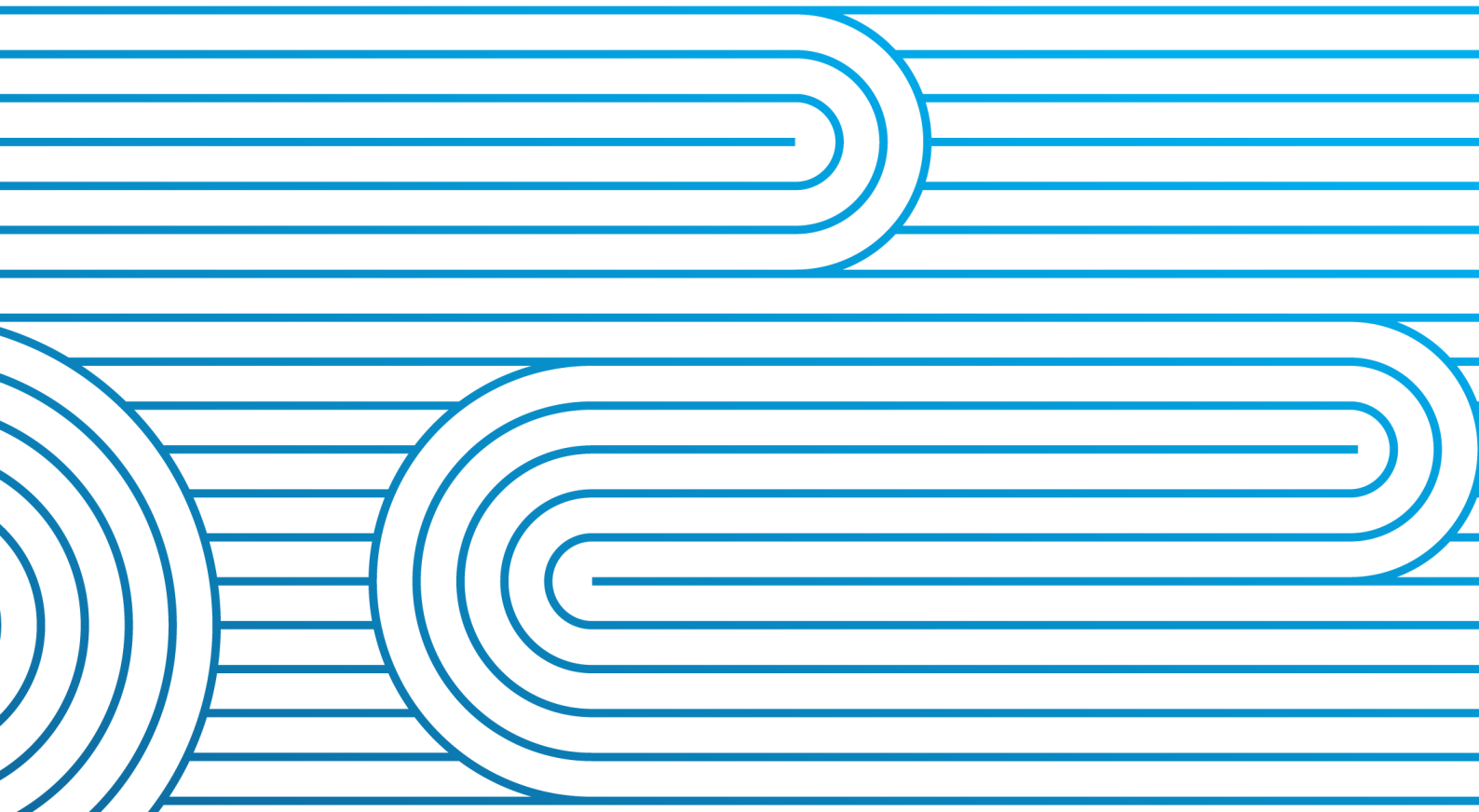
TRANSPOWER

Submission to the Ministry of Transport

On the Ministry's consultation paper Hīkina te Kohupara – Kia mauri ora ai te iwi - Transport Emissions: Pathways to Net Zero by 2050

25 June 2021



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Introduction

Transpower welcomes the opportunity to respond to the Ministry of Transport's Hīkina te Kohupara – Kia mauri ora ai te iwi. We appreciate the work done to develop this consultation paper and look forward to seeing the outcome in the Government's Emissions Reductions Plan later this year.

