ELECTRIFY ARIZONA

Frequently Asked Questions

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TE Activator

Action now to electrify Arizona's future mobility

electrifyarizona.org

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General EV Information

What is an electric vehicle?

EVs use electric motors that are powered by energy stored in batteries. Some run solely on electricity called Battery Electric Vehicles (BEVs) or all-electric while others use a combination of an electric motor and a traditional gasoline-powered internal combustion engine called Plug-in Hybrid Electric Vehicles (PHEVs). All EVs produce fewer emissions than conventional vehicles.

Battery electric vehicles (BEVs) charge from an electrical grid or in part by a regenerative braking system. BEVs run only on electricity and contains no internal gas-powered engine. Most have all electric ranges of 80 - 150 miles, while a few luxury models have ranges up to 400 miles. When the battery is depleted, it can take from 30 minutes (with fast charging) up to nearly a full day (with Level 1 charging) to recharge the battery. BEVs can plug directly into a standard 110-volt outlet.

Are EVs affordable?

Yes. With more than two dozen EVs available under $40,000 (before incentives), there is an EV for every pocketbook. In addition, when you consider the total cost of ownership, which includes the purchase price, rebates, fuel costs, insurance, and maintenance, the cost of owning and operating an electric vehicle is less over the lifetime of that vehicle. Additionally, EVs are expected to become more affordable over the next 5 to 10 years, as economies of scale are created, and more models are available in the marketplace.

Are EVs dependable?

EVs will last as long or longer than gas- or diesel-powered vehicles. Since there are significantly fewer moving parts in an EV compared to a traditional vehicle, less routine preventative maintenance is needed. EVs do not need oil changes, tune-ups, or new spark plugs. Brake life is extended on EVs since the motor is used to slow the car, recapturing the kinetic energy, and storing it back in the battery. Electric motors will also outlast the body of the vehicle.

Do EVs really reduce emissions?

Vehicle emissions fall into two categories: operating and energy gathering. EVs produce zero short term operating emissions which improves the overall air quality. Energy gathering emissions are the pollution emitted through the fuel gathering process.

However, the fuel gathering process for EVs, on average, produces fewer emissions when compared to regular gasoline energy gathering processes. This is because the electricity generation cycle usually produces less than the gasoline or diesel cycle. The electricity generation cycle can be further minimized when using renewable sources of energy to power EV charging, like solar, wind or hydro power.

Total lifetime CO2 emissions over the life of an EV based on standard non-renewable electricity generation is approximately 35-42 metric tons of CO2, and for renewable electricity is approximately 14-21 metric tons which is less than 50-53 metric tons compared to operating and energy gathering process for a gasoline-powered vehicle.

The International Council for Clean Transportation conducted a study which evaluated the life cycle assessments (LCA) of both EVs and traditional gas- or diesel-powered vehicles and concluded EVs have much lower greenhouse gas

emissions over the life of the vehicle. This included the consideration of the environmental impact of the material extraction, manufacturing, packaging and transportation, use, and end-of-life processes.

What other impacts do EVs have on our environment and health?

EVs produce zero tailpipe emissions, which means they do not contribute to harmful air pollution which can exacerbate symptoms related to asthma and other respiratory ailments, as well as heart conditions. EVs do not produce any direct greenhouse gas emissions (GHG) which contribute to climate change. Also, EVs are very quiet which significantly reduces noise pollution.

DID YOU KNOW? Within Arizona, 12 out of 15 counties have been poorly graded for at least one measure of air quality. Currently, Gila, Maricopa, Pima, and Pinal counties received an F on their air quality report cards, as reported by the American Lung Association. To learn more about your county's air quality and the impact it has on your health visit ***https://www.lung.org/research/sota/city-rankings/states/arizona.***

Can I drive long distances in an EV?

Yes. The average person drives only 37 miles per day. If that's you, then there are dozens of cars that will work for your life. If you require more range, there are many vehicles with ranges between 100 and 400 miles per charge.

If you are planning a long road trip, you can use electric charging infrastructure maps at Electrify America, EVGo, and Chargepoint to help map out your charging needs.

DID YOU KNOW? Currently, in the state of Arizona, there are a total of 1,044 EV charging station locations and 2,924 EV charging ports. To see where these stations and ports are location visit ***https://bit.ly/432Reoo.***

What will affect my electric car's range?

How far your electric car can drive on a single charge depends on the weather conditions, the weight your car is carrying (luggage/people), car amenities like heating and A/C, and of course, the car's battery capacity.

EV Charging & Battery Information

Where can I charge an EV?

Eighty percent of EV owners charge at home, which can be done by simply plugging into a 110-volt wall outlet or by installing a Level 2 home charger. If you're unable to charge at home, Arizona has over 1,000+ stations with over 2,500+ charging ports available.

