experiencing far less wear-and-tear. This means PEV owners also can expect significantly lower maintenance costs.

In fact, in early 2011, Consumer Reports tested a 2002 Prius with more than 200,000 miles and found that the vehicle (and battery) performance showed very little degradation in terms of fuel economy and acceleration.⁴

POWERING PEVS

Q: What energy sources will fuel PEVs?

A: While the electric generation mix varies across the country, electricity is a domestic transportation fuel. Nationwide, coal generates about 45 percent of our electricity, natural gas supplies about 24 percent, nuclear fuel produces about 20 percent, and renewable sources generate 10 percent. In some regions of the country, wind energy is likely to help charge PEVs at night, as this is when that type of variable generation is most common. U.S. electricity generation—and your PEV—will only continue to get greener, as utilities build newer, cleaner generation.

Q: What if my neighbors like my PEV so much that they buy them, too? Will the grid be able to handle it?

A: Yes. Studies have shown that even in neighborhoods with older or smaller-capacity distribution transformers, it would take two to three PEVs added to a single transformer, typically servicing five to ten households, to become an issue. Utilities are aware of the potential impacts to the grid and are working to mitigate them. Transformer maintenance and grid management are part of what electric utilities routinely do—the arrival of mass market PEVs is no different than previous waves of new electric products like clothes dryers, air conditioners, heat pumps, or large-screen TVs.

Q: Will we need more power plants if too many people buy PEVs?

A: No. The grid has surplus capacity built into it, particularly at night, when electricity demand is at its lowest. Already, utilities are educating PEV owners about the benefits of charging at “off-peak” times to help mitigate any future impact PEVs may have. Emerging technologies also will help utilities control and manage, in “real time,” the load on the grid. If PEVs were charged off-peak, the grid could handle roughly 75 percent of the country’s vehicles plugging in without the need for a single new power plant.⁵

Q: Are there any other uses for the batteries in PEVs?

A: Yes. The advanced batteries being built for PEVs have other important applications beyond vehicles. These batteries can potentially be used in stationary applications for many purposes. Energy storage presents an opportunity to increase the reliability and efficiency of the overall electricity grid, to increase the utilization of variable renewable generation like wind and solar, and even to decrease the use of liquid fuels in military operations around the globe.

ADDITIONAL PEV BENEFITS

Q: If PEVs become popular across the country, what impact will that have on the economy?

A: Widespread adoption of PEVs will have a positive impact on the economy. It is estimated that widespread adoption of PEVs would create thousands of domestic jobs; lower our trade deficit by \$127 billion by 2030; boost both household incomes and the country’s gross domestic product (GDP); reduce the federal budget deficit; and make the U.S. economy more resilient to oil price shocks.⁶

Q: What about our national security?

A: Widespread adoption of PEVs also will have a positive effect on the nation’s security. PEVs are powered by electricity produced from domes-

tic energy resources and will help our country reduce its dependence on foreign oil. Electrifying the nation’s light-duty vehicle fleet, which accounts for roughly 45 percent of total U.S. oil consumption,⁷ would reduce oil imports by more than three million barrels per day in 2030.⁸ And doing so could free up 12 to 15 percent of the country’s annual defense budget that is spent on securing imported oil trade routes.⁹

Q: Will PEVs benefit the environment?

A: Yes. PEVs release fewer tailpipe emissions than gasoline vehicles—or no emissions at all.¹⁰ According to an EPRI/NRDC report, widespread adoption of PEVs could reduce greenhouse gas emissions from vehicles by more than 450 million metric tons annually in 2050—that’s the equivalent of taking 82.5 million passenger cars off the road.¹¹ Overall air quality also will improve as more PEVs take the road.¹²

ELECTRIC UTILITY INVESTMENT

Q: Are electric utilities using PEVs in their fleets?

A: Yes. Many electric utilities are using PEVs in their fleets. Utilities often test prototype models and even partner with manufacturers to design and create new PEVs for fleet use. Utilities are often early adopters of PEVs, as they can reduce their diesel fuel and maintenance costs over the lifetimes of heavily-used vehicles, such as bucket trucks.