Our key responses to the work of the Ministry are:

- We need to pursue a pathway that delivers the transport emissions reductions required to meet net zero carbon by 2050 and the Climate Change Commission's emissions budgets leading up to 2035. Currently, only one of the four pathways satisfy this condition, and in that pathway the potential of transport electrification is significantly underestimated
- Electrification of transport is the lever that is likely to realise the largest emissions reduction for New Zealand's transport system and needs to be pushed hard alongside behaviour change and mode shift
- Electrification is a 'least regrets' option that offers significant benefits to New Zealanders and the wider economy in addition to significant emissions reductions
- The electricity sector will enable widespread electrification of transport through cross-sector collaboration and coordination

We need to pursue a pathway that is consistent with the Climate Change Commission's budgets and realises the significant potential of transport electrification

In its final advice to the Government, the Climate Change Commission (the Commission) states that New Zealand's transport emissions need to almost halve by 2035, which is a significant challenge given that transport emissions have almost doubled since 1990. As a country, our transport emissions trajectory needs to be moving at twice the speed in the opposite direction if we are to meet the budgets set by the Commission.

As set out in Hīkina te Kohupara and the Commission's advice, rapidly reducing our transport emissions will require a multi-faceted approach. The Ministry has appropriately grouped several levers available to us under:

- Changing the way we travel
- Improving our passenger vehicles
- Supporting a more efficient freight system

Four pathways have been presented by the Ministry to illustrate how varying the focus on each lever might collectively decrease emissions from New Zealand's transport system. We have two key concerns with the pathway outcomes:

1. Pathway 4 is the only pathway that demonstrates an emissions trajectory that meets the emission reduction required by the Commission's emissions budgets. The remaining three pathways fall short of the emissions reductions required. We think it is only acceptable to pursue a pathway that can bring New Zealand's transport emissions down in line with the

expert advice provided by the Commission. Ignoring this expert advice would be requiring other sectors (e.g. agriculture) to make deeper emissions cuts than recommended by the Commission.

2. Within Pathway 4, we believe that the balance of reductions weighs too heavily on behaviour change and mode shift and significantly underestimates the impact that electrification of the light and heavy fleet can have on emissions.

   In its final advice, the Commission's Demonstration Path still sees electric vehicles making up 36% of the light vehicle fleet by 2035 (a reduction from 41% in its draft advice). This is significantly higher than the 20-27% proposed in the Ministry's pathways. Our own Whakamana i Te Mauri Hiko modelling is consistent with the Commission's modelling.

   Furthermore, the Commission's modelling shows that even in the scenarios with the most ambitious behaviour change, total light vehicle travel is still higher in 2035 compared to 2018-2019 levels (as shown in Figure 1). In 2035, there is a ~20% reduction in light vehicle travel relative to the current policy reference case due to behaviour change which is half of what is modelled in Pathway 4. We think this is more realistic because of the time it takes to deliver the infrastructure required to materially shift travel behaviours.

   By underplaying the potential of electrification, we risk not putting in strong enough policy settings to encourage EV uptake and therefore risk our ability to achieve a net zero carbon transport system by 2050. Ambitious electrification of transport also mitigates the risk of vehicle kilometre travelled reductions not materialising as much as envisaged.

