

# Electric Vehicles Best Practice Guide

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## Benefits

### Lower Fuel Costs

Electric and hybrid vehicle owners enjoy lower or even zero fuel costs by relying on an electric battery to power their vehicle. Fully electric vehicles (EVs) do not require fuel and rely solely on an onboard battery. Hybrid vehicles run on both fuel and electricity. With reduced fuel needs, EV owners are able to save money and reduce their impact on the environment.

### Less Maintenance

Electric motors are efficient and have fewer parts, which leads to less maintenance than a traditional vehicle, helping owners save on operating costs.



## Better Performance

EVs are extremely efficient and can accelerate quickly. Their motors supply power and provide instant torque. Regenerative braking can also help recapture energy that would otherwise be wasted when slowing down.

## Reduced Carbon Footprint

Transportation produces 21% of global carbon emissions and millions of vehicle parts that end up in landfills each year. EVs do not generate exhaust pipe emissions and have fewer vehicle parts that could end up in landfills.


## Incentives

Many places offer incentives for EV owners, such as tax breaks and subsidies as well as charger incentives. Some workplaces also have charging stations and charging incentives for EV drivers. Be sure to check applicable programs in your area for additional details.



## Accelerating

- **EVs provide instant torque.** This means the throttle is sensitive and acceleration can happen quickly. Manufacturers typically adjust the throttle response so there is a delay to help prevent harsh acceleration. Focus on slow, smooth, and steady acceleration.
- **Harsh acceleration can harm the vehicle.** Continuous harsh acceleration increases stress on the vehicle's powertrain and can cause premature wear and aging of various components. This will decrease the efficiency of the vehicle and increase maintenance costs.
- **Most EVs do not shift gears.** They typically have a single gear and the motor is directly connected to the drive shaft, eliminating the need to shift gears and increasing power to the wheels. Remember that there are no shifting pauses since the motor will not need to change gears.
- **EVs are heavy.** Although EVs have a heavy onboard battery that lowers the vehicle's center of gravity and reduces the likelihood of rollovers, you should still slow down to a safe speed around corners.
- **EVs are quiet.** Monitor your acceleration closely and choose a speed and following distance that is safe for conditions.



EVs are extremely efficient and accelerate differently than conventional vehicles.



## Braking

Regenerative braking recaptures some of the vehicle's kinetic energy to recharge the battery. This reduces the amount of energy wasted when decreasing speed and can extend the vehicle's range.

To take advantage of regenerative braking, you just need to brake or release the EV's accelerator. Regenerative braking creates an effect similar to engine braking. Some vehicles even have a display that will say how much energy was captured.

Lower regenerative settings apply less braking force, allowing the vehicle to coast farther, while higher regenerative settings slow the vehicle more quickly. Once the vehicle reaches a certain deceleration threshold, the brake lights should automatically activate to alert other drivers to your deceleration, even if the brake pedal is never used. Check your owner's manual for more details.

**Braking operates differently in an EV. Instead of relying solely on friction braking, EVs can take advantage of regenerative braking.**



The traditional friction brakes are always available and operate normally. When you fully apply the brakes or brake harshly, the friction brakes will stop the vehicle. Because the friction brakes are not used much, they suffer little wear.

To maximize the effects of regenerative braking, drive slowly, smoothly, and steadily. While EVs are more efficient in urban settings compared to conventional vehicles, it is still more efficient to travel at a steady speed, regardless of vehicle type. More energy is consumed at faster speeds, so always drive at an appropriate speed. An EV's range is heavily affected by driving behavior, so always use proper defensive driving skills to maximize performance.

**Keep in mind that regenerative braking may not function normally under certain circumstances, such as when the battery is fully charged, when the antilock braking system is active, and when the weather is cold.**



## Charging

Charging equipment is built to be durable and to withstand exposure to the elements and regular wear.

### Tips

- Always use a qualified electrician to install your charger.
- Position the charging unit close to the vehicle's electrical inlet, if possible.
- Store the charging cable in a clean, dry location and out of walking areas. Overhead supports can help keep the cord off the floor to prevent tripping.
- Charge overnight to avoid peak energy demand.
- Regularly inspect your vehicle's charging equipment for dirt, wear, and corrosion.

