

Frequently Asked Questions

Moving the light fleet  
to low emissions –  
the Clean Car  
Standard and Clean  
Car Discount

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## Questions about the Clean Car Discount (Feebate)

### What is the Clean Car Discount?

The purpose of the Clean Car Discount is to encourage consumers to purchase vehicles which are low emission. Light vehicles first entering New Zealand (whether new or imported used) would be subject to fees or discounts, or be zero rated.

Buyers of higher emission vehicles would incur a **fee**, while buyers of low emission vehicles would receive a discount (**rebate**), hence the term 'feebate'. Vehicles with emissions that fall into the zero band would not attract a fee nor be entitled to a discount.

The fees and discounts would be set to encourage consumers to choose vehicles which are electric powered or otherwise low emission.

Similar feebate schemes have proven effective in other countries including France, Sweden and Singapore.

A significant feature of the Clean Car Discount is that it could be managed to be self-funding by matching the outgoing payments of discounts with the incoming revenue gained from fees.

### How might the Clean Car Discount work?

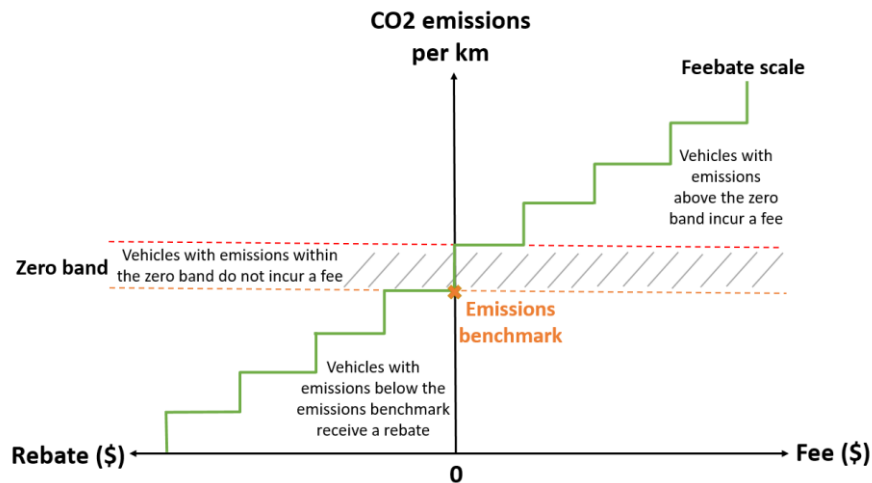
The Clean Car Discount would apply to new and used light vehicles sold for the first time in New Zealand, including all cars, SUVs, vans, utes and light trucks of 3.5 tonnes gross vehicle mass or less

Some basic design concepts of the Clean Car Discount are:

- a. there would be a feebate schedule for new vehicles (including near-new vehicles up to three years old); and a separate schedule for used vehicles imported into New Zealand
- b. the fees (paid into the fund) and the discounts (paid from the fund) should be in balance over the life of the Clean Car Discount
- c. the amount of the fees paid determines the size of the discounts able to be offered
- d. the level of a vehicle's emissions determine whether a vehicle will attract a fee or a discount
- e. the emissions benchmark that divides vehicles into those that get discounts and those that get fees, will gradually lower in grams CO<sub>2</sub> per kilometre over the life of the Clean Car Discount
- f. there would be a zero-band above the emissions benchmark where vehicles would not attract a fee.

The following diagram shows how the feebate schedule would be structured:

## The proposed feebate scheme



### How long might a Clean Car Discount last?

The purpose of the Clean Car Discount is to help people transition to low emission vehicles. Consumers need this help because of the high up front costs of buying an EV as the technology is new and rapidly growing.

When EVs achieve reasonable price parity with fossil fuelled vehicles there may no longer be a policy justification for the Clean Car Discount. For modelling purposes the Ministry of Transport used 2028 as the final year.

### How will the Clean Car Discount fees and discounts be paid or received?

We are proposing that the fees and discounts are applied directly at the point of vehicle purchase. With this approach consumers would pay the fees to the retailer, who would then forward the fees to the administrator. For the discounts, consumers could either apply to the administrator to have the discount paid to them, or the discount could be deducted from the purchase price by the retailer. The retailer would then apply to the administrator to have the discount reimbursed.

The government would look to use existing systems, such as the NZTA Online Services, to implement the Clean Car Discount.

The government will also be able to track fee and discount scheme payments after the vehicle has been purchased. Discounts and fees are to be displayed on vehicles available for sale.

### How will compliance with the Clean Car Discount be monitored?

The NZ Transport Agency will be the administrator of the Clean Car Discount and will be responsible for checking all the fees and discounts. Vehicle suppliers would be required to display the specific fees and discounts that apply to vehicles available for sale.

A proposed penalty of \$5,000 would apply where fees and discounts are not displayed on a vehicle.

It would also be an offence for vehicle suppliers to pass on the discounts or collect the fees incorrectly. The proposed penalties are:

- for an individual, a fine not exceeding \$15,000
- for a person or an organisation other than an individual, a fine not exceeding \$75,000.

The NZ Transport Agency's design and delivery work will include designing the necessary regulatory functions, including data analytics, monitoring, audit and investigation functions, education, working with the industry, complaints handling, and establishing how to encourage compliance and deal with non-compliance. It is yet to be established how the regulatory function will be designed and delivered to be effective to deal with the complexities that will likely be encountered.

The design of the regulatory function will depend on the final policy design, for example how fees and discounts are collected, which will be determined following consultation.

### Will the Clean Car Discount mean that all low emission vehicles will receive a discount?

The government is conscious that many consumers are already willing and able to afford high value low emission vehicles. For social equity reasons, it would be inappropriate to provide a discount for them.