If you're new to electric cars, or just want to understand charging better, we recommend using the ***PlugShare*** or ***Chargeway*** app. The Chargeway app customizes results that fit vehicles' preferences, so you can find quick, convenient charging anywhere. You can also utilize the ***Alternative Fuels Data Center: Electric Vehicle Charging Station Locations Tool***. (If viewing digitally, click the link in paragraph. If viewing printed copy please refer to resource list for web addresses)

How much does it cost to charge an EV?

It is much less expensive to charge an EV than it is to fuel a similar gas- or diesel-powered vehicle; but exactly how much depends on the electricity rates. In Arizona, the price of electricity is approximately $0.1321 per kWh. Depending on the station, drivers might use a network card, credit card, phone, cash, or even simply enter an account number to pay.

- To fully charge a Chevy Bolt with a 65 kWh battery, it will cost around $8.58.
- To fully charge a Ford F-150 Lightning with a 98 kWh battery, it will cost about $12.94.

- There are also free chargers where users can plug in and charge, but they are typically the slower Level 1 chargers.

How long does it take an EV to charge?

Charging time takes into consideration two key elements, battery size and type of charger. Figure 1 identifies the three types of chargers, level 1, level 2 and level 3 which are called DC Fast Chargers. Depending on the size of the battery and the speed of the charger, fully charging a battery can take anywhere from 30 minutes to over 24 hours.

Figure 1: Types of Chargers & Replenish Rates

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Charging Level & Description	Location	Range Replenished
Level 1 (120 volts); this cord will come with your car & requires a three prong outlet or charging station	Home. Work. Public	3-5 miles of range/hour
Level 2 (240 volts); requires an EV charging station	Home. Work. Public	8-24 miles of range/hour, more on some models
DC Fast Charging; requires an EV charging station - 50 kW [2]	Work. Public	2-3 miles of range/minute; charges a 100-mile range car to 80% in 30 minutes
DC Fast Charging; requires an EV charging station - 150 kW [2]	Work. Public	6-9 miles of range/minute; charges a 240-mile range car to 80% in 30 minutes
DC Fast Charging; requires an EV charging station - 350 kW [2]	Work. Public	12-18 miles of range/minute; charges a 300-mile range car to 80% in 20 minutes

**The amount of range replenished may vary beyond the numbers shown, depending on the charger type and vehicle*
**Most current U.S> DC Fast chargers offer a maximum power level of 50 kW-150kW. Tesla Superchargers offer 120 kW-150 kW. Tesla V3 Superchargers promise up to 250 kW. Porsche uses up to 270 kW at stations from Electrify America and other networks. Multiple networks promise 350 kW+ DC Fast Chargers for future vehicles that can take advantage of them.*

What happens if an EV runs out of charge?

Your vehicle will alert you when your charge is starting to get low. It will typically take extra precautions to curtail non-essential vehicle functions to extend your battery range as well. If you do run out of a charge, you will need to have your vehicle towed to your home or a charging station.

What is regenerative braking?

Regenerative braking allows EVs to capture energy normally lost during braking by using the electric motor as a generator and storing the captured energy in the battery. This helps drivers to extend battery range and/or reduce the amount of time needed to fully charge their vehicle.

Does an EV battery lose any of its charge while the vehicle is turned off?

Yes. Every battery ever made self-discharges. Newer lithium-ion batteries used in EVs are better at maintaining their state of charge than certain other types of batteries, but there is still some level of self-discharge. In addition, when an EV is parked in extreme ambient conditions it uses energy to either heat or cool the battery pack to keep it at a safe temperature.

Will extreme heat in Arizona effect my EV battery?

Many factors can reduce the overall range of an EV when summer brings the extreme heat. Between journeys, there are several ways to get your battery into the best possible condition to increase your range and manage your battery life.

1. Leave your car plugged in: Keep your vehicle plugged in between journeys. The vehicle won't overcharge beyond the limit you set for it, but it will use electricity to

power the cooling system should this be required. If the battery gets too hot, a mechanical cooling system will kick in to keep the battery in its safe operating limits.

2. Limit your overnight charge: If you charge your battery too fast or too high a capacity, it will get too hot, and the battery management system will drain it again. The optimum charge for an electric vehicle car battery sits at around 80%, at 100% it can get too hot. The best practice is to only charge to 100% if you have a long drive ahead.

3. Preconditioning: Most new EVs have a "preconditioning" setting. The vehicle will ready itself for you and optimize battery temperature for a set time of departure. Preconditioning systems typically pulls power directly from the outlet by default, so your car will be in peak driving condition before you go, all without draining your battery.

