



Energy Efficiency and
Conservation Authority
Te Tari Tiaki Pūngao



How to Maximise Your EV Battery Life

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Electric vehicle (EV) batteries are sophisticated pieces of equipment designed to last many years. Manufacturers are increasingly offering battery warranties of five to 10 years or more.

EV owners can get the best of their batteries and extend their life by looking after them.

What is EV battery degradation and why does it occur?

Unlike lead acid batteries used in petrol or diesel cars, EV batteries rarely completely fail. Instead they degrade slowly over time meaning that the distance (range) the EV can travel gradually reduces.

Some motorists do not require the original full range of their EV, and find it continues to meet their needs even after some degradation occurs. Equally, a used EV which has a partly degraded battery will be perfectly adequate for many owners' daily needs.

There are two ways that an EV battery can gradually fall in performance:

1. the way the EV is parked and stored, this is known as **calendar degradation**

This is degradation which happens over time, regardless of the number of times the battery has been charged and the amount the EV has been driven. It can be worsened by heat and state of charge.

For example, an EV that spends most of its time parked outdoors in full sun with the battery fully charged most of the time, is likely to experience a higher rate of calendar degradation.

2. the way the EV is driven and recharged, this is known as **cyclic degradation**

This is degradation which takes place as result of the number of times the battery is charged and discharged.

For example, an EV frequently used for long journeys, and is driven hard to empty, and is fast-charged on a regular basis is likely to degrade faster.

Recommended Battery Practices for EV Buyers and Owners

Follow guidance and use apps/features

- Follow the guidance for both driving and charging in your owner's manual. If your EV didn't come with an owner's manual, they can be downloaded on the internet.
- Follow the warranty conditions, even after the warranty period has expired. These recommendations are designed to maximise battery life.
- If your EV has an option to charge to less than 100%, use it if you can – this is designed to preserve battery life.
- Some EVs have smart phone apps to track and manage battery status remotely – make use of them.

Efficient driving habits:

- Avoid aggressive driving and learn to “eco-drive” your EV. This will cut energy consumed and reduce battery stress. Many EVs have aids for eco-driving, including economy driving mode (recommended) and information displays on the operation of the drive system.



The EV information display, such as this one in the Mitsubishi Outlander PHEV, can help you drive more efficiently to prolong battery life.

Minimise Deep Discharge (running down to empty):

- Minimise operating your EV battery below 20% remaining capacity on the display.
- For plug-in hybrids, use the engine to avoid rapidly depleting the battery in demanding driving conditions, such as extended hill climbing or towing a trailer.
- Avoid aggressive driving particularly with a near-empty battery.

Minimise Fast Charging:

- Charge at home and use fast charging only where necessary – it's better to fast charge occasionally rather than very frequently.

Charging at home – avoid charging to 100%

- Minimise recharging to full every day, unless you need to, because a fully charged battery is under greater stress than a partially charged battery, and that leads to faster degradation.
- Use software or timers on the charger to minimise the time the battery is fully charged.

Protect your battery from extreme hot or cold temperatures:

- New Zealand's temperate climate is good for maximising battery life, but in times of extreme temperatures, try to park in the shade or indoors.
- In very cold weather (i.e. below freezing), plug in when you can to take advantage of your EV's battery thermal management systems.



Your EV battery doesn't like extreme cold weather any more than you do, but plugging in allows the EV thermal management systems to help keep the battery comfortable.

Parking and storing your EV for longer periods:

Plan ahead for periods of extended storage of one month or more:

- Store the vehicle in a sheltered location that won't get too hot or too cold.
- If your EV is equipped with a "storage" charging mode – use it and keep it plugged in.
- Don't store the EV with a battery that's too full, nor too empty:
 - A good compromise is just above half full (~60%) – which gives enough tolerance for long periods of self-discharge, but enough range for a short drive if needed.
 - Never let an EV sit idle for more than three months, or let the state-of-charge in storage drop below 20%, without applying a "refresher" charge (back to ~60%).

Best servicing, repair and replacement practices

The best protection against EV battery failure is regular servicing by a qualified service provider. Follow the servicing schedule in your owner's manual. Servicing typically involves a simple diagnostic test of the battery's health – it's better to identify and remediate faults early before they escalate. Not following the manufacturer's recommendations can void the warranty.

Motorists should never try to service or repair their own EV batteries, since they contain lethal voltages and the parts may be vulnerable to damage from mishandling. Orange plugs and cables are part of the car's high voltage system, and should be treated with extreme caution.

If something does go wrong with your EV battery, then contact your qualified service provider as they have the appropriate diagnostic equipment and training to figure out the issue. They can identify and implement the best fix to get your EV on the road again.



An authorised technician uses an industrial hoist to help inspect the underfloor high-voltage battery in an electric vehicle. Don't try this at home!

What to look for when buying a used EV:

If buying a used EV:

- An EV's remaining battery capacity is one of the most important things to know when buying a used EV.
- Battery capacity is not directly related to the car's mileage – an EV with higher mileage but good remaining battery capacity may be a better buy than a car with low mileage but poorer remaining battery capacity.
- Newer model EVs have more advanced batteries than early models in this rapidly evolving technology.
- Ask the seller to tell you the battery's residual capacity or State of Health (often shown as a percentage value):
 - Some EVs show this information on the vehicle's dashboard, and some require diagnostic equipment used to communicate with the vehicle.
 - A private seller may share anecdotal experiences about changes to the performance
 - If the seller cannot provide the above types of information, be cautious!
- Try to find out where and how the EV was used:
 - Avoid vehicles that have come from, or been used in, extreme hot/cold environments
 - If the EV has fast-charge capability, try to find out how often this was used (eg via diagnostic equipment)
 - Find out if the vehicle has been in accidents or if battery parts have been replaced
- Find out if there is a warranty available to cover the battery.
- Find out what local servicing support is available for this EV.



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