Therefore, the government has determined that only low emission vehicles below \$80,000 price (including GST) will attract a discount. All high emission vehicles will attract a fee irrespective of their selling price.

### Would the Clean Car Discount result in low-income New Zealanders subsidising high-income New Zealanders?

No. How people would be affected by the Clean Car Discount depends on their vehicle choices, not their income.

In fact, the Clean Car Discount would make it more likely that low-income New Zealanders would be able to benefit from lower emission vehicles.

Currently, lower emission vehicles like electric vehicles, petrol hybrids, and ultra-efficient conventional vehicles tend to cost more to buy than conventional vehicles. This price premium makes it difficult for low income New Zealanders to enjoy the fuel savings from cleaner vehicles.

The discount element of the Clean Car Discount addresses this barrier by subsidising the purchase price of lower emission vehicles, making these vehicles accessible to a broader range of people.

It is not correct to assume that low-income households are more likely to buy high-emitting vehicles and thus incur fees under the Clean Car Discount. The Ministry of Transport's analysis shows that compared to other households, a lower proportion of the vehicles low income households buy are high emitting vehicles.

As well, vehicles with a retail price of \$80,000 and above would not be eligible for discounts. This cut off is to prevent the scheme transferring wealth to New Zealanders who are able to buy vehicles that cost \$80,000 or more.

## Questions about the Clean Car Standard

### Why is a vehicle fuel efficiency scheme needed?

Within OECD countries, the only countries without a vehicle fuel efficiency standard (VFES) are Russia, Australia and New Zealand. This results in New Zealand being supplied with less efficient vehicle models compared with those countries that do operate a VFES. For some manufacturers, New Zealand could be seen as an attractive market to sell vehicles with less advanced emission technology. For example, other markets are offered hybrid variants whereas New Zealand is not, or more efficient transmissions where New Zealand is not.

<b>Comparison of the best performing variants of top selling passenger vehicles in New Zealand with the best performing comparable variant sold in the UK (August 2017)<sup>1</sup></b>					
<b>Model</b>	<b>New Zealand</b>		<b>United Kingdom</b>		<b>Difference %</b>
	<b>Most efficient variant</b>	<b>Tailpipe CO<sub>2</sub> (g/km)</b>	<b>Most efficient variant</b>	<b>Tailpipe CO<sub>2</sub> (g/km)</b>	
Toyota Corolla	1.8L Petrol Hybrid	96	1.8L Petrol Hybrid	79	<b>18</b>
Toyota Rav4	GX 2.2D/AWD/6AT	176	Petrol Hybrid AWD 2.5 VVT-i Auto	118	<b>33</b>
Toyota Yaris	GX 1.3P/5MT	134	1.5 VVT-i hybrid Auto	75	<b>44</b>
Kia Sportage	Urban EX 2.0P/6AT	182	1.7 CRDi 114bhp	119	<b>35</b>
Mazda CX-5	GSX 2.2D/4WD/6AT	158	2.2 SKYACTIV-D (150PS) 4WD A6	144	<b>9</b>
Mazda 3	GLX 2.0P/6AT	136	1.5L TD 6-Manual	99	<b>27</b>
Mitsubishi Outlander	XLS PHEV/4WD	39	GX5h 2.0 PHEV	44	<b>-13</b>
Suzuki Swift	GL 1.2P/5MT	106	1.2 2WD	116	<b>-9</b>
Suzuki Vitara	1.4P/6AT	138	1.6 2WD	106	<b>23</b>
Hyundai Tucson	2.0 CRDi 4WD/6AT	178	2.0i CRDi 4WD/A6	160	<b>10</b>
Hyundai i30	1.6 CRD/7A	136	1.6L TD, 6-Manual	94	<b>31</b>
Hyundai Santa Fe	2.2 CRDi/4WD/6AT	205	2.2 CRDi/4WD	159	<b>22</b>
Nissan Qashqai	2.0P/CVT	159	CRDi 110	99	<b>38</b>
Nissan X-Trail	2.5P/6CVT	188	CRDi 130 2WD	129	<b>31</b>
Ford Focus	2.0D/6AT	115	1.5 Duratorq TDCi with stop/start	88	<b>23</b>
Subaru Outback	2.0D/AWD/6CVT	165	2.0D AWD CVT	159	<b>4</b>
HONDA HR-V	1.8P/CVT	160	1.6 i-DTEC S	104	<b>35</b>

Shown in the above table, New Zealand was only offered two vehicle models that performed better in terms of CO<sub>2</sub> emissions compared with the UK, the Mitsubishi Outlander PHEV and the Suzuki Swift. Meanwhile, seven of the models the UK variants were over 30% more efficient in terms of CO<sub>2</sub> emissions than the New Zealand variant.

The Clean Car Standard would serve to encourage New Zealand suppliers to offer more fuel efficient variants.

<sup>1</sup> This comparison has been derived from data sourced from the UK Vehicle Certification Agency <http://www.dft.gov.uk/vca/> and from data routinely provided by distributors through the New Zealand Motor Industry Association's Model Information system.

Moreover, the Clean Car Standard could be applied to used vehicle imports, where it will incentivise traders to offer more fuel efficient models and variants than they might otherwise have imported.

The purpose of a Clean Car Standard is to incentivise vehicle suppliers to improve the overall fuel efficiency of the vehicles brought into New Zealand. Over time this will reduce the emissions of the New Zealand fleet. It would help incentivise the supply of zero- and low emission vehicles, such as, EVs and hybrids.

