

EECA

BUYING AN ELECTRIC VEHICLE

A GEN LESS GUIDE



GEN
LESS[^]

[New Zealand Government](#)

PURE BATTERY OR PLUG-IN HYBRID?

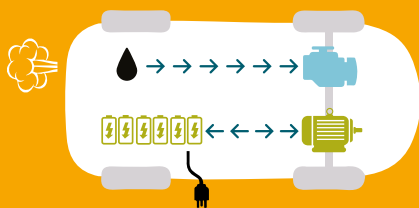
FOSSIL FUEL VEHICLE



NON PLUG-IN HYBRID

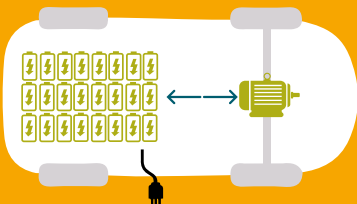


PLUG-IN HYBRID (PHEV)



BATTERY ELECTRIC (BEV)

✓
No tailpipe
emissions



KEY:



EVs ON

YOUR MIND

Thinking about making the move to electric transportation?

If you've seen the benefits and are excited by the possibilities, you're not alone.

In fact, over forty percent of New Zealanders say they would now consider buying a battery EV (Electric Vehicle)*.



Your guide

This guide contains all the important 'must-know' information about buying an EV.

It focuses on helping you choose the perfect EV for how you want to live.

This guide is backed by EECA – the Government's Energy Efficiency and Conservation Authority, so you know the information is reliable at the time of publishing.

It was produced as part of the Government's push to accelerate the uptake of EVs in New Zealand. Be sure to do your homework if you are buying any used or new vehicle or charging equipment.

Find out more about EVs at **electricvehicles.govt.nz**

* EECA Consumer Monitor Research – April-June 2020, combined consideration of battery electric vehicles (BEV) and plug-in hybrid vehicles (PHEV)



GET MORE

OUT OF LESS

Moving Gen Less

Transport makes up around 40% of our energy-related greenhouse gas emissions. EECA's Gen Less programme encourages people to get more out of life while using less harmful energy. Moving to electric transport will have a huge, positive impact on our emissions.

EVs give you more

Generally speaking, electric cars are fun to drive and near-silent, which makes them very pleasant for listening to music or hearing the person next to you.

They also cost less to run and maintain (more on that later), and battery electric vehicles don't emit any petrol or diesel exhaust, which is a win for everyone's health.



EVs use less harmful energy

The average New Zealand petrol or diesel car emits about 2.6 tonnes of greenhouse gas per year – the equivalent of burning a tonne of coal.

In comparison, a battery EV has no tailpipe emissions at all. So that's less fumes at street level, finding their way into the air we breathe.

Because of New Zealand's high levels of renewable energy, an EV produces 80% fewer emissions than an equivalent petrol or diesel car¹.

One of many

More than 21,000 EVs have been registered in New Zealand so far.

For the latest stats, go to the Ministry of Transport website: **www.transport.govt.nz**

You'll find the info under: Resources > Vehicle fleet statistics > Monthly electric and hybrid vehicle registrations

¹ Lifecycle assessment of electric vehicles, EECA, 2015

BATTERY ELECTRIC VEHICLE (BEV)

A BEV is charged by plugging the vehicle into an external electricity source. This could be a regular electrical socket, a dedicated charging unit, or one of the many public charging stations around the country.

The battery also recovers and stores energy generated when the car brakes, a system known as regenerative braking.

It has no exhaust pipe or exhaust pipe emissions.

BEVs particularly suit people who can charge overnight at home or at work, and who mostly travel within the battery range.