When disconnecting the charger from your EV, be sure to use the handle rather than pulling on the cable, which can cause damage.

**EV chargers can be found along major routes and in commercial areas, and they can be installed in homes. They can be safely installed in garages, under covered parking areas, and outside.**



## Maintenance

EVs have fewer maintenance requirements than conventional vehicles, such as not needing oil changes, spark plugs, or a timing belt. However, they still require regular inspections to help prevent issues, mitigate repair costs, and increase safety on the road.

Your owner's manual should outline required maintenance, but here is a checklist of common items that need to be inspected on your EV:

### Tires

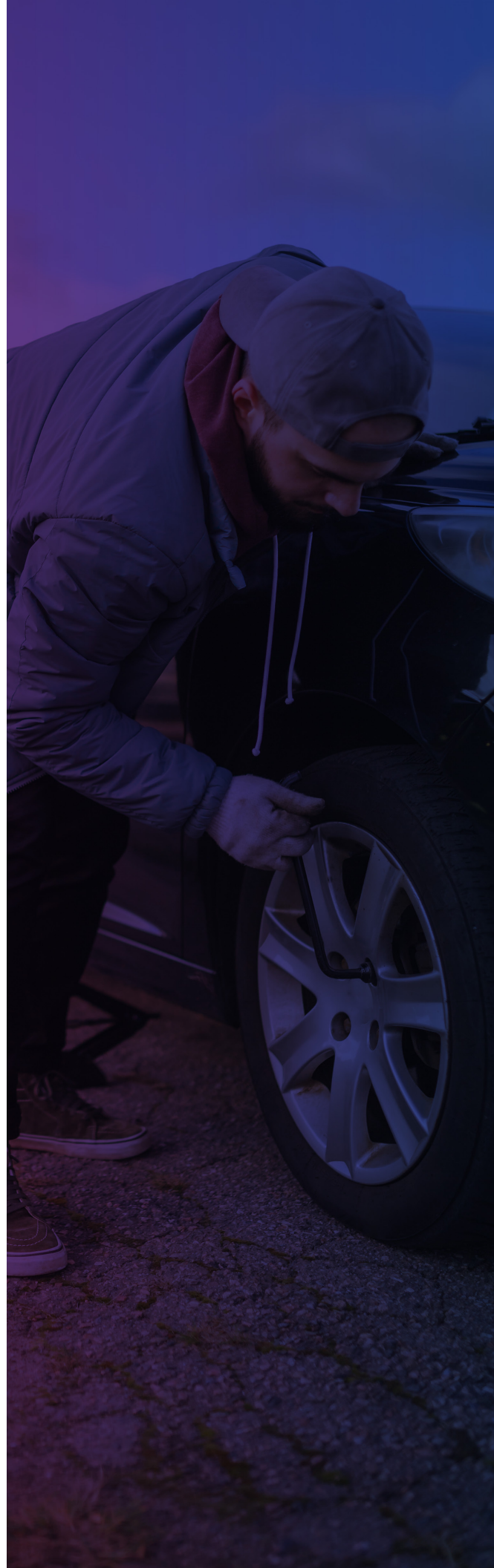
- **Pressure** – Ensure the tires are properly inflated according to the manufacturer's guidelines.
- **Tread depth** – Make sure they have adequate grip on the road.
- **Wear** – Look for damage, such as bulges or cuts. The tires will need to be rotated and aligned regularly to prevent uneven wear.

### Fluid Levels

Although EVs do not typically need oil changes, you might still need to check other fluid levels.

- Wiper fluid
- Coolant
- Brake fluid
- Transmission fluid, if applicable

**Remember to check underneath the vehicle for leaks.**



## Friction Brakes

Since EVs use regenerative braking, the friction brakes are not used as often so rust can develop on the brake parts, which reduces the vehicle's stopping power when emergency braking is needed. Be sure to test the friction brakes regularly.

1. Move to a safe place away from other vehicles and hazards to test the brakes.
2. While driving slowly, apply the brakes and assess their responsiveness. Check if the vehicle is pulling to the side and listen for unusual noises that could alert you to a potential issue.

## Lights

Check all the lights on your vehicle to ensure they are clean, undamaged, and properly aligned.