### What would the Clean Car Standard involve?

The following vehicles would not be subject to the Clean Car Standard:

- heavy vehicles (vehicles over 3,500kgs gross weight)
- scooters, motorbikes, quad bikes
- non-road registered vehicles such as farm tractors
- vehicles designed solely for military operations
- existing light vehicles in the fleet that are sold in the domestic second-hand market.

The Clean Car Standard would mandate an emissions target that vehicle suppliers must meet, on average, across their entire vehicle fleets – that is the total fleet of vehicles they supply each year.

Using an average fleet target means that vehicle suppliers would be able to supply vehicles with emissions over the target, so long as this is balanced by sufficient numbers of vehicles with emissions that are under the target.

This allows vehicle suppliers to supply a broad range of vehicles to meet diverse consumer needs while still addressing the requirement to reduce emissions.

The emissions target would be weight-adjusted to allow for the variation of vehicle types. This approach recognises that it takes more fuel to move a heavier vehicle compared to a lighter vehicle. Vehicles that are heavier than average would be set a higher emissions target and vice-versa.

The use of weight bands (rather than individual vehicle calculations) reduces the administrative burden of the Clean Car Standard. The average emission target and the various weight targets would adjust each year to become progressively more stringent.

### What will the targets be?

The table gives the weight adjusted emission targets consulted on:

Vehicle weight band	Year 1	Year 2	Year 3	Year 4 (2025)
	161 g CO <sub>2</sub> fleet emission target by weight	142 g CO <sub>2</sub> fleet emission target by weight	124 g CO <sub>2</sub> fleet emission target by weight	105 g CO <sub>2</sub> fleet emission target by weight
Up to 1,000kg	123	108	95	80
>1,000kg to <=1,200kg	131	116	101	85
>1,200kg to <=1,400kg	146	129	112	95
>1,400kg to <=1,600kg	159	140	122	103
>1,600kg to <=1,800kg	171	151	132	112
>1,800kg to <=2,000kg	187	165	144	122
>2,000kg to <=2,200kg	199	175	153	130
>2,200kg	216	190	166	141



NOTE: These targets could be changed as a result of feedback gained from the consultation process. Beyond 2025 the fleet emission target and weight targets will continue to be stricter. At some point they will optimise for the variety and functionality of vehicles required for the New Zealand fleet.

### What are the calculations that will be required for the Clean Car Standard?

There are several calculations that are necessary for the implementation of the Clean Car Standard:

- *Fleet's emission target*: a function of the government advised weight band emission targets, weighted by the number of vehicles a supplier has in each of the eight weight bands. The average of the weight band targets becomes that supplier's fleet emission target.
- *Actual fleet's average emissions*: the weighted average of all the vehicle's tailpipe emissions in a supplier's fleet.
- *Compliance calculation*: the actual fleet's average emissions minus the fleet's emission target. A positive figure indicates non-compliance (ie actual average fleet emissions exceed the target average).
- *Penalty calculation*: a non-compliance result multiplied by the appropriate penalty and the number of vehicles in a supplier's fleet.
- *The pooling of target emissions and actual emissions*: The calculations as described above where suppliers have grouped together and treat their individual fleets as one fleet for the purposes of complying with the fuel efficiency standard.

As described in the consultation document, all these calculations are based on emissions-intensity measured in grams CO<sub>2</sub> per kilometre emissions. New, near-new and older used vehicles are all treated the same except for the penalty rates for non-compliance.

We plan to establish an online tool to help car importers track compliance with the new standards. The tool could include a calculator to show how their fleet averages would change if they were to purchase particular vehicles. They will also have a year to get used to tracking the emissions profile of their fleet before the system kicks in.

### How is grouping going to work?

Suppliers of new vehicles could group with other new vehicle suppliers and comply as a group. For example, a supplier with high emission vehicles could enter into a commercial arrangement to pool their imports with a supplier specialising in low emission vehicles.

The suppliers involved select one person to be the 'pool manager'<sup>2</sup> who is then responsible for administering the pool under the Clean Car Standard. Similarly, two or more used vehicle importers could group together.

The arrangement does not allow new vehicles suppliers and used vehicle importers to be grouped together. This is because equating the lifetime emissions of new versus used vehicles would add significant complexity to scheme compliance costs.

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<sup>2</sup> The appointment of pool manager is the group members' decision.

How could we ensure a valid comparison between vehicle emissions when we know there are different test standards used around the world?

The Clean Car Standard outlined in the consultation document specifies New European Drive Cycle (NEDC) emission values.

For new vehicles, the Clean Car Standard, when implemented, would adopt the new Worldwide Harmonised Light Vehicles Test Procedure (WLTP) as the basis for measuring a vehicle's CO<sub>2</sub> emissions. The WLTP has been designed to achieve a better correlation between a vehicle's emissions when tested in laboratory conditions and that vehicle's real on-road performance.<sup>3</sup>

We understand the WLTP will be adopted internationally with the exception of the United States. It was adopted in Europe in October 2017. Japan promulgated regulations adopting the test procedure in October 2017 and Korea is also expected to adopt the WLTP. New Zealand has taken steps to adopt the WLTP in its vehicle certification and fuel efficiency regulation. For new vehicles the WLTP will replace the New European Drive Cycle (NEDC) procedure for approval of light vehicles, with the full transition from NEDC to WLTP occurring after 2020.

However, it will take some time before all used imports have WLTP determined CO<sub>2</sub> emissions values. Currently there are five standards to which the vehicles New Zealand receives are tested. These are the WLTP, the NEDC, the Japanese JC08, the older Japanese 10/15 used for pre-2008 vehicles, and the American Federal Test Procedure (CAFE). To provide for a valid alignment of emissions values derived from these different tests, internationally recognised conversion factors would be used to align test results to the WLTP.

