

# ANSWERS TO COMMON QUESTIONS ABOUT ELECTRIC VEHICLES

Electric vehicles (EVs), also called all-electric or battery electric vehicles (BEVs), offer many benefits. They operate smoothly and quietly and have responsive acceleration, zero tailpipe emissions, and low costs for maintenance and fueling. Plug-in hybrid electric vehicles (PHEVs) offer many of the same benefits but can run on both electricity and gasoline, allowing for extended range for long trips without the need to recharge. As a consumer, you may be drawn to these features, but you may also have some questions that make you cautious about purchasing an EV. **This fact sheet, provides information that will help you make an informed decision about EVs.** (In this fact sheet, the term *EV* covers both all-electric EVs and PHEVs unless stated otherwise.)

## Are EVs expensive?

**The cost of many EVs keeps coming down relative to conventional vehicles.** In fact, some new EV manufacturers' suggested retail prices (MSRPs) start under \$30,000 before state and federal rebates and tax credits, which can reduce costs even further.

**Federal tax credits are available** for up to \$7,500 for new EVs, PHEVs, and fuel cell electric vehicles purchased new in 2023 or after and up to \$4,000 for used EVs. Tax credits are available in select communities for home chargers and associated energy storage, each up to \$1,000.<sup>1</sup> Some states also offer incentives for EVs. Information about available incentives can be found at FuelEconomy.gov's Tax Center<sup>2</sup> as well as at several state government EV sites. Leasing an EV can be an economical choice. Used EVs can be a great buy as well, since the cost can be much lower and the benefits remain.

**An EV motor has few moving parts and requires less maintenance** than conventional vehicle engines. EVs never need oil changes or exhaust system repairs, and regenerative braking significantly reduces brake wear while extending electric range. And there is no worrying about costly engine repairs. While not all auto shops stock EV parts and can service EVs yet, the number of EV-capable repair



shops is growing. Increasingly, technicians are being trained to service EVs. The National Institute for Automotive Service and the National Automotive Parts Association are among the many organizations that offer EV training programs for technicians.

Some people may be concerned about replacing the drive system battery, which is the most expensive part of an EV. New EVs, however, come with a battery warranty that protects the buyer, typically for 8 years or 100,000 miles. Some warranties cover up to 175,000 miles.<sup>3</sup>

**Statistics show that very few batteries have actually failed during a car's lifetime,**<sup>4,5</sup> and there is a thriving market for batteries from older EVs.<sup>6</sup> At the end of their first life, EV batteries can be put to other uses, such as home energy storage for solar panels. And, in case you're worried about an EV's resale value, used EVs are in great demand in the U.S. and abroad.<sup>6</sup>

## Will it be expensive to charge my EV?

Unless you plan to use only pay-per-use direct current fast chargers (DCFCs), **it will typically cost less**—possibly as much as \$2,200 less per year—to charge your EV than it would to fuel your gasoline-powered vehicle. For a PHEV, savings of up to \$1,500 per year are possible.<sup>7</sup>

<sup>1</sup> U.S. Department of Energy (DOE). Electric Vehicles, <https://www.energy.gov/save/electric-vehicles>. Accessed Dec. 18, 2024.

<sup>2</sup> DOE and U.S. Environmental Protection Agency (EPA). Tax Incentives, <https://fuelconomy.gov/feg/taxcenter.shtml>. Accessed Oct. 10, 2024.

<sup>3</sup> Rivian, "What is the warranty coverage on a new Rivian?" <https://rivian.com/support/article/what-is-the-warranty-coverage-on-a-new-rivian-in-the-united-states>. Accessed Dec. 18, 2024.

<sup>4</sup> Charles Morris, "Battery life exceeds expectations in Recurrent study of 15,000 EVs." *EV Engineering News*, April 3, 2023. <https://chargedevs.com/newswire/battery-life-exceeds-expectations-in-recurrent-study-of-15000-evs/>. Accessed Oct. 29, 2024.

<sup>5</sup> Najman, L., "New Updates: How Long Do Electric Car Batteries Last?" *Recurrent*, May 20, 2024. <https://www.recurrentauto.com/research/how-long-do-ev-batteries-last>. Accessed Oct. 14, 2024.

