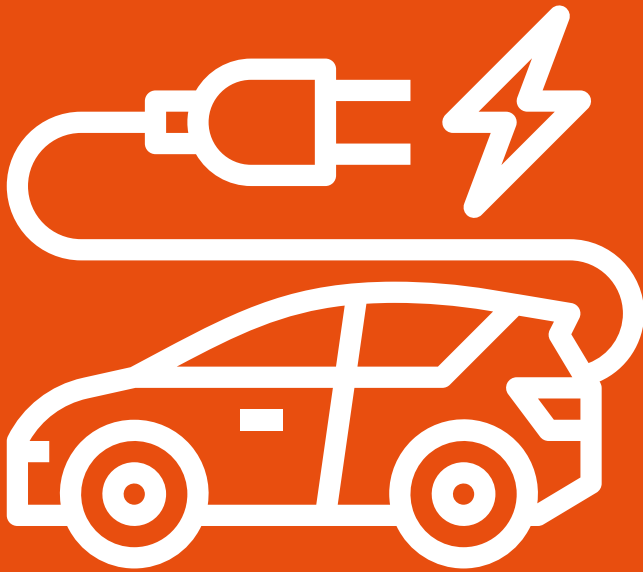


Northpower

# Electric Vehicles



Our need to know guide if you are considering purchasing an electric vehicle.

# Electric vehicles (EVs)

## In this guide

What is an EV?

Benefits of EVs

What to Consider

Owning and Using an EV

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## Who are we?

Northpower operates and maintains both the electricity distribution and fibre networks in the Whangārei and Kaipara region with more than 60,000 connected customers.

Northpower is community owned and we aim to provide you with non-biased, accurate information about EVs.

# What is an EV?

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An electric vehicle (EV) has an electric motor that is powered by a battery. It is charged by connecting to an external source of electricity.

Electric vehicles are becoming more popular and there are now a wide variety of brands, makes and models to choose from, both new and second-hand.

There are two main types of electric vehicle:

*Battery electric vehicles*, (BEVs or EVs) are purely electric vehicles. Only the battery powers them.



*Plug-in hybrid electric vehicles* (PHEVs) have two engines. One is powered by a battery and can be charged, and the other engine is fuelled from a petrol or diesel fuel tank.

Petrol hybrid vehicles that don't 'plug-in' aren't considered electric vehicles as they aren't charged by an external source. Their batteries charge by re-capturing energy when braking or from electricity generated by the engine.

# Benefits of Electric Vehicles

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## Lower Greenhouse Gas Emissions

According to New Zealand's Energy Efficiency and Conservation Authority (EECA), in New Zealand, where typically at least 80% of our electricity is generated from renewable sources, it has been calculated that electric vehicles emit 80% less CO<sub>2</sub> than an equivalent petrol vehicle.

EVs eliminate tailpipe pollution so can lead to improved air quality over time, especially in major cities.

EECA also state that battery run EVs emit 60% fewer climate-changing emissions over their full life cycle than petrol vehicles, even when you take into account raw material extraction, battery manufacture, vehicle manufacture and shipping.

## Fuel Up at Home

Instead of having to stop at petrol stations, you can charge your electric vehicle conveniently at home. If you are away from home, there are public chargers at least every 75km in urban areas as well as most state highways, and the number of places to charge is growing all the time.



## Cheaper To Run

Charging an electric vehicle at home, especially on an off peak electricity rate, is significantly cheaper per 100km than petrol or diesel. Check out Northpower or EECA's website for a more detailed cost comparison. Additionally, battery EV motors have so few moving parts there is less to maintain or go wrong.

## Quiet but Powerful

Since the electric powered motor is more responsive than a combustion engine, you can get to full power quicker when you touch the accelerator. Plus there is no engine noise. Regenerative braking means they often recharge while going downhill or braking.

## Plug In Anywhere

Usually EVs come with a portable back up charger, which means you can charge anywhere there is a power supply when there is not a dedicated EV charger available. This is a slower option but the chargers can be used inside or outside, in any weather, as long as all equipment is designed for use in New Zealand and for the conditions in which it will be used.

# What to Consider

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## Full Electric or Hybrid

Plug-in hybrids can be a good transition into EVs as they offer the security of a petrol/diesel engine as well as electric power. However, maintenance costs are likely to be about the same as conventional vehicles, where full electric vehicle maintenance is cheaper. Some hybrids cannot be fast charged.

## Cost

EVs can be more expensive to buy upfront, especially if you are buying brand new, but they have lower running costs than petrol/diesel vehicles.