The Clean Car Standard will depend on having a single source of 'truth' with regard to a particular vehicle make/model/variant's measurement of carbon emissions. It is likely that the Clean Car Standard will utilise the dataset on vehicles and emissions managed by the Energy Efficiency and Conservation Authority as our source of data truth.

How might a Clean Car Standard change vehicle prices?

An evaluation of the impact of fuel efficiency standards implemented in the EU found a relatively small impact on vehicle production costs incurred by manufacturers, despite improving technologies to reduce emissions. Hence, a small impact was felt at the consumer price level.

For New Zealand, the market will adapt so we too are supplied with the more fuel efficient models already being manufactured. So, like the Europe experience, we expect only a small upward pressure on vehicle prices - more akin to a one-off market adjustment to the technically superior models.

The extent of this upward pressure on consumer prices in the short term is unknown as it will depend on:

- the mix of vehicle types, makes and models being purchased in order to achieve the sales-weighted target
- the marketing and pricing strategies adopted by importers

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<sup>3</sup> For more information see <http://wltpfacts.eu>.

- the willingness for vehicle buyers to change behaviour (e.g. choosing a more fuel efficient vehicle or switching to another mode of transport).

For used imports, higher prices could occur mainly due to the younger, more technically superior model range of vehicles being offered. Any potential increase in cost would also be offset in part or in full by the clean car discount, which would offer discounts on low-emission vehicles.

The Clean Car Standard will promote an increase in choices of low emission vehicles. Low emission vehicles, including EVs, will become cheaper over time as the technology becomes more common and supply increases, inducing more competition and allowing economies of scale to be gained by manufacturers.

### How will the Government ensure that the Clean Car Standard emission targets are met?

As with other jurisdictions in the world that have implemented a fuel efficiency standard, they have been supported by robust compliance. New Zealand will do the same.

The approach the Government intends to take is largely based on that used in Europe, although aimed at importers rather than vehicle manufacturers.

The importers will be required to report annually the actual number of vehicles that fall within each weight band and the average emissions of those vehicles. These averages would be used to calculate the overall annual fleet target. The actual emission averages would be compared with the government-set emissions targets on a fleet basis.

To comply with the Clean Car Standard, importers would have to ensure that the annual average CO<sub>2</sub> emissions of their fleets are less than, or equal to, their required target fleet average.

Non-compliance would be penalised. The following penalties have been proposed:

- *New vehicle suppliers*: \$100 for each gram CO<sub>2</sub> per kilometre that a supplier exceeds its fleet target (i.e. net excess grams CO<sub>2</sub> per kilometre that the fleet exceeds the target multiplied by the number of vehicles imported in the year multiplied by \$100)
- *Used vehicle suppliers*: \$50 for each gram CO<sub>2</sub> per kilometre that a supplier exceeds its fleet target (i.e. net excess grams CO<sub>2</sub> per kilometre that the fleet exceeds the target multiplied by the number of vehicles imported in the year multiplied by \$50). The lower penalty for used vehicles recognises that generally less revenue is earned per vehicle in the used-import sector compared with the new sector and that used imports have a reduced life compared to new vehicles.

### Is the Government going to stop accepting Japanese vehicles assessed using the Japanese 10/15 testing procedure?

The Government is considering whether New Zealand should continue to accept vehicles that were tested using the old Japanese 10/15 emissions testing procedure. Japanese vehicles manufactured prior to 2008 were assessed using this test.

This is because the vehicle tailpipe emissions assessed through this test, cannot be reliably converted into emission values consistent with those derived from the more modern tests. Officials estimate that in 2021 this would restrict only 2 percent of used vehicles that would otherwise have been imported.

## Questions about the impacts of the Clean Car Standard and the Clean Car Discount

What percentage of New Zealanders might be affected by the Clean Car Standard or Clean Car Discount?

More than 70 percent of all vehicle transactions are from the domestic market. The proposals do not apply to these sales.

Households purchase 74% of the vehicles entering the fleet (new and used imports), with businesses purchasing the remainder. The Ministry of Transport estimates that 42% of all New Zealand households may be directly affected by these policies over the next six years to 2025.

The Ministry estimates that 59% of households buying a vehicle new to the fleet would either receive a discount, or not incur a fee.

Would low-income households be negatively affected by the Clean Car Standard or the Clean Car Discount?

Overall New Zealanders will be better off as a result of the Clean Car Standard and Clean Car Discount scheme. Apart from reducing carbon emissions, people who buy vehicles affected by the scheme will enjoy significant fuel savings.

However, there would be some short term risks, but whether low-income New Zealanders would be negatively affected by them will depend on the vehicle choices they make.

In the short term, the Clean Car Standard is expected to increase the average price of vehicles coming into the fleet because the average vehicle would be offering better engine technology. This could impact more on low income households as it would consume a greater proportion of their income.

However, if these households opt to buy a low emissions vehicle, the discount from the Clean Car Discount could offset any increase. Low income households that buy vehicles new to the fleet tend to buy lower emission vehicles.

The other risk that could impact on low-income households, is that people who need large vehicles and want to buy a vehicle new to the fleet may not be able to avoid paying a fee under the Clean Car Discount. This would happen if a low emissions alternative is not available at an affordable price.

Over time, this risk will dissipate as the supply of low emission vehicles builds. In any event, low-income households could avoid a fee by buying a vehicle from the domestic second-hand market.

Would rural households be negatively affected by the Clean Car Standard or the Clean Car Discount?

As with all other households, whether rural households would be negatively affected by the vehicle reforms depends on the vehicle choices they make.

Currently, compared to all households a greater proportion of the vehicles rural households buy are high emission vehicles.