<sup>6</sup> Hans Eric Melin, Circular Energy Storage Online, email message to Linda Gaines, Argonne National Laboratory, Nov. 15, 2022.

<sup>7</sup> Wu, X., Zhou, Y., and Gohlke, D., 2024. "Adoption of Plug-in Electric Vehicles: Local Fuel Use and Greenhouse Gas Emissions Reductions Across the U.S." <https://doi.org/10.2172/2314987>.



See Argonne’s [Driving Electric: Local Fuel Savings Calculator](#) for a personal estimate of potential savings.

Of course, if you don’t have charging capability at home, you’ll need to use public charging stations, or stations at work if your employer has them. Charging at a 240-volt Level 2 station will provide about 25 miles of range per hour. Charging at a DCFC station provides 100–200+ miles of charge in 30 minutes.<sup>8</sup>

Even using a combination of Level 2 chargers and DCFCs could save EV drivers hundreds of dollars per year in fueling costs.

The table below shows the annual cost of fuel for various charging methods at various kilowatt-hour (kWh) prices compared with conventional fuel at \$3.27/gallon.

### Fueling Cost Scenarios for EVs and Conventional Vehicles

Vehicle	Fueling source	When the fuel price is . . .	The fuel cost per 10,000 miles is . . .
EV	Level 1 Charger	\$0.16/kWh <sup>9</sup>	\$516
EV	Level 2 Charger	\$0.21/kWh <sup>10</sup>	\$672
EV	DC Fast Charger	\$0.35/kWh <sup>10</sup>	\$1,120
Conventional	Gasoline	\$3.27/gal <sup>11</sup>	\$1,555

**You may save even more**, since workplace charging and charging at some stores and destinations may be free, and many cars come with free charging at the dealership and other public charging locations for a period. Of course, both **electricity and gasoline prices vary significantly**, not only by location but sometimes by time of day (for electricity), so you need to estimate your own savings based on your own situation.

### Will I have problems driving my EV in cold weather?

**EVs actually have some advantages over conventional vehicles in cold weather.** They warm up faster without any toxic start-up emissions. Their driving performance is generally unaffected in mildly cold weather, but more electricity is used per mile traveled (largely due to heating the car and reduced battery performance in cold weather), so driving range is reduced, especially at temperatures below 20°F. Also, charging can take longer if the battery begins charging when cold.

**Argonne’s Driving Electric: Local Fuel Savings Calculator** shows you how much you can save on fuel by switching to an electric vehicle (EV) or a plug-in hybrid vehicle (PHEV). It allows you to enter your ZIP code or state, as well as specifics about your vehicle. The tool then estimates how much you can save by switching to an EV or a PHEV. [Learn More](#)

In scientific tests conducted at Argonne National Laboratory, three different EVs lost about 40% range at 0°F, 20%–30% at 32°F, and about 10% at 95°F.<sup>12</sup> Conventional vehicles also lost efficiency, although generally less. The plug-in hybrid SUV tested lost about 20% of range at 95°F and 50% at 20°F in charge-depleting mode but had combustion-engine backup.<sup>13</sup>

**Preheating your car while it is still plugged in can maximize cold-weather range**, as can using features such as heated seats and heated steering wheels to minimize the need for forced heated air.

Another cold-weather concern is getting stuck on a snow-bound highway. EV occupants can expect to stay warm on timelines similar to those in a conventional vehicle, without the danger of having the tailpipe blocked by snow and sending exhaust into the vehicle, or the added expense of having to run an inefficient internal combustion engine to generate heat. An experiment conducted by *Car and Driver* in Michigan, at a temperature of around 15°F, showed that the fully charged 80-kWh battery was sufficient to heat (at 65°F) and illuminate an EV for as long as 45 hours.<sup>14</sup>

### Will I be able to get an EV with capabilities to meet all my needs?

Maybe the first EVs on the market wouldn’t have fit your needs, but the technology and market have changed over the past decade. **There are models to suit most needs, from powerful SUVs to pickup trucks fully capable of towing a trailer.**

For instance, the Ford F-150 Lightning EV not only has towing capacity but is vehicle-to-tool (V2T) and vehicle-to-house (V2H) capable. That means it can export power, running tools at a job site or supplying power back to your house in the event of a power failure. This feature is available on an increasing selection of new car models.