4. Where possible, leave the vehicle in the shade: If you can leave the vehicle in a shady place or in the garage while plugged in, it will reduce the need for the battery management system to kick in, while also reducing the need to use air conditioning and other active cooling systems while driving.

5. Recharging: When driving your electric vehicle in hot weather, consider your charging needs carefully. On longer trips, it can pay to do smaller, more frequent fast charges, because fast charging heats the battery and the battery management system must work harder to keep it at optimum efficiency. If you regularly charge the battery to 100% and then drain it almost to empty, you will shorten the overall life of the EV battery. Research has shown you get an increased lifespan from an EV battery when it is neither discharged too much nor excessively charged to full capacity.

6. Limit cooling in the cabin: Heating and cooling the cabin steals energy that could otherwise be used for propulsion. All of which means less driving range in hot weather. While every EV will experience a significantly shorter driving range in

hotter conditions, the results vary widely depending on the temperature and your drive cycle and climate control settings. But a good estimate is that range will be reduced by roughly 20 to 30 percent.

How can I extend the range and overall life of an EV battery?

Some tips to extend the life of your battery include charging at a slower rate, i.e., charging more at home and less at high voltage public chargers, not fully charging the battery to 100%, or letting the battery charge run down below 10%. It's good practice to charge the battery to about 80% of its capacity and plug in again when the battery runs down to about 20%.

Utilizing regenerative braking is one way to extend battery range. Practicing good driving behaviors will also extend battery range. For example, using gentle acceleration and deceleration, maintaining properly inflated tires, and not running the heat or AC on full blast for extended periods of time will all help to maximize the battery range of your EV.

Can you recycle EV batteries?

When your electric vehicle reaches the end of its life, your vehicle dealer can recycle and repurpose the battery for alternate energy storage purposes.

EV Performance Information

Do EVs have a short lifespan?

Electric vehicle batteries are estimated to be serviceable for 10 years or longer. All manufacturers offer a lengthy warranty. Most EVs have shown excellent performance due to sophisticated battery management systems and cooling technology. Newer Evs comes with a battery warranty that spans at least eight

years or 100,000 miles. As with all warranties, the specific details and exclusions vary among automakers.

Am I sacrificing performance with an EV?

No. In typical city driving, EVs are much quicker and more fun to drive than gas-powered vehicles. EVs have maximum torque available even at a complete standstill. That instant throttle, combined with a low center of gravity, make for an exhilarating driving experience.

Do EVs require regular tune ups?

EVs generally need less service than gas-powered engines. A gas engine has more than a thousand moving parts. Your electric motor has just three. With fewer parts, there are fewer things that can go wrong. Typical EV maintenance consists of rotating tires once or twice a year and replacing brake fluid every few years.

Can an EV drive through water, rain, or a car wash?

Yes. EVs have an ingress protective system that protects the vehicle from dust and water. The higher the IP number, the more protection the vehicle has. EVs today have an IP67 rating, which means the vehicle can endure three feet of water for 30 minutes without risk to the battery terminals or high voltage components.

What happens if an EV catches fire?

An EV can catch fire if the lithium-ion batteries are damaged in a crash. However, EVs are much less likely to catch fire, compared to traditional gas-powered vehicles. According to the National Fire Protection Agency, if your EV catches fire, call 911. Do not attempt to put out the fire yourself. Fires involving lithium-ion batteries can be difficult to extinguish and require a significant amount of water to resolve.

Firefighters have also been trained on how to disconnect the EV's high-voltage system.

Can an EV be towed?

Yes and no. Unlike gas-powered vehicles, EV motors are connected to the wheels, so they require additional considerations when towing. Your owner's manual will provide safe towing methods specific to your vehicle.

EV Incentive Directory

Federal Incentives

Alternative Fuels Data Center: Alternative Fuel Infrastructure Tax Credit (energy.gov)

https://afdc.energy.gov/laws/10513

Alternative Fuels Data Center: Commercial Electric Vehicle (EV) and Fuel Cell Electric Vehicle (FCEV) Tax Credit (energy.gov)

https://afdc.energy.gov/laws/13039

Alternative Fuels Data Center: Electric Vehicle (EV) and Fuel Cell Electric Vehicle (FCEV) Tax Credit (energy.gov)

https://afdc.energy.gov/laws/409

Alternative Fuels Data Center: Natural Gas Vehicle (NGV) and Plug-In Electric Vehicle (PEV) Weight Exemption (energy.gov)

https://afdc.energy.gov/laws/11682

Alternative Fuels Data Center: Pre-Owned Electric Vehicle (EV) and Fuel Cell Electric Vehicle (FCEV) Tax Credit (energy.gov)

https://afdc.energy.gov/laws/13038

State Incentives

Alternative Fuel Vehicle (AFV) Parking Incentive

https://shorturl.at/deLMX

High Occupancy Vehicle (HOV) Lane Exemption & Zero Emission Vehicle Emissions Test Exemption