The cost of charging an EV can vary but the cheapest option is to charge at home using an off-peak kW/hr rate (check with your retailer what off-peak rates they offer or shop around for the best off-peak deals). If you pay 25c per kWh off peak at home, then you can add 100km range for roughly \$4.15 (based on an average fuel economy of 17kWh per 100km). Prices may vary during peak times or if you have to charge at a public charger.

## Vehicle Safety

All electric vehicles sold in New Zealand must still meet the standard warrant of fitness requirements. The ANCAP safety rating system also applies to EVs, so when purchasing, look for the ANCAP rating (five star is the highest) or check out [rightcar.govt.nz](http://rightcar.govt.nz) to compare vehicles.

EECA states that because EVs don't have a gas tank, they are less likely to catch fire in a crash than petrol or diesel vehicles. And they have a lower centre of gravity due to the weight of the battery pack so they are less likely to roll.

## Charger Safety

Any EV purchased in New Zealand, including used imports, should be supplied with charging equipment designed for use in New Zealand.

When buying a charging cable or wall-mounted charging unit, or purchasing an EV with a charging cable included, ask the seller for a signed copy of a Supplier Declaration of Conformity. This declaration shows the unit has been tested and meets electrical safety standards.

Some cables come with an industrial or caravan plug that allows faster charging. An electrician will need to install a special wall power point for these.

A registered electrician must install wall-mounted faster charging units because they require a higher capacity load. They will need to make sure the cable to the socket is capable of supplying the power that the unit can deliver. They will also be able to confirm the charging equipment has a Supplier Declaration of Conformity to show the unit has been tested and meets NZ electrical safety regulations.

# Charging an Electric Vehicle

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There are a few different types of chargers and charging ports, methods of charging and EVs have a variety of different capacities to charge and battery sizes. This makes understanding what is best for you difficult at times. In this section we briefly cover the different types of chargers you might come across while out, or what is available at home. EV Guide NZ states that depending on driving style and car, you can usually expect to travel around 5 to 7km per kWh of charge, so we will use those figures here.

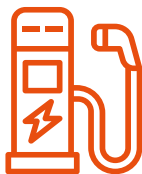
## Charger Types

### *Domestic 3 Pin Plug*

These portable options are usually supplied when you buy an EV. They can be plugged in almost anywhere into a standard wall socket, as long as it is designed for use in New Zealand. This is known as Mode 2 and is the slowest form of charging, but is fine for most people only doing short trips each day, and the most cost effective if you can get an off-peak (overnight) rate from your electricity retailer.

### *Caravan Plug*

Also known as a Blue Commando Socket, these types of sockets are often found at campgrounds. They can be used at many locations and with a higher current allows a faster charge. You can get an electrician to fit this socket at home and it will charge slightly faster than the 3-pin plug but you will still need a few hours to fully recharge an EV battery.



### *Dedicated "Slow" (AC) Charging Station*

These can be installed at home to increase charging speed and are often found at businesses and public places where people spend a bit of time, like shopping centres, cafes or swimming pools. They come with either a tethered (attached) cable or just a socket meaning a BYO cable is required.

These require special installation by an electrician and are useful for people who travel longer distances each day or who want the convenience of being able to fully charge their car's battery overnight.

The charging speed will depend on your vehicle, as some EVs have a maximum pace of AC charging (eg. Nissan Leafs only charge up to 3.6kW) but they provide fast enough charging speeds for day-time users.

### *Fast DC Charger*

Fast DC chargers work by providing a greater amount of electricity and changing it into direct current (DC) meaning it feeds straight into the battery. They come with a large range of speeds (fast to rapid to ultra) and take much less time to recharge than other options, so they are great for topping up on long trips. Both fast and rapid chargers are now commonly found at various locations around New Zealand. You may need to create an account and set up a payment method to use these chargers while out.

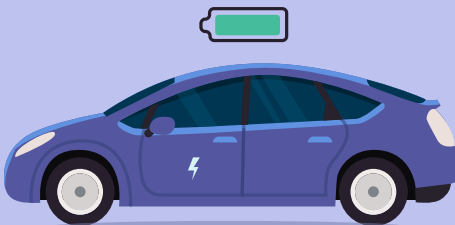
It is best to fast charge occasionally rather than frequently as it seems to be better for your battery.

The last 20% of your battery takes the longest to charge so if you are in a hurry, if other people are waiting, or there is a time limit on the charger, select the 'charge to 80%' option.