<sup>8</sup> Electric Vehicles for Consumers. [https://afdc.energy.gov/vehicles/electric\\_consumers.html](https://afdc.energy.gov/vehicles/electric_consumers.html). Accessed Dec. 18, 2024.

<sup>9</sup> Energy Information Administration (EIA). 2023 Total Electric Industry: Average Retail Price [residential]. [https://www.eia.gov/electricity/sales\\_revenue\\_price/pdf/table\\_4.pdf](https://www.eia.gov/electricity/sales_revenue_price/pdf/table_4.pdf). Accessed Oct. 29, 2024.

<sup>10</sup> Summarized by Argonne from data at Energetics’ EV WATTS Vehicle Dashboard. <https://www.clearesult.com/insights/evwatts>. Accessed Oct. 30, 2024.

<sup>11</sup> Energy Information Administration. Weekly Retail Gasoline and Diesel Prices, for the week of Oct. 21, 2024. [https://www.eia.gov/dnav/pet/pet\\_pri\\_gnd\\_dcus\\_nus\\_w.htm](https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_w.htm). Accessed Oct. 28, 2024.

<sup>12</sup> National Highway Traffic Safety Administration, Argonne National Laboratory Benchmarking Reports, July 2023. 2019 Nissan Leaf Plus (DOT HS 813 352); 2020 Chevrolet Bolt (DOT HS 813 351); and 2020 Tesla Model 3 AWD (DOT HS 813 359) <https://www.regulations.gov/document/NHTSA-2023-0022-0010>. Accessed Jan. 21, 2024.

<sup>13</sup> National Highway Traffic Safety Administration, Argonne National Laboratory Benchmarking Reports, July 2023. 2021 Toyota RAV4 Prime (DOT HS 813 356). <https://www.regulations.gov/document/NHTSA-2023-0022-0010>. Accessed Jan. 4, 2024.

<sup>14</sup> John Voelker, “What Do You Do If You Get Stranded in an EV in Winter?” *Car & Driver*, Feb. 1, 2023. <https://www.caranddriver.com/features/a42642119/ev-winter-stranded-tips/>. Accessed July 19, 2024.

**Many EVs feature one-pedal driving**, which offers convenience and efficiency thanks to regenerative braking enabled by the electric motor(s).<sup>15</sup> Regenerative braking allows EVs to capture energy normally lost during braking and store that energy in the battery.<sup>16</sup>

Range was considered a real issue when one of the first modern affordable EVs, the Nissan Leaf, with a real-world range of less than 100 miles, came out in 2010. **Today's EVs offer ranges from 200 to 300 miles, and many models offer ranges of 400 to 500 miles.**<sup>17</sup>

While such long range is helpful for occasional long-distance trips, cars in the U.S. average under 40 miles a day.<sup>18</sup>

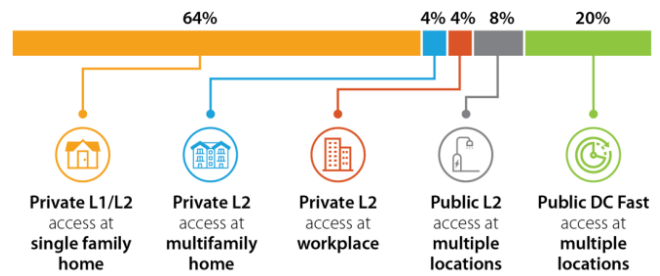
### Is the public charging network reliable, and can I find an available charger when I need it?

The federal [National Electric Vehicle Infrastructure \(NEVI\) Program](#) is currently building a national network of 500,000 public EV chargers along the nation's highways and in its communities. **Nearly 1,000 new public chargers are turned on every week** thanks to a combination of federal funding, federal tax incentives, state and local funding, and private investment. Some of the country's most heavily traveled routes already have good charging coverage, and many more heavily trafficked routes will come online by the end of 2024 and into 2025.