What's to love

- It's better for the environment. EVs have 80% fewer CO₂ emissions than equivalent petrol cars when used in New Zealand, thanks to our extremely high use of clean renewable energy, and 60% fewer over their entire life².
- Battery range varies from around 200km up to 600km in new, high-end models.
- Low running costs. Using a residential off-peak electricity rate means you can charge your EV conveniently overnight for much less than the price of a tank of petrol.³
- Low maintenance costs. A BEV motor has very few moving parts, compared to a typical petrol or diesel car. There is no oil to change and no oil filter, air filter, gearbox, drive belts or spark plugs to worry about. The regenerative braking system saves wear on the brakes.
- Very efficient around town. Regenerative braking recaptures and stores energy every time you slow down, and you use no energy when stopped in traffic.

² Lifecycle assessment of electric vehicles, EECA, 2015

³ Costs will vary. Visit www.electricvehicles.govt.nz for detailed fuel calculations

What you need to know

- BEVs can be more expensive to purchase than their petrol/diesel equivalents, especially brand new.
- Charging can take from around 20 minutes or overnight depending on the battery and the charger you use. For long distance travel, you may need to plan where to stop and recharge (see page 15 for more about battery range).

Take a test drive

A test-drive is the best way to experience an EV.

Check with your local dealer, or keep your eye out for EV ride-and-drive events in your area

PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV)

A PHEV has two types of motors – an electric motor and battery, and an internal combustion engine fuelled by petrol or diesel.

Most PHEVs start and drive in EV-only mode until most of the power stored in the battery is used, then the petrol/diesel engine automatically takes over. Regenerative braking charges the battery in both modes.

During heavy acceleration, such as driving fast up a steep hill, the petrol/diesel engine and the electric motor work together to avoid excessive draw from the battery.

Some PHEVs use a small petrol engine to generate electricity known as a range extender to power the electric motor once the battery charge decreases to a certain point.

The range of a PHEV in EV-only mode varies significantly between models. Some can only do 15-20km while some newer models can do 60km or more.

PHEVs particularly suit people who can charge overnight at home or at work, and often need to use the vehicle to travel beyond the battery range.

What's to love

Compared to the equivalent petrol/diesel vehicle, a PHEV has lower running costs and a lower environmental impact if you do most of your journeys in EV mode⁴.

⁴ Costs will vary. Visit www.electricvehicles.govt.nz for calculations

What you need to know

- PHEVs can be more expensive to purchase than their petrol/diesel equivalents. As PHEVs have a petrol/diesel engine, the maintenance costs are likely to be about the same as conventional vehicles.
- Like a BEV, regenerative braking saves wear on the brakes.
- Not all PHEVs can be fast-charged – check this when you're considering any PHEV model.
- Using the petrol/diesel engine generates emissions.

What about hybrids?

Hybrids that don't plug into an external electricity supply to recharge are not EVs.

The battery is charged by a petrol/diesel combustion engine and regenerative braking. They are more efficient than a conventional petrol/diesel vehicle and generate fewer emissions.

MORE ELATION, NO PETROL STATION

Charging at home is the most convenient way to keep your vehicle ready to go. For longer trips, there are public chargers at least every 75km on most of the state highway network⁵.

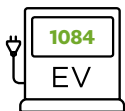
You're almost never too far from your next charge, and the charging network is growing all the time, with a focus on covering major routes and increasing the numbers available.

EV chargers co-funded by the Government

EECA administers the Low Emission Vehicles Contestable Fund, which, as of February 2020, had committed co-funding to over 1,000 private and public electric vehicle (EV) chargers in New Zealand, contributing to New Zealand's wider charging infrastructure and enabling EV uptake.