Figure 1: Commission's modelled vehicle-kilometres travelled by light vehicles

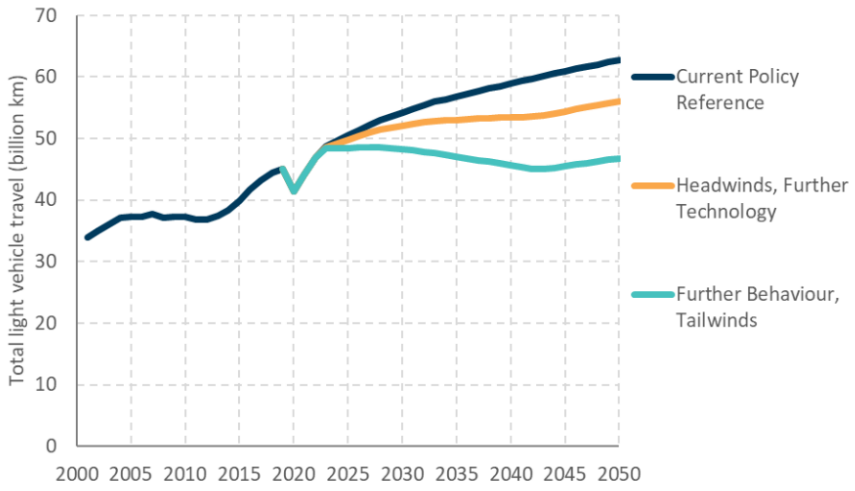


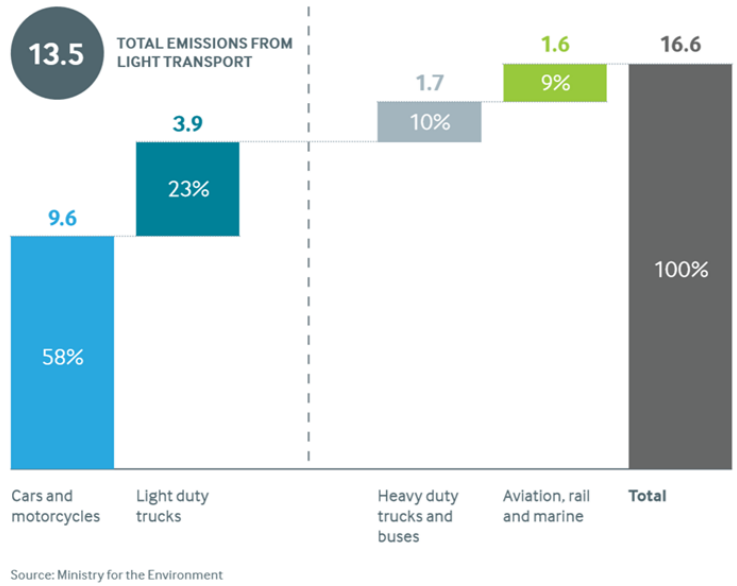
Figure 12.13: Vehicle-kilometres travelled by light vehicles

Source: Commission analysis

Electrification is our largest emissions reduction opportunity and needs to be pushed hard with mode shift

Around 80% of emissions from transport are from light vehicles, vans and light duty trucks, as shown in Figure 2 below. These emissions can be addressed jointly through two levers: mode shift through widescale behaviour change and vehicle electrification. It is critical that these are seen as complementary measures that will jointly deliver the reductions we need, rather than a one or the other approach.

Figure 2: Breakdown of New Zealand's transport emissions 2018 (Million tonnes CO2-e)



Source: Ministry for the Environment

Mode shift is a significant opportunity for emissions reductions but changing our urban form and transport options to influence low emissions human behaviours is a long-term approach. By way of example, Auckland's City Rail Link is due to be completed in 2024, 14 years after its initial business case in 2010. Because of this long lead time, action needs to start now, but emissions reductions may not be evident for another decade or more. This dampens the potential impact of mode shift in the context of meeting our 2030 Paris Agreement climate change target.

The Commission's budgets outline that we do not have many years to wait to fundamentally overhaul our national urban form and transport system. Therefore, we also need to be thinking about how we realise emissions reductions **today**, and in the near-term, using our existing transport infrastructure, human behaviours and travel needs.

This is where accelerated EV uptake can and will play a significant role in a zero-carbon transport system. Cars, vans, light duty trucks and buses are well suited to electrification, costs are falling and the number of new models available continue to grow.

Even with material behaviour change, decarbonising our fleet will make significant progress towards reducing our emissions. Our analysis of the Commission's 'Demonstration Path' in Figure 3, finds that EVs can provide the most emissions reductions in light vehicles, equivalent to 3.8 Mt CO2-e by 2035, or 46% of the abated emissions. This is slightly more than behaviour change, like switching to public transport or travelling less, which can achieve 3.6 Mt CO2-e or 44% reduction by 2035.

Figure 3: Composition of light passenger transport emissions reductions based on the Commission's 'Demonstration Path' scenario (Mt CO2-e)[1]

	2020	2035	% of abatement
Gross emissions	7.3	12	-
Abatement from behaviour change	-	-3.6	**44%**
Abatement from improved ICE efficiency	-	-0.8	**10%**
Abatement from electrification	-	-3.8	**46%**
Net emissions	7.3	3.8	-

Again, we iterate the importance of pushing hard on both mode shift and light passenger vehicle electrification. As there are some risks posed to these two key levers, going hard on both can act as a hedge where if vehicle kilometres travelled reductions from mode shift do not reach the levels modelled, additional emissions reductions can be gained from more EVs, or vice versa.

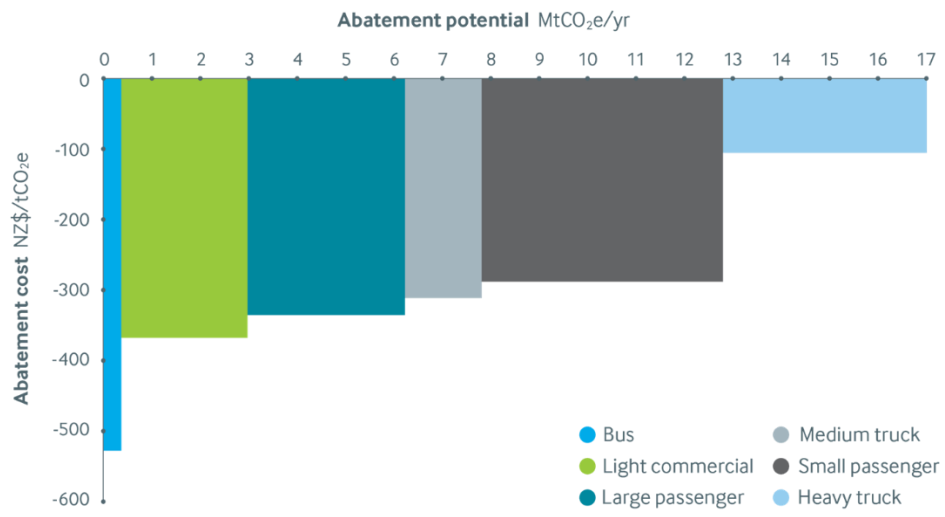
Electrified transport will enable decarbonisation and wider benefits

Accelerating EV adoption is a 'least regrets' move. Electric vehicles are already more economic to run than current internal combustion vehicles (ICE) and their falling up front capital cost will mean that they will soon, if not already, outcompete existing ICE vehicles on a total cost of ownership basis.