**New minimum standards** for federally funded chargers ensure that they are convenient, reliable, and accessible. Each charging port is required to have an average annual uptime of more than 97%. Standardization and consolidation of system designs will further improve charger reliability, which has been an issue.

**Charger-availability smartphone apps**, such as the Department of Energy's (DOE) Alternative Fueling Station Locator,<sup>19</sup> help identify sites that are operational. Some apps also provide real-time charger availability. These are especially helpful when embarking on longer trips.

**Think about where and when you would likely charge your car.** Since the average length of passenger trips in the U.S. is less than 10 miles,<sup>18</sup> home charging, for those who can, is generally sufficient.<sup>20</sup> Because electricity rates are usually lowest overnight, overnight home charging is also the least expensive way to charge, equivalent to paying less than \$1.00 per gallon of gas. (To charge a 50-kWh EV battery at



National Renewable Energy Laboratory projects that Level 1 and Level 2 chargers will handle 80% of all EV charging duties by 2030, when electricity to support 33 million EVs may be needed. Source: National Renewable Energy Laboratory, [The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure](#), June 2023.

\$0.10/kWh would cost \$5.00.) According to the DOE 2020 Residential Energy Consumption Survey, 67% of all housing units in the United States have vehicle parking within 20 feet of an electrical outlet.<sup>21</sup>

**For people without access to home charging**, many employers offer free or low-cost workplace charging. Use of public charging stations may be required only for longer trips.

### What if there's a power failure and I can't charge my EV?

This challenge isn't unique to EVs. If there's a power failure, gas pumps, which are electrically powered, won't work either. But if you're home, your vehicle is likely to have been plugged in for a while and have enough charge to get where you need to go.

Because EV drivers generally have access to residential charging and use it almost every day, their EVs are usually well charged.<sup>22</sup> EV WATTS data<sup>23</sup> suggests that most EV trips are conducted, on average, at approximately 70% battery charge. If an electricity outage is very localized, you can use a public charger or perhaps even charge at your workplace.

**If your vehicle is one of the increasing number with bidirectional charging capabilities**, your car can serve as emergency back-up power for your house to keep the lights on and the refrigerator running. Similarly, your truck could even supply life-saving power to a hospital in a storm-caused power outage. New electric trucks and many cars offer this feature. Of course, the building must also be equipped for bidirectional charging.

<sup>15</sup> JDPower.com. "What Is One-Pedal Driving and How Does It Work?" <https://www.jdpower.com/cars/shopping-guides/what-is-one-pedal-driving-and-how-does-it-work>, March 1, 2021. Accessed Oct. 16, 2024.

<sup>16</sup> U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. "At a Glance: Electric Vehicles." [https://afdc.energy.gov/files/u/publication/electric-drive\\_vehicles.pdf?46ed6d7f2c](https://afdc.energy.gov/files/u/publication/electric-drive_vehicles.pdf?46ed6d7f2c). Accessed Oct. 20, 2024.

<sup>17</sup> "2020 NextGen NHTS OD Data Product Summaries." *NextGen NHTS Newsletter*, Summer 2022, [https://nhts.omni.gov/assets/NextGen%20NHTS\\_Newsletter\\_Issue4\\_062222.pdf](https://nhts.omni.gov/assets/NextGen%20NHTS_Newsletter_Issue4_062222.pdf). Accessed July 19, 2023.

<sup>18</sup> U.S. Federal Highway Administration (FHWA), "Explore Vehicle Trips Data," <https://nhts.omni.gov/vehicle-trips>. Accessed Jan. 21, 2024.

<sup>19</sup> U.S. Department of Energy (DOE), Alternative Fuels Data Center, Electric Vehicle Charging Station Locations,

[https://afdc.energy.gov/fuels/electricity\\_locations.htm#/find/nearest?fuel=ELEC](https://afdc.energy.gov/fuels/electricity_locations.htm#/find/nearest?fuel=ELEC). Accessed Oct. 10, 2024.

<sup>20</sup> Ge, Y., et al. 2021. There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure. <https://www.nrel.gov/docs/fy22osti/81065.pdf>.