NEW ZEALAND

606 Installed
478 In Progress



NORTH ISLAND

336 Installed
354 In Progress



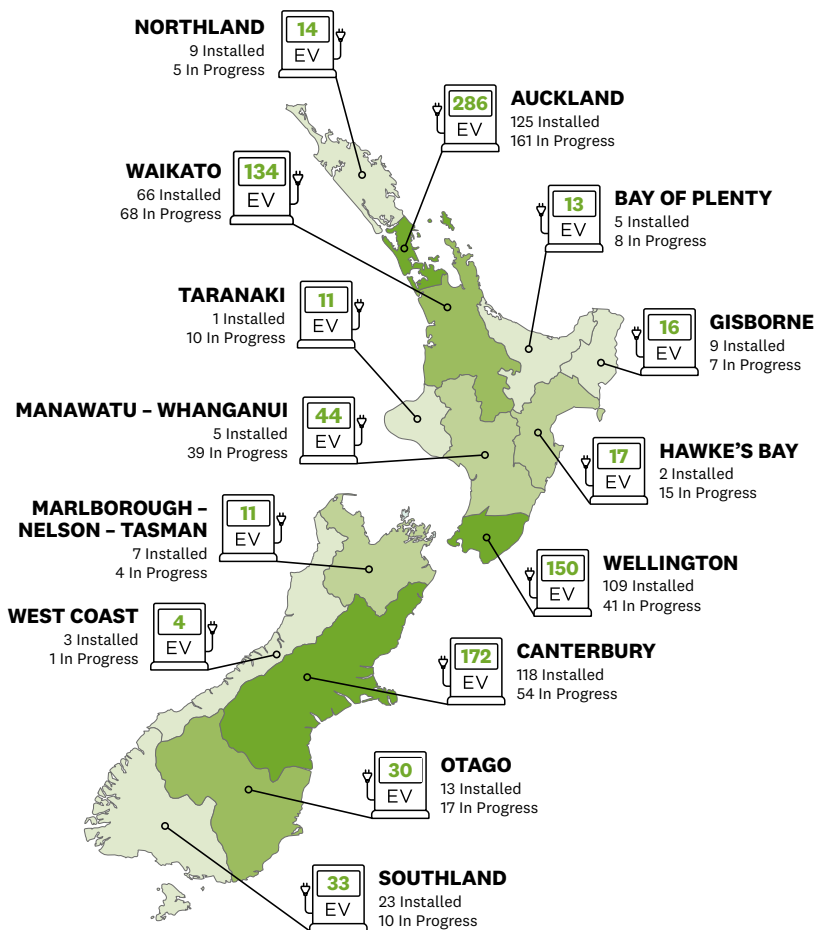
SOUTH ISLAND

166 Installed
88 In Progress



Charger numbers above include projects co-funded by EECA but not yet allocated to a region.

EECA CO-FUNDED CHARGING STATION MAP



Map represents chargers installed and committed by recipients of EECA co-funding, not a complete charger map of New Zealand. Totals include chargers co-funded but not yet allocated to a specific region.

SOURCE: NZ Transport Agency EVRoam and Energy Efficiency Conservation Authority.
Data accurate as at February 2020

THE EV

EXPERIENCE

Driving an EV is much the same as a petrol or diesel car – but people often notice:

- They've got great torque: EVs can accelerate quickly and smoothly from a standing start. With no gears to work through, an EV is able to apply full power as soon as you touch the accelerator pedal.
- How quiet they are: The car stereo sounds great and conversations with passengers are much easier.
- They handle well: The weight of the battery packs gives EVs a lower centre of gravity.
- The braking is different: The regenerative braking system means the car starts to slow as soon as you lift your foot off the accelerator.

How safe are EVs?

EVs sold in New Zealand must meet the same minimum vehicle safety standards as petrol and diesel vehicles. The vehicle safety rating shows how safe the vehicle is – see www.rightcar.govt.nz

The maximum 5-star ANCAP rating is recommended. An EV's high-voltage electric system is designed to automatically deactivate in a crash. They are less likely to catch fire in a crash than petrol or diesel vehicles. In addition, the weight of the battery packs give EVs a lower centre of gravity, so they are less likely to roll.



Is an EV right for me?

An EV is a great solution for many Kiwis' everyday needs.

- 90% of our car trips are shorter than 90km⁶.
- Our average daily car travel is around 30km⁷.