The following chart from the Ministry for the Environment shows how large the economic and environmental opportunity can be for New Zealand in 2030. Here, light transport (including small and large passenger, and light commercial vehicles) makes up the majority of New Zealand's carbon reduction opportunity. Based on this cost curve, our Electrification Roadmap analysis indicates that if we accelerate the electrification of transport, by 2030, we can reduce annual emissions by 2.1MtCO2-e, and generate net benefits to the economy of $0.6 billion. By 2035, annual emissions reductions increase to 6.1MtCO2-e and net benefits to $1.6 billion.

[1] Note that total light passenger vehicle emissions will differ from the chart published in the Electrification Roadmap due the data in the CCC chart starting from 2020 (when emissions were lower due to COVID-19) rather than 2018, and slight differences in how the CCC and MfE categorise emissions for light vehicles. From a whole of transport sector perspective, emissions reported by CCC and MfE (which were used in the Electrification Roadmap) are consistent.

Figure 4: EV transition marginal abatement cost curve, 2030



Source: Ministry for the Environment

Furthermore, accelerated EV adoption is a prime opportunity to deliver emissions reductions while using the existing roading networks and infrastructure. This means that we do no need to wait to design and build new communities, new cycle networks or new public transport corridors to see emissions reductions – drivers swapping their internal combustion engine car with an electric vehicle today will reduce emissions today.

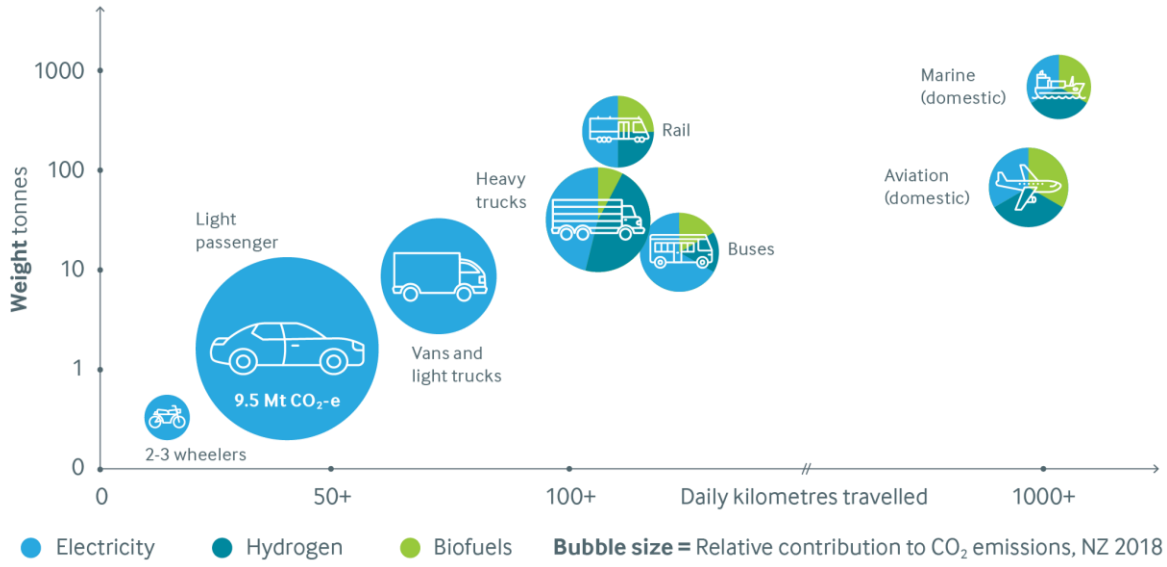
However electric vehicles currently make up less than 1% of New Zealand's fleet and there are challenges to accelerating electric vehicle uptake that will require policy and regulation to overcome. Up front capital cost remains to be the largest barrier, even in instances where the total cost of ownership for an EV equivalent is lower. Other challenges include New Zealand's access to the global market and New Zealanders' access to vehicles and charging.

Part of the suite of solutions to overcome these challenges are already underway and more have been announced by the Government since the release of Hīkina te Kohupara. The Clean Car Standard, Clean Car Discount, proposed Sustainable Biofuels Mandate, expansion of the Low Emission Transport Fund, funding for state sector EVs and signal to set up an electric vehicle sector leadership group are all steps that need to be taken to take the country to net zero carbon transport.