<sup>21</sup> U.S. Department of Energy, Vehicle Technologies Office, "Fact of the Week 1308: Sixty-Seven Percent of all Housing Units in the United States Have Vehicle Parking Within 20 Feet of an Electrical Outlet," Sept. 18, 2023, <https://www.energy.gov/eere/vehicles/articles/fotw-1308-september-18-2023-sixty-seven-percent-all-housing-units-united>. Accessed Feb. 1, 2024.

<sup>22</sup> Smart, J., et al. 2015. Plugged In: How Americans Charge Their Electric Vehicles. <https://avt.inl.gov/sites/default/files/pdf/arra/PluggedInSummaryReport.pdf>.

<sup>23</sup> Energetics, 2024, Energetics | EV WATTS: Electric Vehicle Widescale Analysis for Tomorrow's Transportation Solutions, <https://www.clearexact.com/insights/evwatts>.

## Should I be concerned about EV batteries degrading over time?

Driving range does decrease slowly as your car's battery pack ages. One study of the Chevrolet Volt (an extended range EV) showed only a 10% decrease in range after 100,000 miles.<sup>24</sup> Repeated use of fast charging and exposure to high temperatures can reduce range faster.

This should not be a significant concern for most drivers, who generally drive much less than their car's range on a daily basis. While reduced range can be a concern for longer trips, this can be managed by planning for more frequent charging stops.

## What happens to my EV when I want to get a new car?

**The market for used EVs is quite robust**, so you can sell your used EV in the same ways you'd sell your used gasoline car. Cars deemed unusable are generally sold at auction and sent to auto recyclers where usable parts are salvaged and inventoried for sale to repair shops. The battery must be handled safely by trained personnel at auto recyclers.

Numerous businesses have been established to test used EV batteries, place them in second uses that require less power than EVs, or recycle them if not of sufficient quality. More information can be found in the fact sheet, [Battery Second Life: Frequently Asked Questions](#).

## EVs advantages in brief

Although our shift to EVs has not been without bumps, issues are being identified and resolved, and some concerns have been proven to be unwarranted. **EVs are safe, clean, efficient, and affordable** and offer drivers many advantages, including lower maintenance and fueling costs, leading to lower total cost of ownership and high owner satisfaction.

**Not only can EVs save you money**, but they are also better for the environment, significantly reducing greenhouse gas emissions compared to conventional vehicles. Sustainability issues are discussed in the companion fact sheet, [EV Batteries and Recycling](#) and in the resources in the next section.

## Additional Resources

- [Electric Vehicle Basics](#), U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE)
- [Facts About Electric Vehicles](#), Argonne National Laboratory
- [Electric Vehicles for Consumers](#), DOE EERE
- [About Hybrid and Electric Cars](#), fueleconomy.gov
- [At a Glance: Electric Vehicles](#), DOE EERE
- [Alternative Fuels Data Center Maps and Data – Electric Vehicle Laws and Incentives by State](#), DOE EERE
- U.S. Department of Energy, Energy Efficiency and Renewable Energy, Vehicle Technologies Office:
  - Fact of the Week 1295, June 19, 2023: All-Electric Cars Offer Wide Selection of Ranges, <https://www.energy.gov/eere/vehicles/articles/fotw-1295-june-19-2023-all-electric-cars-offer-wide-selection-ranges>
  - Fact of the Week 1290, May 15, 2023: In Model Year 2022, the Longest-Range EV Reached 520 Miles on a Single Charge, <https://www.energy.gov/eere/vehicles/articles/fotw-1290-may-15-2023-model-year-2022-longest-range-ev-reached-520-miles>
  - Fact of the Week 1286, April 17, 2023: Top 10 New Electric Vehicle Registrations in 2022 Were Models with Long Ranges, <https://www.energy.gov/eere/vehicles/articles/fotw-1286-april-17-2023-top-10-new-electric-vehicle-registrations-2022-were>
- Kelly, J.C., Elgowainy, A., Raphael, I., et al. Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies, Argonne National Laboratory, <https://publications.anl.gov/anlpubs/2022/07/176270.pdf>

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<sup>24</sup> Najman, L. "New Updates: How Long Do Electric Car Batteries Last?" *Recurrent*, March 27, 2023. <https://www.recurrentauto.com/research/how-long-do-ev-batteries-last>. Accessed Oct. 14, 2024.