Try tracking your everyday driving – you may be surprised to find that an EV would be perfect for your needs. This is especially true if you are often stuck in traffic – an EV almost makes traffic worthwhile, because regenerative braking recaptures and stores energy every time you slow down, and you use no energy when stationary.



















And while a BEV may not be right for you if you regularly drive beyond the battery range, a PHEV may be just what you need.

⁶ Driver Travel New Zealand Household Travel Survey 2011 – 2014, Ministry of Transport
⁷ As above

WOULD A BEV OR PHEV SUIT YOU BEST?

 **Ideal**

 **It depends** – find out more in this guide or talk to a dealer or EV expert.

DO YOU...	BEV	PHEV
Mostly travel within battery range?		
Have off-street parking and access to a plug?		
Want an economical second car?		
Sit in traffic a lot?		
Need the car for a mix of short and long trips?		
Need it for regular long-distance travel?		
Want to tow a boat or a trailer?		
Want to reduce emissions?		
Want low running costs?		

HOW FAR CAN AN EV GO?

The distance you can drive on a single charge depends on the type of EV, its battery capacity, the type of roads (flat, hilly or winding) and your driving style.

A drive of 300km is within easy reach of most new EVs, with high-end models claiming ranges of up to 600km.

If you're driving beyond your EV's battery capacity in one go, plan a route with a public charger at regular intervals. Websites and apps help you do this by showing you the location of public charging stations, whether they're in working order, and the type of connectors they use. (And whether they're near a good coffee!)

See the New Zealand Transport Agency website www.nzta.govt.nz/evroam, or check websites such as **PlugShare**, **ChargeNet** and **Vector**.

To go further on a single charge

- Be aware that cold weather reduces an EV's range, particularly if heaters and demisters are used.
- Remove any heavy luggage or accessories (such as roof racks) you don't need.

See page 20 for more information about battery charging.

BUYING

AN EV

New or used?

The variety of used BEVs and PHEVs imported into New Zealand is growing all the time. Both new and used models offer fuel and maintenance savings. Used models are more affordable than new. The advantage of buying new is that EV technology is constantly evolving and improving, so you can enjoy new features and better battery range.

EV buyer's checklist

- Check the battery size. This is in kilowatt hours (kWh) and indicates how much electricity the battery can store when new, and therefore how far it can drive on a charge.
- Any warranty covering the EV battery.
- What charger inlets the vehicle has. (Be aware not all vehicles can use fast charging stations.)
- What charging equipment is supplied, such as portable charging cables and/or supply leads. These must comply with New Zealand electrical safety standards.
- Check the safety and fuel economy ratings of different cars at www.rightcar.govt.nz. You can compare the running costs with petrol or diesel cars.
- See if the EV has the latest software updates installed.

Additional checks for PHEVs

When looking at a used PHEV, you will need to consider the same mechanical issues as you would for a used petrol or diesel vehicle.

Assessing the battery

Battery condition can be described in a number of ways including percentage of battery capacity remaining, State of Health ('SoH') and, for a Nissan Leaf, how many bars the car will charge to out of 12.

If buying a used EV, it's important to get the battery properly checked. A data reader can be plugged in and a battery health check performed – you can even have the results sent to your smartphone.

The battery's SoH describes the overall condition of a battery – not its current charge. For some vehicles, on-board diagnostics can provide data that will help you determine how much longer you can expect it to last, based on how it has been used to date. SoH can be more useful than an odometer reading. For example, an EV may have very low mileage but a reduced SoH if it has been in storage for some time, or has been excessively fast-charged. An EV with slightly higher mileage but better SoH may be a better option.

Most new EVs have battery warranties that guarantee the battery for a certain length of time (typically 5-8 years, sometimes longer) or distance (such as 100,000km).



Even once your battery no longer suits driving, it can go on to have a “second life”: It can be refurbished, repurposed or recycled – for example, to store electricity from solar PV panels, or its raw materials may be reclaimed. You may even be paid for the old battery.