Rural households that buy vehicles new to the fleet make up 5% of New Zealand households. If rural households were to maintain their current vehicle preferences under the Clean Car Discount, then slightly more than half of the households that buy a vehicle are likely to pay a fee.

However, there is the opportunity for these households to change their buying habits and avoid this fee. It is also expected that manufacturers will be offering low emission vehicles in the future.

### How would the domestic second-hand vehicle market be affected?

Neither the Clean Car Standard nor the Clean Car Discount will impact directly on vehicles for sale in the domestic second-hand market.

However, the policies will induce a gradual phase-in of more low emission vehicles into the domestic second-hand market. This development will benefit all used vehicle buyers through a wider choice of low emission vehicles.

### Will the Clean Car Standard or the Clean Car Discount impact my ability to own and drive my existing vehicle?

No, these policies would have no impact on the existing vehicle fleet already registered and operating on our roads. These proposed policies target vehicles entering the fleet.

## Questions about the RUC exemption for EVs

### What is the RUC exemption for EVs?

The government does not charge road user charges (RUCs) on electric vehicles. This exemption saves an electric car owner around \$800 if they are driving 12,000km a year. This exemption began in 2009 and is in force until 31 December 2021.

### Will the RUC exemption be replaced or extended?

The RUC exemption for light EVs is to finish as at 31 December 2021. There is no intention to extend the exemption. The Clean Car Discount scheme would replace the current RUC exemption for light EVs.

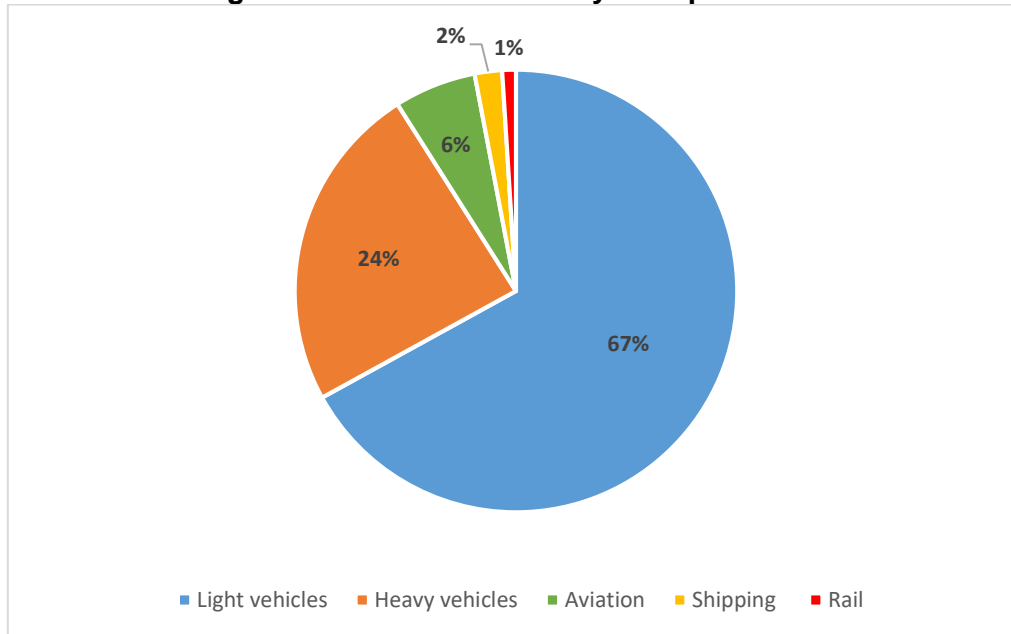
## General questions about transport emissions

### What is New Zealand's emissions situation?

About 50% of New Zealand's emissions come from agriculture, mostly from the methane (CH<sub>4</sub>) produced from livestock. Industry and manufacturing accounts for about 27% of New Zealand's emissions.

Transport (ships/boats, planes, trains, and road vehicles) emissions account for about 20% of New Zealand's total emissions. Of this about 91% is from road transport. The travel done in light vehicles accounts for 67 percent of transport emissions. This is 13 percent of New Zealand's total gross emissions.

**Figure 2 – GHG emissions by transport mode**



NB: Light vehicles are cars, SUVs, vans, utes and small trucks all under 3.5 tonnes.

[Why is the Government so concerned with vehicle emissions?](#)

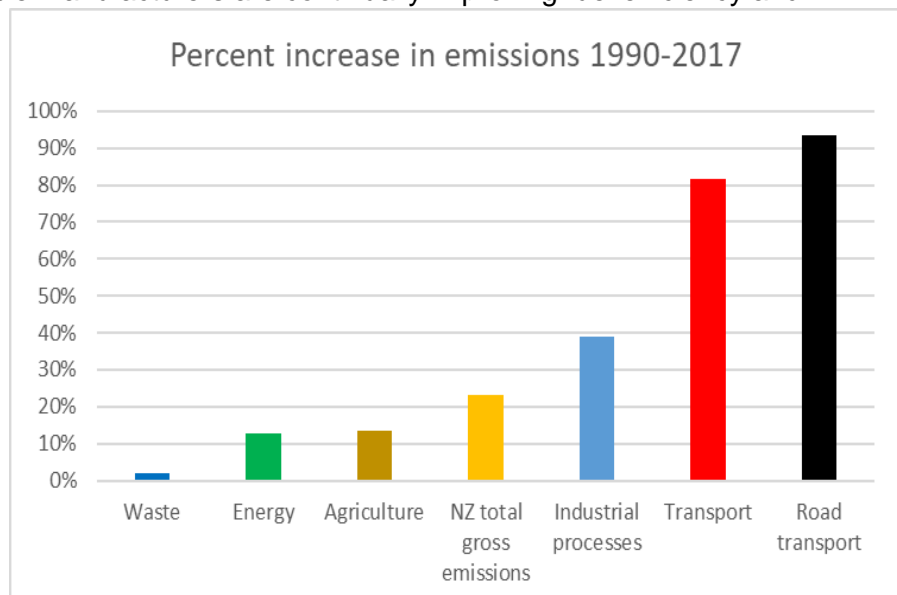
The Government’s concern is that transport emissions are continuing to grow while in the other major emitting sectors emissions have either stabilised, or they are declining. Between 1990 and 2017, overall transport emissions grew by 82 percent with emissions from road transport growing by 93 percent.