Light commercial vehicles, such as vans and small trucks, as well as buses, trains and ferries are already proving to be able to be decarbonised through electrification. In public transport, near-term electrification has the potential to increase its attractiveness to the public, which then aids in accelerating mode shift for where the public transport network and options exist today.

Electrification, hydrogen and biofuels will be needed to decarbonise the remaining heavy transport fleet, as shown in Figure 5 below. However, technology in heavy, long-distance trucking, marine and aviation is still emerging so policy implemented today cannot "pick winners". Instead, we need to ensure that policy encourages innovation, proof of deployment and creates an environment such that when a technology is ready for widespread adoption, it is enabled to do so at pace.

Figure 5: Decarbonisation opportunities by transport segment



The electricity sector will enable electrified transport

Part of the opportunity to decarbonise transport lies with the electricity sector. We are entering a period where, for the first time at a large, widespread scale, the transport sector and the electricity sector will converge to jointly deliver transport outcomes for New Zealanders, as a growing number of EV owners plug their car into the electricity system to charge. For both sectors, there is a need to develop an understanding of how the other operates, where the two interface and where value can be maximised from a co-ordinated approach.

For the electricity sector, transport makes up one part of a net zero carbon future. In Whakamana i Te Mauri Hiko, we forecast that electricity demand across the economy could increase by 55-70% by 2050, with 50-70% of that coming from transport electrification. The electricity sector is preparing for this future where we will be able to support EV adoption, wider electrification of the economy and increasing renewable generation capacity, while also ensuring electricity is reliable, secure in supply and affordable to all electricity consumers.

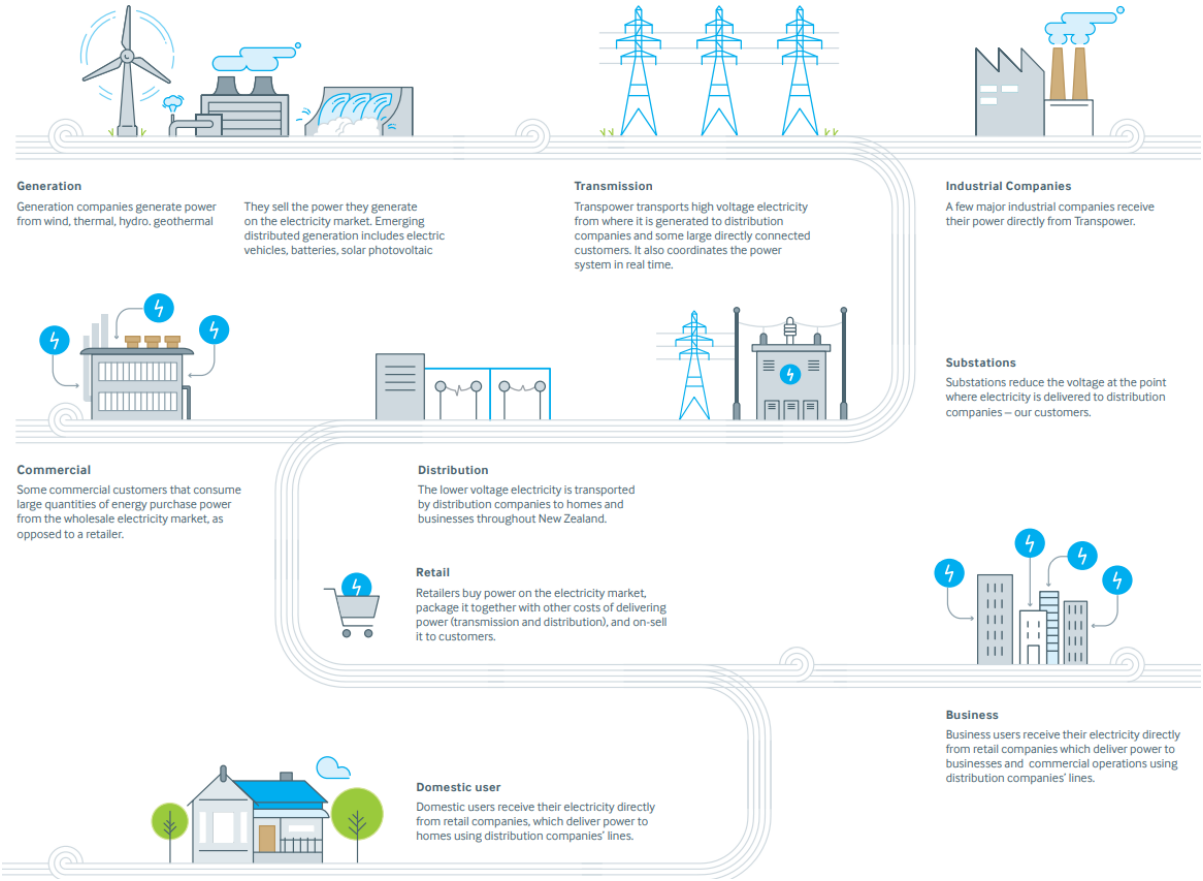
Transpower and others in the industry are committed to ensuring that a highly electrified future is possible and realised. The task is significant, but achievable with sufficient planning, coordination, collaboration and adaptability.