Members of the Motor Industry Association of New Zealand (MIA) have committed to a code of practice to have suitable systems in place for the use, capture, return, refurbishment, reuse, recycling or disposal of EV and hybrid batteries, with the aim that no batteries end up in landfills.

EECA also supports the Battery Industry Group (BIG), a cross-industry collaboration that will design reuse and recycling solutions for large batteries, commonly found in electric vehicles or in stationary energy storage.

Visit big.org.nz for more information.

A knowledgeable dealer will help you understand EV technology.

The 12V battery

As well as the main battery, most EVs have a 12 volt (V) battery that stores power to run the management computer and accessories like lights and stereo. It’s a traditional lead-acid battery that doesn’t need to be plugged in to charge – but if it runs flat the car won’t go, even if there’s charge in the EV battery.

FIND OUT MORE:

Check the owner’s manual for more detailed battery care advice, information on warranty conditions and expected useful battery life.



Get the best out of your battery

As with any car, the driver of an EV has the biggest influence on its performance over time.

You'll get more out of your battery if you:

- Drive smoothly, avoiding harsh acceleration and/or braking.
- Minimise frequent fast charging. (This may differ depending on the EV model and the climate it is operating in – the EV manual or manufacturer should provide more details.)
- Only recharge the battery when needed. Many EV owners find they only need to charge every few days.
- Limit battery exposure to extreme heat or cold. In very hot weather (over 30 degrees C), park and charge in the shade or in a garage. In very cold weather (below freezing), follow battery care instructions in the manual. Some batteries have thermal management systems that use a small amount of energy to protect the battery by regulating its temperature.
- When storing an EV for a long time, follow the battery care instructions in the manual. Don't store it with a fully charged battery.
- Follow the manufacturer's servicing recommendations. EVs should always be serviced by a qualified technician.

CHARGING

AN EV

Charging an EV is as easy as charging a phone – you just plug it in.

You can charge inside or outside, in any weather, so long as all equipment is designed for use in New Zealand and for the conditions in which it will be used.

Charging at home

For most people, charging at home overnight is the simplest, cheapest and most convenient way to charge.

You may be able to take advantage of off-peak electricity rates. Some power companies even offer special rates for EVs.

Portable 3-pin charging cable

This plugs into a standard household power point and is typically supplied with the EV when you buy it. It can be called an in-cable control and protection device (IC-CPD).

CHECK:

Used vehicles from other countries may be supplied with an original charging cable. These should not be used and should be replaced with a charging cable that is suitable for New Zealand's power supply. Some cables come with an industrial or caravan plug that allows faster charging. These require an electrician to install a special wall power point.

SAFETY:

Do not use extension cables or adaptors.

TIPS:

To maximise the EV's battery life, avoid charging to full every day unless needed. See other tips on page 19.



Future-proof your EV

Widespread EV adoption is vital to decarbonising New Zealand's transport system, but it will increase electricity demand in New Zealand. A dedicated wall-mounted “smart” charger is a great way to manage your car's energy use.

There is a wide selection available⁸, with a variety of features, including charge timers, to allow you to take advantage of low-demand times and/or off-peak rates, wifi access or the ability to control and monitor charging on your phone via an app. Optimising your charging, rather than “setting and forgetting”, keeps your battery healthier.

In future, they may also allow for system-level energy management, to ensure EV charging is managed against other energy demands, which is better for the environment.

The units need to be installed by a registered electrician who should:

- install a separate sub-circuit.
- make sure the cable to the socket is capable of supplying the power that the unit can deliver. A circuit capable of supplying 32 Amps will futureproof the installation.
- install a Type B RCD.
- be able to confirm the charging equipment has a Supplier Declaration of Conformity to show the unit has been tested and meets electrical safety law.

⁸ Electric Vehicle Charging Technology – a New Zealand Residential Perspective, EECA, 2019



Safety checks

When buying an EV, including a used import, you should only be supplied with charging equipment (such as cables) designed for use in New Zealand. If the vehicle comes with equipment that doesn't display a voltage range that includes 230V, doesn't have a New Zealand plug, or has been modified (even to fit a New Zealand plug), it should not be used as it isn't suitable for New Zealand's electricity supply. Even if it appears to work, you can't be sure the in-cable safety device will work when it needs to.