Q: Are electric utilities offering special PEV electric rates?

A: Many electric utilities are currently offering what is called a “time of use” rate for either the entire household or just for the PEV (through a separate meter). The utility offers a discounted rate during its “off-peak” demand times—typically at night—and a higher rate during “peak” times. These special rates are meant to encourage customers to charge their vehicles at night, which benefits both customers and the utility.

Some utilities also are offering a special monthly flat rate for a PEV, through use of a separate meter.

Other electric utilities continue to work with state regulators to be able to offer special rates to consumers and/or businesses that use PEVs.

As part of these efforts, utilities provide educational materials to customers and communities that describe the options associated with special PEV rates.

Q: Will I need a separate meter for my new PEV?

A: In the areas where PEVs are first being introduced, most electric utilities are not installing a separate, PEV-specific meter. However, some utilities are installing separate meters as part of pilot programs and often offer incentives to cover the cost of the meter and even a Level 2 charger. There are some areas where a separate meter, or sub-meter, may be beneficial, as it allows the utility to offer a lower rate, or time-of-use rate, specifically for PEVs.

Q: Are other industries and companies supporting PEVs?

A: There are a significant number of companies in the United States and around the world that recognize the value of PEVs—ranging from rental car agencies and global delivery service companies to big box retailers and software and information technology giants. Groups such as the Electric Drive Transportation Association and the Electrification Coalition bring together many economic interests for the common purpose of moving our transportation sector away from foreign oil.

ENDNOTES

1. This calculation is based on today's average annual residential electric rate of 11.5 cents per kWh (U.S. Department of Energy, Energy Information Administration), a vehicle with an efficiency of 3.5 miles per kWh, and a typical gasoline vehicle that gets 30 miles per gallon.
2. Currently available in AZ, CA, FL, GA, MD, NJ, TN, UT, VA. Source: U.S. Department of Energy, Alternative Fuels Data Center.
3. Currently available in AZ, CA, CT, HI, UT. Source: U.S. Department of Energy, Alternative Fuels Data Center.
4. Consumer Reports "The 200,000-mile question: How does the Toyota Prius hold up?", February 16, 2011, at: <http://news.consumerreports.org/cars/2011/02/200000-mile-toyota-prius-still-performs.html>
5. Pacific Northwest National Laboratory, *Impacts Assessment of Plug-In Hybrid Vehicles on Electric Utilities and Regional U.S. Power Grids: Part 1: Technical Analysis*, 2007.
6. Inter-Industry Forecasting Project at the University of Maryland, Keybridge Research LLC & Electrification Coalition, *Economic Impacts of the Electrification Roadmap*, April 2010.
7. U.S. Department of Energy, Energy Information Administration.
8. Inter-Industry Forecasting Project at the University of Maryland, Keybridge Research LLC & Electrification Coalition, *Economic Impacts of the Electrification Roadmap*, April 2010.
9. RAND Corporation, *Imported Oil and U.S. National Security*, 2009.
10. U.S. Environmental Protection Agency and Department of Transportation Fuel Economy Labels, www.fueleconomy.gov/feg/label/.
11. Electric Power Research Institute, Natural Resources Defense Council & Charles Clark Group, *Environmental Assessment of Plug-In Hybrid Electric Vehicles, Volume 1: Nationwide Greenhouse Gas Emissions*, July 2007.
12. Electric Power Research Institute, Natural Resources Defense Council & Charles Clark Group, *Environmental Assessment of Plug-In Hybrid Electric Vehicles, Volume 2: United States Air Quality Analysis*, July 2007.

The **Edison Electric Institute (EEI)** is the association of U.S. shareholder-owned electric companies. Our members serve 95% of the ultimate customers in the shareholder-owned segment of the industry, and represent approximately 70% of the U.S. electric power industry. We also have as Affiliate members more than 80 International electric companies, and as Associate members more than 200 industry suppliers and related organizations.

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