The electricity sector's role in the future of transport

Electricity already plays a role in transport by charging the small number of electric bikes, cars, trucks, and buses on the roads, and powering the parts of the rail system that are electrified. To date, electrifying the small volume of vehicles has been manageable for the electricity system, however with the imminent mass electrification of the fleet, the electricity industry needs to adapt to enable a just transition.

In Figure 6 below, we lay out the high-level electricity system to help with understanding the role the electricity sector will play in electrified transport.

Figure 6: New Zealand electricity supply chain



Transpower New Zealand Limited (*Transpower*) is the State-Owned Enterprise that owns, operates, maintains, and upgrades New Zealand's high voltage electricity transmission network, the National Grid. Its roles are to reliably and efficiently transport electricity from generators to distributors and large users, and to operate a competitive electricity market and deliver a secure power system.

Transpower's role in the transition to a low emissions economy will involve making new connections to the National Grid from renewable energy generation and to major electricity users and distributors, and by maintaining and enhancing the resilience and security of the Grid overall.

It is unlikely that Transpower will directly interact with EV owners – that will be the role of electricity distribution businesses, retailers and aggregators. Transpower however will still be impacted by the

increase in EVs because the cumulative effect of EV charging on distribution networks will ultimately feed back to the Grid and the increased demand for electricity will require more generation to be connected. This will have implications on how we manage, maintain and operate our infrastructure.

We have released a number of papers in recent years which provide further information on the matters covered in this submission:

- *Te Mauri Hiko – Energy Futures* (2018);
- *Whakamana i Te Mauri Hiko – Empowering our Energy Future* (2020);
- Transpower's submissions on MBIE's Accelerating Renewable Energy and Energy Efficiency discussion document;
- *A Roadmap for Electrification: Decarbonising transport and process heat* (2021); and
- Transpower's submission on the Climate Change Commission's Draft emissions budgets and advice to the Government (2021).
- We will also be providing a response to the Infrastructure Commission's He Tūāpapa ki te Ora - Infrastructure for a Better Future consultation paper

Navigating challenges and unlocking benefits through a cross sector approach

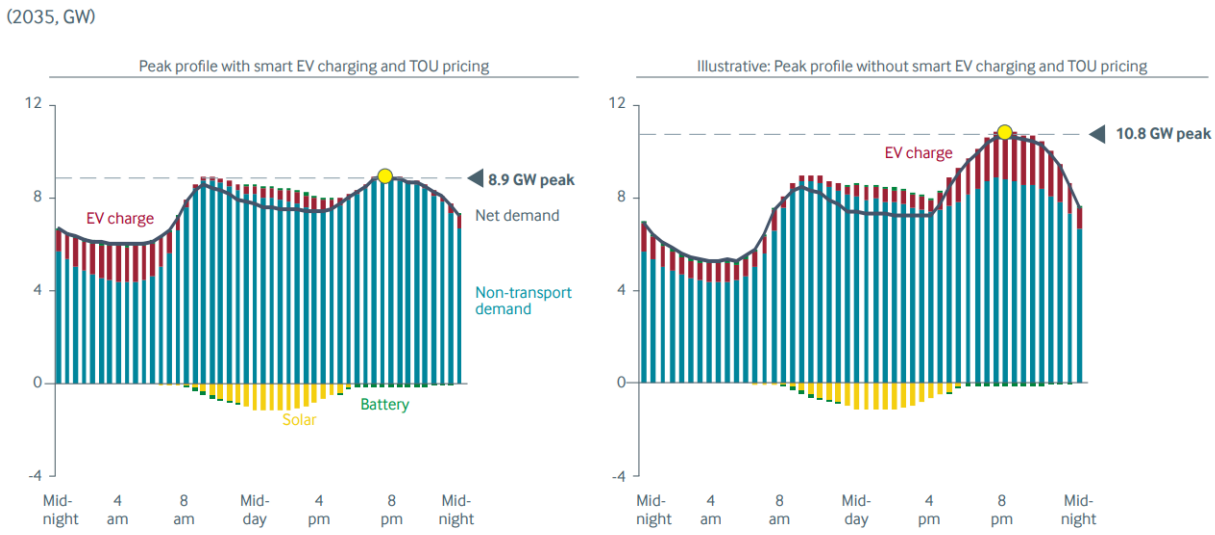
The Climate Change Commission in their advice stated that the electrification of energy use, as needs to happen in the transport sector, will require a major expansion of the electricity system.