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.

To charge an EV safely:

- Never use extension cables.
- Never take a cable across a footpath to charge.
- Do not use devices to connect the charging cable to the power supply (such as multi-boxes, double plugs or travel plugs).
- You can use an adaptor to connect the charging cable to the car, provided it is confirmed for use by the manufacturers of the vehicle and the cable.
- Never use modified charging equipment such as overseas equipment that has been fitted with a New Zealand plug. Never use damaged or faulty charging equipment. Have it checked by the manufacturer or a registered electrician.

Find out more on <https://worksafe.govt.nz/managing-health-and-safety/consumers/safe-living-with-electricity/safely-charging-your-electric-vehicle-at-home>



Charging out and about

You may sometimes want to top up when you're out, or on a longer trip.

An ever-increasing number of public charging stations are popping up on New Zealand highways and at places like shopping malls, airports, supermarkets and even petrol stations.

Websites and apps show the locations of public chargers, whether they're slow (AC) or fast (DC) and what type of connectors or sockets are provided or required. It's easy to plan a long-distance route online - see the New Zealand Transport Agency website (www.nzta.govt.nz/evroam) or visit **PlugShare**, **ChargeNet** and **Vector** websites or phone apps.

Public fast charging

Fast charging costs will vary, but are around \$10 per 100km. They can add up to approximately 100km of range to the battery in 20–30 minutes.

Companies that install fast charging stations include local electricity networks, ChargeNet, ChargeMaster and ABB. To access a fast charging network you generally need to create an account online first.

TIPS:

All fast charge stations have tethered CHAdeMO and/or CCS Type 2 cables so you don't need to bring one.

- Sign up to a fast charging network for easy billing and payment.
- It's better for your battery to fast charge occasionally, and only when needed.
- The last 20% of the battery takes longer to charge – that's why fast chargers have an option to charge only to 80%.

CHECK:

Most pure EVs can fast charge, but many plug-in hybrid EVs cannot.

Public slow charging

These are often found at locations where drivers stop longer (such as shops, hotels, tourist attractions).

Charging is usually free and can take several hours.

TIP:

You usually need to bring your own supply lead to use this type of charger.



Mind your EV manners

The Better NZ Trust⁹ has a great guide to public EV charging etiquette, including:

- Only use public chargers if you cannot charge at home. Keep them free for those that need them.
- Parks displaying an EV charging sign are for charging only. Do not park there if you are not charging, even if you're in an EV.
- Only unplug another vehicle if you are certain it has finished charging, or you have been given permission, eg: on Plugshare.
- Make use of apps or txt alerts to monitor the state of charge. Plugshare is a safe way to communicate, but is optional.
- Stations are designed to allow you to leave your vehicle charging. But you must be back before charging stops, and before any parking time limits are up.
- Check for Parking/Charging Limits.
- Look after the stations, cables and plugs. Report any damage to the service provider, & ensure cables are safely tucked away.

⁹ www.leadingthecharge.org.nz/etiquette

EV CHARGING CHOICES

Charging station type

Time to add 32 kilometres

Range added per 10 min charge

3.7 - 7.7kW



91
minutes

4
kilometres

7-7kW



47
minutes

7
kilometres

22kW



15
minutes

22
kilometres

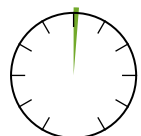
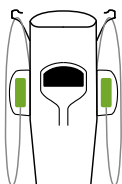
50kW



7
minutes

49
kilometres

350kW



1
minute

343
kilometres

Times and ranges are approximate only, and will vary depending on your vehicle make and model, and battery state of health.

Want to know more?

For FAQs, research, etc, visit electricvehicles.govt.nz



GEN LESS[^]