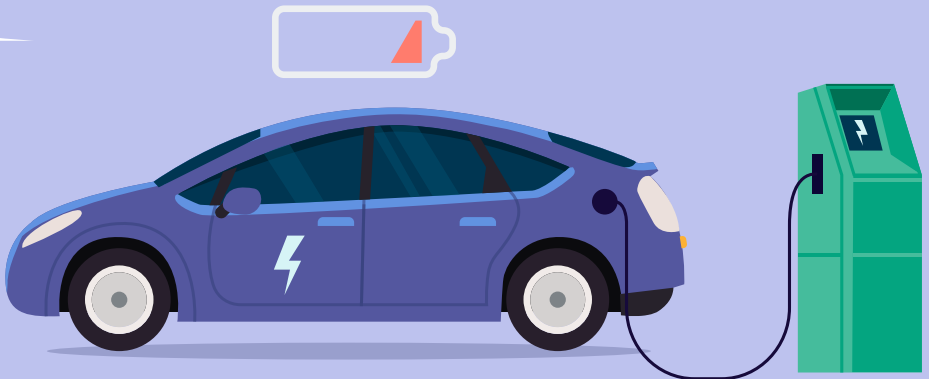
# Charging Times

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	Specifications	Charges at	Time to add 100 to range
<b>Domestic 3 pin plug</b>	6-10 amps Single phase AC 230V	1.4-2.3kW	10 hours
<b>Caravan Plug</b>	Up to 16 amps Single phase AC 230V	3.6kW	5 hours
<b>Dedicated "Slow" AC Charger</b>	16-32 amps Single phase AC 230V	3-7.4kW	2-5 hours
	32 amps 3 phase AC 400V	22kW	Less than an hour
<b>Fast DC Charger</b>	Requires 40 amps 3 phase supply	25kW	Less than an hour
<b>Rapid DC Charger</b>	Requires 80 amps 3 phase supply	50kW	25 minutes



km	Fully Charge a 50kW battery	At Home Option	Other notes
	25 hours	Yes	Usually supplied with vehicle. Great for recharging at home after short trips.
	14 hours	Yes	Good option for slightly faster charging at home. Should be wired by an electrician.
	8 hours	Yes if you have 3 phase	More expensive to install at home and you need to consider the capacity of your home supply.
ur	3 hours	Could be, but starting to get costly	Often found at destinations like businesses & shopping centres.
ur	2 hours	No	Common in NZ and good for a top-up while out and about.
	1 hour	No	Common in NZ and good for a top-up, especially on long road trips.



# Connectors and Inlets

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## Slow AC Chargers



Type 1



Type 2

## Faster DC Chargers



CCS Type 2



CHAdeMO

## Find a Charging Station

There are a few different websites and apps show the locations of public chargers, if they are available and whether they are fast or slow chargers.

A couple that we recommend are;

**Chargenet:** [charge.net.nz/map](http://charge.net.nz/map)  
**Plugshare:** [plugshare.com](http://plugshare.com)  
**Open Loop:** [openloop.co.nz](http://openloop.co.nz)

EV Roam Journey Planner:  
[journeys.nzta.govt.nz](http://journeys.nzta.govt.nz)



## Charging Safely

Take care when charging your EV. Using the right equipment in the correct way is important to keep everyone safe.

Do not use extension cables or any devices to connect the charging cable to the power supply (such as multi-boxes, double plugs or travel plugs). Only use an adaptor that is confirmed for use by the EV's and cable's manufacturers. Do not use modified, damaged or faulty equipment.

Only use equipment that displays a voltage range that includes 230V as this is supply voltage in New Zealand. It should have an unmodified New Zealand plug, otherwise it isn't suitable for New Zealand's electricity supply. Even if it appears to work, you cannot be sure the in-cable safety device will work when it needs to.



[charge.net.nz](http://charge.net.nz)



[plugshare.com](http://plugshare.com)



# Other Things to Know

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## Road User Charges

Light battery EVs and plug-in EVs need to pay road user charges (RUC). See the NZTA website for details of these charges.

## Servicing

The AA recommends EVs be serviced as often as petrol/diesel vehicles; that is every 12 months or 15,000km, or according to the manufacturer's recommendation. Because plug-in hybrid vehicles (PHEVs) still use a fuel-powered engine, they need the same regular servicing as a petrol/diesel car. All vehicles need checks and maintenance on things like brakes, tyres, lights and wipers.