The transport sector is an area where this expansion in the electricity system can be more nuanced than building a lot more infrastructure at increasing cost. The uptake of EVs will drive demand for significant increases in the volume of electricity to be delivered around New Zealand. However, it also has the potential to help flatten the peak demand on the network, by empowering consumers to shift demand to off peak periods and access significant off-peak electricity price savings.

There is also a significant opportunity to reduce electricity costs for all electricity consumers across New Zealand. An important concept to understand is that both transmission and distribution networks are built to meet peak demand capacity. Network costs are driven by the capacity (MW) of the infrastructure, but consumers are often charged by their retailer on a usage ($/MWh) basis. Therefore, if peak demand is maintained but energy consumption grows (i.e. more electricity is used to charge EVs during the off-peak period), then charges to all electricity consumers, not just EV users, can be reduced on a per unit basis.

This major opportunity to reduce electricity costs for all New Zealanders can be realised by encouraging widespread adoption of solutions such as time of use pricing and smart charging. Smart chargers enable consumers to physically plug in their car when they get home in the evening but control actual charging such that it occurs through the night outside of peak periods. Smart chargers' 'peak smoothing' effect, which is shown in the first chart in Figure 7, increases the utilisation of the electricity network and has the potential to save consumers approximately $1.5 billion for every gigawatt of avoided peak electricity demand growth.

Figure 7: Peak profile loads with and without smart EV charging[2]



In 2019, the UK EV charging project 'Electric Nation', which at the time was claimed to be the "largest smart charging project in the world", concluded that with there is sufficient flexibility in charging requirements such that with the right incentives and tools (such as time of use pricing and smart charging) the impact of charging on peak demand can be managed. The next phase of the project is focussing on 'vehicle to grid' (V2G) capabilities, which has the potential to be more beneficial than smart charging due to the ability to put significant levels back into the network at peaks times, reducing the need for additional peaking generation. This not only benefits the electricity network but can also benefit the customers who generally will be paid to inject electricity into the network.

These are the types of benefits that we need to ensure New Zealanders can access through the accelerated uptake of EVs. Unlocking this potential requires coordinating the availability of EVs, smart charging infrastructure, peak/off peak pricing tariffs and innovative electricity retail offerings. We are already seeing this thinking come through as some electricity retailers are offering off-peak tariffs of around 15c/kWh (down from the standard residential price of 28-30c/kWh), equivalent to refuelling a petrol vehicle at approximately $0.40/litre or 80% less than the cost of petrol today.

This is an important first step that needs to be built on through strong cross sector-collaboration between the energy and transport sectors.

[2] Section 5 of Whakamana i Te Mauri Hiko – "Demand side management of peaks" pp 61 - 70

Response to consultation questions

Question 1: Principles in Hīkina te Kohupara

We support the seven principles used to shape the advice in Hīkina te Kohupara.

Principle Four mentions the need for "multiple, co-ordinated actions to reduce and avoid emissions – both within the transport sector, and in other sectors (such as land use planning) that have a strong influence on transport emissions." Here, we think it is appropriate to also emphasise the co-ordination required with the energy sector as the proposed transition of the transport sector towards electricity, biofuels and/or hydrogen is highly dependent on the ability of the energy sector to adapt and deliver. Because multiple sectors are required to deliver the transport transition, we need to highlight the importance of a systems-level approach to the transition across government and across sectors.

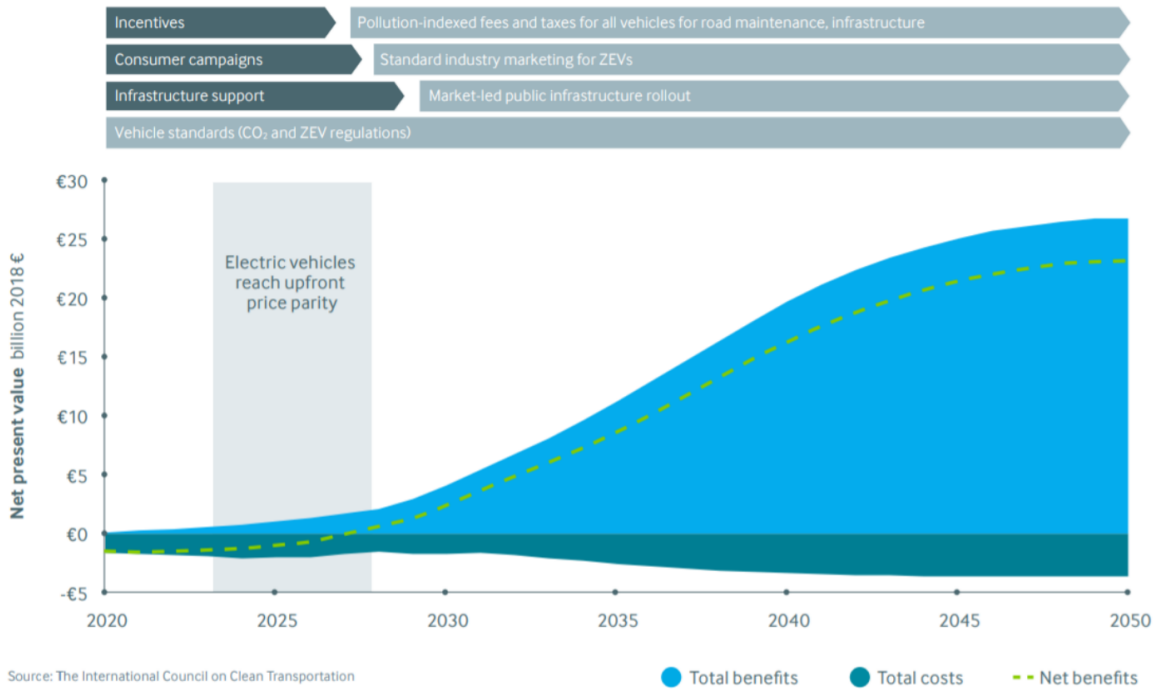
Question 2: Government's role in reducing transport emissions