- Headlights, including low beam and full beam
- Indicators
- Rear lights
- Brake lights
- Fog lights
- License plate lights
- Dashboard warning lights  
(be sure to address them immediately)

## Mirrors and Windows

To improve your visibility, ensure the mirrors, windshield and windows are clean, undamaged, and properly adjusted. Repair any cracks or chips as soon as possible because they impair the integrity of the glass. Make sure the wiper blades and defrost controls are functioning correctly to help prevent visibility issues.

**Be sure to brake hard enough for the vehicle to engage the friction brakes occasionally to help prevent rust buildup.**





## Safety and Emergency Equipment

Inspect all safety and emergency equipment.

- Inspect protective equipment, such as seat belts and head restraints.
- Make sure your emergency kit is stocked with nonperishable food, water, repair tools, a first aid kit, a flashlight with extra batteries, and high-visibility clothing in case of a breakdown.

## Charging Equipment

As part of your weekly vehicle inspection, check your EV's charging equipment. See the manufacturer's guidelines for specific requirements regarding maintenance and repair.

- **Plugs, cables, and charging unit** — Look for dirt, wear, corrosion, and other damage.
- **Charge level** — Check the charge before and after trips so you can plan where or if a recharge is necessary.

## Software Updates

Some EVs adjust their safety, performance, and features through regular software updates. Sometimes updates can be set to install automatically if the vehicle is connected to a wireless network, however, you should still check that all software is up to date before each drive.



## Trip Planning

### Vehicle Range

Vehicle range can be preserved by selecting safe speeds and performing slow, smooth, and steady driving maneuvers. Aggressive speeds, frequent acceleration and deceleration, and increased weight and wind drag, on the other hand, can diminish an EV's range.

### Eco-Friendly Behaviors

Slow down and use eco-mode when possible. The faster you drive, the more energy is consumed, reducing your vehicle's battery charge. Aim for slow, smooth, and steady starts and stops. Hard acceleration consumes more energy than smooth acceleration, and although regenerative braking allows you to capture some energy that would have been lost, a constant speed can maximize range.

Also, reduce distractions that can take your attention off the road and cause sudden maneuvers that could lead to a collision.

### Efficient Routes

The most efficient route is one that avoids hazards and allows you to travel at an eco-friendly speed for your vehicle. There are also apps that can help you plan your trips along EV-friendly routes that take advantage of charging stations.



## Charging Stations

Familiarize yourself with your vehicle's charging connector. Find out where charging stations are along your route, bring a charging adapter if your EV needs one, and plan for extra rest stops. Take a 15-minute break for every two hours of driving to avoid fatigue, and never let your vehicle's battery dip too low.

Some EVs have an onboard navigation system that can help you identify the nearest charging locations. Make sure you are safely stopped before researching nearby charging stations. If your EV supports battery preconditioning, use the built-in software to take you to the charging point. Your vehicle will then ensure that its battery is at the optimum temperature when you arrive, which can significantly reduce how long it takes to charge. Keep in mind that some places will be free to charge while others will charge a fee.

Consider using a rapid charger on long trips. Rapid charging allows you to recharge your vehicle's battery much faster.

## Other Tips

- Inflate your tires to the correct pressure and check for uneven wear that could affect efficiency.
- Reduce vehicle weight and wind drag by removing unnecessary items and roof racks that are not in use.
- Use hotels with on-site charging stations for easy overnight charging.



# Extreme Temperatures

## Heat

Extreme heat means that you will need to use your vehicle's air conditioning, which runs off the vehicle's battery power. Air conditioning can reduce your range, so cool your vehicle's cabin before departing when it is still plugged into the charger. Park your EV in an enclosed parking area or in the shade, if possible, to make it easier to cool the cabin.

## Cold

Freezing temperatures can make it more difficult for your EV's battery to hold its charge. Cold weather slows down chemical reactions in the battery, reducing efficiency and range and increasing charging time. Heating an EV's cabin during cold weather also drains the battery.

Remember to heat the cabin while the vehicle is still connected to a charger, if possible. If your vehicle is fitted with heated seats and heated steering wheels, turn them on to reduce the need to heat the entire cabin.

**EVs outperform conventional vehicles in all types of weather, but they can function a little differently in extreme temperatures.**