[The emission standards imposed on vehicle manufacturers are getting tougher, so why doesn’t the Government just let the market deliver?](#)

Most international vehicle manufacturers are continually improving fuel efficiency and reducing emissions.

However, there is evidence that a relatively less fuel efficient selection of new vehicles is made available to our market.

As well, in 2018 more than 60% of vehicles new to the fleet were used imported vehicles. The



average age of these vehicles is about 10 years. This means that a significant proportion of vehicles entering New Zealand's fleet were manufactured using older emissions technologies.

Vehicles entering our fleet today are expected to last to an average age of about 20 years. So higher emitting vehicles entering the fleet today will have an enduring impact on transport emissions lasting for hundreds of years in the atmosphere.

The Ministry of Transport's projections suggest that under current policies, road emissions will continue to rise until around 2022, due to population and economic growth. This occurs despite the growing uptake of electric vehicles and other low emission vehicles.

### Isn't the ETS reducing emissions?

The Emissions Trading Scheme (ETS) is the Government's main scheme for reducing emissions. It is a broad scheme that applies across the economy.

However, the Productivity Commission's analysis<sup>4</sup> concluded that the ETS currently plays a very limited role in reducing transport emissions as the carbon price is a relatively small component of fuel prices and fuel demand is relatively unresponsive to changes in price.

The Government is convinced that there needs to be specific transport measures to deliver the timing and extent of emission reductions needed.

### The big polluters are big trucks, so what is the Government doing about them?

Emissions from the heavy fleet make up about 24% of transport emissions. Compared to light vehicles, heavy vehicles produce a larger amount of emissions over their lifetime because they produce more emissions per kilometre, they are used more intensely and they have longer lives. So, yes, the heavy fleet offers significant opportunity for emission savings.

However, there is no silver bullet solution in immediate reach. Today's battery technology is still developing for broad application to heavy vehicles.

For buses and some smaller heavy vehicles that have predictable travel and can be scheduled to return to base for recharging, electric power can be viable.

New Zealand has had some heavy electric vehicles join its fleet, and this trend will no doubt increase. Yet overall the numbers are tiny (e.g. licenced buses in New Zealand: 22,298 diesel, 4,649 petrol, 25 electric, and 16 alternative (LPG, CNG, hybrid) as at October 2018).

More efficient logistics, aerodynamic retrofits, reduced rolling resistance of tyres, vehicle weight reduction, increased engine efficiency and hybridisation may all have their place in reducing emissions from the heavy fleet.

Other opportunities for reducing the emissions from heavy vehicles lie with substituting fossil-fuels with liquid biofuels, biogas and hydrogen fuel.

The Government will continue to support research into these areas and keep an eye on other policy settings to incentivise the heavy vehicle fleet to reduce emissions.

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<sup>4</sup> New Zealand Productivity Commission (2018). Low emissions economy: Draft report.

## General questions about electric vehicles

### What is an electric vehicle?

The definition of an electric vehicle (EV) has actually been defined in New Zealand law: The Road User Charges Act 2012. The key is that an EV has “motive power wholly or partly derived from an external source of electricity”.

Battery EVs and plug-in hybrid EVs are the two main types of EV. An EV can run with zero emissions.

#### *Battery electric vehicles (BEVs)*

A pure EV powered only by the battery. The battery is charged by plugging it into an electric power point (example: Nissan Leaf).

A ‘range extender’ vehicle is a BEV that includes an auxiliary power unit (APU) that drives a generator to charge the battery cells. The APU cannot directly drive the vehicles transmission/wheels.

#### *Plug-in hybrid electric vehicles (PHEVs)*

A PHEV is an EV whose battery can be recharged by plugging it into an external source of electric power, as well by its on-board petrol or diesel engine. For the PHEV, the petrol or diesel motor can also directly drive the vehicle’s transmission/wheels, hence it is an EV that is hybrid (example: Mitsubishi Outlander PHEV).

### Is the common hybrid vehicle an electric vehicle?

Hybrids that don't plug-in are not considered EVs. Their batteries are only charged by re-capturing energy when braking or from electricity generated by the engine. They cannot source electricity from an external source. The Toyota Prius and Honda Civic Hybrid are examples of hybrids. While not classified as an EV, hybrid vehicles are certainly considered low emission vehicles.

### Electric cars will only ever be a small percentage of the fleet won't they?

That may be the case short-term, but longer term, say beyond 15 or 20 years, we'll let you make up your mind. Here are a few facts to help:

- Investments in electrified vehicle research and development announced to November 2018 include at least \$19 billion by automakers in the United States, \$21 billion in China and \$52 billion in Germany. In addition, Volkswagen/Audi/Porsche has put out \$60 billion worth of tenders to procure batteries.
- Many corporates are progressively converting their company fleets to low emission vehicles.
- The New Zealand Government is progressively converting its fleet to low emission vehicles. The government’s vehicle fleet, where practicable, is to become emissions-free by 2025/26.
- Tesla – fully electric fleet.
- Porsche – EVs will be 100% of sales by 2030.
- General Motors has announced plans to phase out fossil-fuelled vehicles for an "all-electric future" and plans for 20 all-electric vehicles by 2023.