## Battery Replacement

EV batteries should last 10-20 years before they need replacing. Most new EVs have a battery warranty for 5-8 years or 100,000km. If a battery is no longer providing a useful driving range, it can be replaced. Options are being developed in New Zealand to refurbish or replace EV batteries and old batteries can be re-purposed or recycled.

## Trip Planning

On longer trips, you may need to stop to charge your vehicle. The length of time it takes to charge will depend on your vehicle and the charger type. A standard 50kW charger will add 50kW of charge in an hour, or roughly 100km to the range in 20 minutes. It is best to make sure you have a full charge before leaving and then use a site like PlugShare or EV Roam to plan your charging stops during the trip.

## Driving Further

To get the most out of a single charge, try these helpful hints;

- > Fully charge your EV before you set off.
- > Warm up the interior before you unplug the EV.
- > Inflate tyres to the right pressure.
- > Drive smoothly at a steady speed.
- > Cold weather can reduce an EV's range, particularly if heaters and demisters are used.
- > Remove any unnecessary heavy luggage or accessories such as roof racks.



## More Information

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There is an abundance of information out there about Electric Vehicles, so you want to make sure you are getting it from a reliable source. For more information, see the Northpower website: [northpower.com](http://northpower.com)

*Or check out these helpful websites;*

[evguide.nz](http://evguide.nz)

[genless.govt.nz](http://genless.govt.nz)

All information quoted from EECA in this brochure is found on the [genless.govt.nz](http://genless.govt.nz) website.

# Frequently Asked Questions

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## *Where can I charge my EV?*

The best place to charge your EV is to plug it in overnight at home. If you are on the road and looking for a charging station, the ChargeNet and Plugshare websites both have maps of charging stations throughout the country.

## *When is the best time to charge my EV at home?*

The cheapest and easiest way to charge your EV is to plug it in overnight at home, especially if you have a special night/off-peak rate from your retailer. An overnight charge will typically cost around \$4 per 100km.

## *Do I need to upgrade the electrical supply to my house to charge an EV?*

Generally you should be able to slow charge your EV without upgrading your electrical supply. Many EV owners use an IC-CPD (in cord control & protection device) that will plug into a standard 10 Amp socket outlet or 16 Amp caravan socket outlet. If in doubt check with your electrician. If you want to install a fixed wall mounted charger you will need to have it wired by an electrician who will also check if the electrical supply has sufficient capacity.

## *Will the network handle the increased usage of electric vehicles?*

Studies indicate that an EV may increase household electricity use by up to 35%. This can be supported most of the time but becomes challenging during peak demand periods (usually in the early mornings and evenings) when the electricity network is already busy.

Collectively we can minimise the need to upgrade electricity networks to accommodate this additional demand, by shifting EV charging to times when the network isn't as busy - overnight, usually after 10pm. That is why a smart EV charger, that lets you control the time of charging, often accessing cheaper off-peak electricity rates, is a good idea

## *What happens to old EV batteries?*

If a battery is no longer providing a useful driving range, it can be replaced. If replaced in the vehicle, the old battery can then be repurposed or recycled, or the raw materials may be reclaimed for another use.

## *How far can I go?*

Battery range depends on the specific vehicle, with models in New Zealand giving you between 100km and 600km. As a battery ages, it loses capacity and so can lose some range. It is important to check this out thoroughly when buying a second hand EV.

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### *Is EV charging free?*

It depends on the owner of the charging station. Check on Plugshare, ChargeNet or the charging station owner's web site.

### *Can electric vehicles travel at the same speed as a conventional vehicle?*

Yes, in fact acceleration in many cases is better than conventional petrol/diesel cars due to the motor's quicker response time.

### *How much does an EV cost?*

The range of new and second hand EVs in New Zealand continues to expand, with a range of price options. The cheapest is a second hand Nissan Leaf, which can start from around \$10,000, to mid-range new vehicles at around \$45,000 - \$70,000.

### *Are EVs really better for the environment?*

There is a lot of discussion around this point but increasingly scientists and researchers around the world are saying EVs do have fewer carbon emissions over their lifetime. In New Zealand, at least 80% of our electricity is generated from renewable sources, but EECA says that even if your EV was fully recharged using coal power, coal produces approximately 0.16kg of carbon dioxide per kilometre driven; petrol emits 0.23kg per kilometre.

### *Is it safe to drive an EV in the wet?*

Electric vehicles have protections built in to make sure the electrical components do not get wet when driving in rainy conditions or on a wet road. However full submersion in a flood is not recommended.



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If you have any further questions, call Northpower on  
**0800 667 847** or visit [northpower.com](http://northpower.com)