https://shorturl.at/afnCF

Reduced Alternative Fuel Vehicle (AFV) License Tax

https://shorturl.at/juLUX

Alternative Fuel and Alternative Fuel Vehicle (AFV) Use Tax Exemption

https://bit.ly/3NOW4kT

Idle Reduction and Alternative Fuel Vehicle Weight Exemption

https://bit.ly/3XwZGvd

Utility Incentives

APS

Electric Vehicle (EV) Charging Station Rebate (APS)

https://shorturl.at/bcdev

Take Charge AZ (APS)

https://shorturl.at/ilK06

Electric Vehicle Charging Rates (APS)

https://bit.ly/3XyoxyK

SRP

EV Vehicle Charging Price Plans

https://www.srpnet.com/price-plans/residential-electric/electric-vehicle

Home EV Charger Rebate (SRP)

https://www.srpnet.com/energy-savings-rebates/home/rebates/ev-charger

Business EV Charger Rebate (SRP)

https://www.srpnet.com/energy-savings-rebates/business/rebates/ev-charger

Commercial Electrification Rebates (SRP)

https://www.srpnet.com/energy-savings-rebates/business/rebates/electrification

TEP

Electric Vehicle (EV) Charging Station Rebate (TEP)

https://www.tep.com/electric-vehicles/#rebates

Electric Vehicle (EV) Charging Rates (TEP)

https://www.tep.com/rates-for-ev-owners/

Commercial Electric Vehicle (EV) Charging Station Rebate (TEP)

https://www.tep.com/smart-ev-charging-program/

Mohave Electric Cooperative

Electric Vehicle Charging Rebate (MEC)

https://bit.ly/4440EBi

Electrical District No. 3 (City of Maricopa)

City of Maricopa – Electrical District No. 3 – Non-Residential EV Charger Rebate

https://www.ed3online.org/energy-services/non-residential-rebates/ev-chargers

City of Maricopa – Electrical District No. 3 – Residential EV Charger Rebate

https://www.ed3online.org/energy-services/residential-rebates/ev-charger-rebate

EV Resource Directory

State Resources

Arizona Department of Transportation

https://azdot.gov/planning/transportation-studies/arizona-electric-vehicle-program

City Resources

Mesa

https://www.selectmesa.com/industries/electric-vehicles

Phoenix

https://www.phoenix.gov/sustainability/electric-vehicles

Tempe

https://shorturl.at/ipMQX

Utility Resources

APS Electric Vehicles

https://shorturl.at/ltR08

SRP Electric Vehicles

https://bit.ly/44m9sCn

TEP Electric Vehicles

https://bit.ly/3PwtUwj

Charging Resources

PlugShare - EV Charging Station Map - Find a place to charge your car!

https://www.plugshare.com/

Mobile App - Chargeway

https://www.chargeway.net/mobile-app/

Alternative Fuels Data Center: Electric Vehicle Charging Station Locations (energy.gov)

https://bit.ly/432Reoo

Electric Vehicle and Infrastructure Codes and Standards Chart

https://afdc.energy.gov/files/pdfs/48604.pdf

Federal Workplace Charging Program Guide

https://www.energy.gov/femp/federal-workplace-charging-program-guide

Plug-in Electric Vehicle Charging Infrastructure Guidelines for Multi-unit Dwellings

https://shorturl.at/gmvxU

Plug-In Electric Vehicle Handbook for Workplace Charging Hosts

https://shorturl.at/vzGU2

EV Selection Resources

SRP EV Consumer Guide

https://shorturl.at/hiBS8

SRP Cost Savings Calculator

https://srp.wattplan.com/ev/

TEP EV Comparison Tool

https://tep.wattplan.com/ev/

Electric Vehicles (aps.com)

https://bit.ly/46DygrE

Calculators

Alternative Fuels Data Center: Vehicle Cost Calculator (energy.gov)

https://afdc.energy.gov/calc/

All Other Resources

Alternative Fuels Data Center

https://afdc.energy.gov/vehicles/electric.html

American Lung Association (ALA)

https://www.lung.org/research/sota/city-rankings/states/arizona

Atlas EV Hub

https://www.atlasevhub.com/

Electrification Coalition

https://electrificationcoalition.org/

Forth Mobility

https://forthmobility.org/

Maricopa Association of Governments (MAG)

https://azmag.gov/Programs/Transportation/Electrification-Readiness

Plug in America

https://pluginamerica.org/

Southwest Energy Efficiency Project (SWEEP)

https://www.swenergy.org/

Transportation Electrification Activator (TEA)

https://sustainabilityactivator.com/

Western Resource Advocates (WRA)
https://westernresourceadvocates.org/