- Ford has created the EV-dedicated "Team Edison" to focus on the development of all-electric cars and has pledged to invest \$4.5 billion over five years on new all-electric and hybrid vehicles.
- Volvo and Jaguar Land Rover have committed to stop launching new models solely powered by internal combustion engines to dedicate their manufacturing to fully electric or hybrid models by 2020.
- Mercedes-Benz outlined a plan to electrify its "entire portfolio" by 2022, proposing some 50 electric and hybrid models.
- Volkswagen will offer their entire fleet as electric and hybrid versions by 2030. EVs will be 25% of sales by 2025.
- The Renault-Nissan-Mitsubishi Alliance has committed billions into its EV and battery development programs with the aim to become the leader in zero-emission transportation.
- Honda has said EVs and hydrogen vehicles will be 15% of sales by 2030.

Also we understand that the following countries have commitments to end the sales of ICE vehicles: Norway by 2025; India, China, Slovenia, Austria, Israel, the Netherlands, and Ireland by 2030; Scotland by 2032; and UK, France Sri Lanka and Taiwan by 2040.

The supply of EVs will increase, the types/range of offerings will widen and the prices will fall, charging infrastructure will expand, and associated services will develop. Associated services would include battery refurbishers/recyclers and third-party mechanical/electrical networks to service EVs.

As a result consumer concerns will gradually ease and EVs will progressively be regarded as mainstream vehicles.

Maybe other alternative fuels will soon start to have significant uptake. One major technology that is growing in commercial acceptance is hydrogen fuel cells.

[Isn't the real issue simply cost – electric vehicles are too dear for what they are?](#)

Yes, our research certainly tells us that the high price of EVs and the limited range of some models are barriers for people converting to EVs.

For some models there is a significant price premium for EVs in comparison with a similar fossil-fuelled vehicle, particularly for new vehicles. In late 2018, the premium seems commonly around 30% to 40%. Some EVs are more than double the fossil-fuelled alternative.

But certainly some manufacturers are offering EVs much more price aligned with their diesel or petrol versions.

For imported used EVs there can also be a price premium, but for some models it is not that great, and the price gap does appear to be closing.

Batteries, which are the biggest single cost in an EV, have followed a price reduction pathway similar to other new technologies, and battery costs are projected to decline by almost half over the next five years.

A number of commentators on the global vehicle industry are predicting that broad price parity for EVs will be achieved by the mid 2020s.

## What are the cost relativities of running an EV vs. hybrid vs diesel vs petrol?

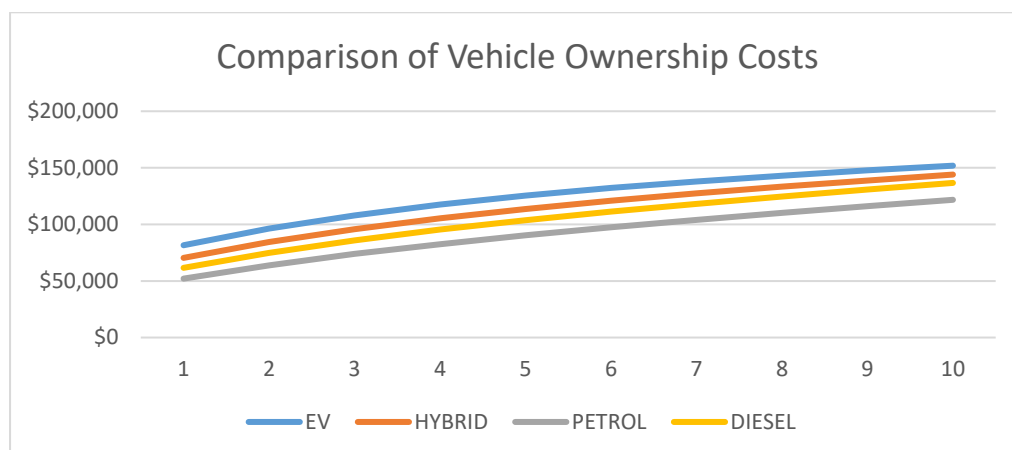
The New Zealand Automobile Association has compared the costs of purchasing and running comparable models of EV, hybrid, diesel and petrol. The running cost modelling is based on the AA Motoring Running Costs 2018 as their published costs compare these four types of vehicles.

We have based the comparison for diesel and petrol vehicles on what the AA describe as a 'compact car'.

The biggest single cost is the upfront capital cost for the vehicle. From the AA report, the average value (price) of vehicles surveyed are as follows: EV \$63K; Hybrid \$53K; Diesel \$46K; and, Petrol \$38K.

If capital costs are factored into the comparison, then it is no surprise that the total cost of ownership over a ten year period sees the EV as the most expensive, then hybrid, then diesel. The petrol vehicle is the least expensive to own and run over the period. This order simply reflects the cost of purchase.

The following graph adds the capital outlay into the year 1 running costs, and then accumulates the annual running costs. The 'x' axis for each graph is years.

