Touchstone Energy Cooperatives

advanced energy

OVERVIEW OF ELECTRIC VEHICLES

Electric vehicles (EVs) are becoming more and more popular. Nearly every manufacturer offers at least one model, and the technology continues to improve. EVs provide environmental benefits, lower operating costs, and a quiet, smooth, fun ride.

Is it smart to rely on such a "new" technology?

Electric-powered vehicles are actually not a new technology. In fact, they have been around for over a century. In the 1890s, electric cars were more popular than gas-powered cars because of their simplicity, reliability and low cost to operate. Henry Ford's wife even drove an EV.

For a variety of reasons, EVs disappeared for much of the 20th century, but the vehicles are on the rise once again. This resurgence is fueled by significant advancements in power electronics and battery technologies.

What do the terms mean?

We are most familiar with conventional combustion-engine vehicles, but the market is changing, and it can be hard to keep up with the latest technologies, models and terminology. For simplicity, vehicles can be sorted into four main categories.

1. Conventional vehicles have an internal combustion engine, with the most common fuels being gasoline and diesel.

2. Hybrid electric vehicles have both a gasoline engine and an electric motor and battery; both gas and electricity power the wheels. The electric motor and battery are designed to improve fuel economy, so less gasoline is used to operate the vehicle. The battery is charged solely by operating the vehicle; it is not possible to charge by plugging in.

3. Plug-in hybrid electric vehicles (PHEVs) have larger batteries than hybrids and use both gas and electricity to power the wheels. These vehicles vary in their electric range but shift to gasoline-only operation when battery power is depleted or in certain other conditions. The vehicles plug in to charge the battery.

4. Battery electric vehicles (BEVs) have much longer electric ranges than PHEVs, are powered solely by electricity and are charged by plugging in.

What is the cost to own and operate an EV vs. a gas-powered vehicle?

While BEVs and PHEVs can have higher purchase prices, incentives and rebates are available, and these vehicles have lower operating costs.

Touchstone Energy calculated the annual energy costs and savings for owning an EV vs. a gas-powered vehicle. Assumptions include driving the vehicle 15,000 miles a year, with 225 days of 50 miles and 50 days of 75 miles. Fuel economy numbers from the U.S. Environmental Protection Agency and average energy costs from the U.S. Energy Information Administration were used.

Comparing an EV to a gas-powered vehicle that gets 25 mpg, the gas-powered vehicle would cost approximately $1,320 for gas per year.

- A typical BEV would save $730 in energy costs per year; electricity costs would be less than half the cost of gasoline.
- A typical PHEV would save $600 per year when combining the cost of gas with the cost of electricity to operate the vehicle.

Other considerations to add to the calculations:

- Tax credit: Many EVs qualify for the federal tax credit of up to $7,500, though the specific amount is based on the vehicle, manufacturer and your tax liability.
- Other incentives: Some states, cities and cooperatives offer additional credits or perks for EVs.
- Less maintenance: BEVs tend to have much lower maintenance costs because of their simplicity (e.g., fewer moving parts). PHEVs are more complex, with both gas and electric components, but maintenance costs can still be less than gas-powered vehicles. For example, thanks to regenerative braking, the brake system experiences reduced wear.

RESOURCES FOR FURTHER INFORMATION

The following resources can help as you explore options for purchasing or leasing a BEV or PHEV.

Cost-of-ownership Calculators

- Edmunds - /www.edmunds.com/tco.html
- U.S. Department of Energy - www.fueleconomy.gov/feg/findacar.shtml
- Alternative Fuels Data Center - https://afdc.energy.gov/calc/

General Information

- GoElectricDrive - www.goelectricdrive.org
- Plug In America - https://pluginamerica.org

Charging Station Locators

- PlugShare - www.plugshare.com
- Alternative Fuels Data Center - www.afdc.energy.gov/fuels/electricity_locations.html

This article was provided by Advanced Energy, a nonprofit energy consulting firm.
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