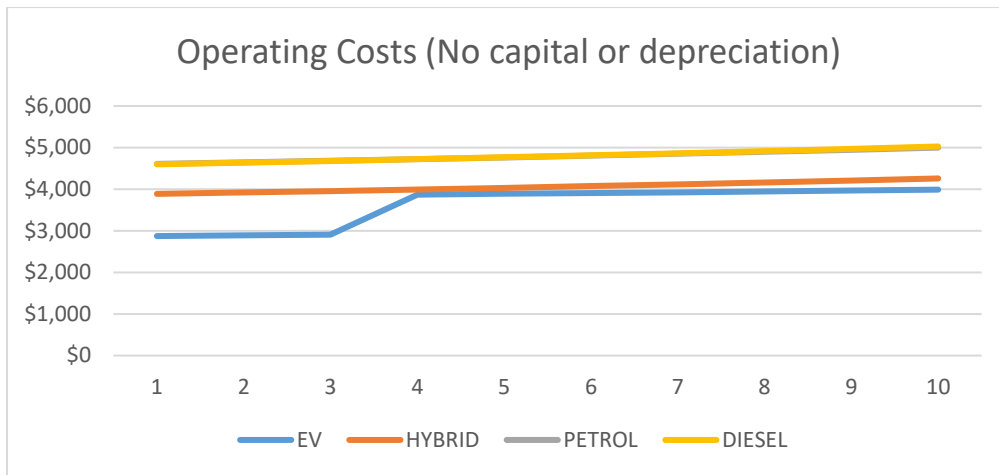


However, this does not reveal the story in regard to operating costs. To compare these we assumed that the RUC exemption for EVs would cease at the end of year 3 of ownership.

The costs considered include vehicle fuel (electricity or diesel or petrol), insurance, registration and maintenance (oil, tyres, repairs and maintenance). But they exclude capital outlay and depreciation<sup>5</sup> - even though we recognise depreciation as the highest annual cost for a new or near new vehicle.

The following graph presents the results of these annual operating costs:

<sup>5</sup> All vehicles are assumed to depreciate at a similar rate. We have no information to suggest that an EV or hybrid will lose market value quicker or slower than an ICE vehicle.



The results show that the EV has the lowest operating costs, and this remains the case even in the situation where they are subject to RUC. Diesels and petrol vehicles have similar costs with the cheaper fuel costs at the pump for diesels balanced by RUC and dearer maintenance.

### Why does the Government think New Zealand is well placed for more electric vehicles?

New Zealand is in a great position to benefit from EVs because:

- EVs will really help our transition to a low-carbon economy, without compromising individual mobility or economic growth
- we have high levels of renewable electricity generation (currently around 85%), meaning that increased use of EVs will replace petrol and diesel with clean, green, locally produced energy
- we have more than enough renewable electricity generation potential to support widespread adoption of EVs
- oil imports are valued at around \$4 billion a year so EVs would improve New Zealand's balance of payments and long term oil security
- the average journey in New Zealand is just 24 kilometres, a distance that today's EVs can easily handle; 90% of travel in a car is less than 90km
- New Zealand's temperate climate is well suited to EVs.

The Government recognises that EVs are only one source of zero-emission motive power. The Government knows there are other low emission motive power such as hydrogen, biofuel, CNG, LPG, and hybrid technology, for example. The Government also understands that reducing GHG emissions involves encouraging the use of public transport, vehicle sharing and active modes of transport.

### What are the benefits from New Zealand increasing the electric vehicle fleet?

A lifecycle analysis report commissioned by the Energy Efficiency and Conservation Authority found EVs are better for the New Zealand environment than petrol or diesel powered vehicles across their whole lifecycle, as well as while the vehicle is in use.

Across their full manufacture-to-scrappage lifecycle, pure EVs generally have around 60 percent fewer carbon dioxide emissions than petrol vehicles.

This result is even stronger in New Zealand where there is around 80 percent fewer carbon dioxide emissions when operating an electric car compared with a petrol car due to our high levels of renewable electricity generation.

EVs also reduce our demand for fossil-fuel, therefore reducing our reliance on imported fossil fuels and increasing our energy security.

Where can I find more information about electric vehicles?

- Electric Vehicles website – Drive the Future – <https://www.electricvehicles.govt.nz/>
- Energy Efficiency and Conservation Authority – <https://www.eeca.govt.nz/>
- Leading the Charge – <https://www.leadingthecharge.org.nz/>
- DriveElectric – <https://driveelectric.org.nz/>
- Flip the Fleet – <https://flipthefleet.org/>

## ABBREVIATIONS / GLOSSARY

**BEV** Battery Electric Vehicle – also called a pure electric vehicle

**CNG** Compressed Natural Gas

**CH<sub>4</sub> Methane** emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills. Methane emitted today lasts about a decade on average, but it absorbs much more energy than CO<sub>2</sub>.

**CO<sub>2</sub>** Carbon dioxide: enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and wood products, and also as a result of certain chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. CO<sub>2</sub> remains in the climate system for thousands of years.

**EV** Electric Vehicle

**GHG** Greenhouse Gases = CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, PM

**GWP** Global Warming Potential: GWP100 compares the cumulative warming of greenhouse gas over a 100 year period.

**ICE** Internal Combustion Engine

**LPG** Liquefied Petroleum Gas

**N<sub>2</sub>O** Nitrous oxide: emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. It is also produced when animal urine oxidises into N<sub>2</sub>O after interacting with microbes in the soil. N<sub>2</sub>O has a GWP 265–298 times that of CO<sub>2</sub> for a 100-year timescale.

**PHEV** Plug-In Hybrid Electric Vehicle

**PM** Particulate Matter

**RUC** Road User Charge: a levy imposed on road vehicles, other than petrol powered vehicles, to fund road network upkeep.

**SUV** Sport Utility Vehicle

**UTE** Utility vehicle: a pickup or sport utility vehicle having an open cargo area, traditionally with the ability to carry a 1 tonne payload. They can have a single cab or double cab configuration, and be 2 wheel drive or 4x4.

**WLTP** the Worldwide Harmonised Light Vehicles Test Procedure for measuring a vehicle's CO<sub>2</sub> emissions in a way that approximates real world driving. [Other older test procedures are NEDC (Europe), JC08 (Japan) and CAFE (America)].