We agree with the Ministry that Government's role in the transport transition is clear in that it needs to set the national direction through policy and funding, drive cross-sector collaboration to deliver a just transition and lead by example.

Government's main role is in setting the long-term national direction policy and regulation that will encourage the private sector and other market players to make decisions that delivers an efficient transport system that is in line with a net zero carbon future. Setting a long-term direction helps to create certainty and can de-risk decisions made by individual players. An example of this would be implementing the Clean Car Standard in conjunction with an ICE ban. These policies would signal to the market that New Zealand, over a period of time, would only import increasingly cleaner vehicles and eventually zero emissions vehicles only. This certainty can drive businesses and consumers towards only buying low emissions vehicles, knowing that their vehicle would still hold value in a future where high emitting vehicles were banned.

While some organisations may be concerned about the role of Government and the need for policy support, it is reasonable to set and deliver clearly signalled long-term transition programmes. In many instances, this support can be short-term and transitional in nature. For example, analysis of German transport policy has illustrated that in the 2020s the balance of investment in the electrification of transport can shift from public investment to private sector and market led initiatives, as shown in Figure 8.

Figure 8: Costs, benefits and policy over the transition to Zero Emissions Vehicles in Germany



Government is also in a unique position where it sits across the whole New Zealand economy and the sectors that make up the economy. This position allows the Government to drive a just transition, ensuring desirable outcomes in one sector do not result in significantly undesirable outcomes in another. For example, focusing on electrifying transport independently of the electricity sector could result in increased electricity prices for all consumers, regardless of whether they owned an EV or not, if time of use pricing and smart charging is not rolled out and peak electricity demand increased materially. An increase in electricity prices could exacerbate some of the energy hardship issues that New Zealanders face. Note that the increase in price described here relates to the additional cost of networks building to meet increased peak demand.

The government needs to ensure that cross-industry collaboration across sectors begins at the top and each of the agencies responsible are working together to deliver emissions reductions - e.g. Electric vehicles under Ministry of Transport, Energy under MBIE, RMA and water allocation and climate change under Ministry for the Environment. There are interdependencies between each that means no agency or department can work in isolation.

Leadership to coordinate across agencies, supported by policy, strategy and assigned accountability will provide both policy makers and industry with clarity and consistency. Over the next decade we expect there to be an increasing convergence of energy uses and sources and the integration of transport with urban infrastructure. Similarly, a cross-government approach will ensure a balance is struck between good economic, social, cultural and environmental outcomes and genuine partnership with iwi.

Government also needs to work closely with private sector to deliver transport outcomes. The private sector is very capable of innovating and adapting to deliver commercially sound solutions that fall within the bounds of policy and direction set by Government. It will be important for

Government to engage closely with the private sector so that businesses can make the most of opportunities for transitioning to a zero emissions economy.

Funding is a large part of government's role and is already being demonstrated through EECA's Low Emissions Transport Fund. Funding enables innovation (e.g. proof of deployment for heavy electric trucking), as well as supporting infrastructure or market growth in areas where it isn't economic yet (e.g. providing funding for light EVs, charging infrastructure build out). This type of government support is critical for accelerating New Zealand's low emissions transport transition.

And finally, part of government's role is to lead by example. Its recently announced 'electric vehicle first' policy and $41.8 million for the leasing of low emissions vehicles across the public sector is a good step in this direction. This not only creates public trust in the technology, but it also brings more EVs into New Zealand which drive the need for supporting workforce and infrastructure, and also later feed into a second-hand market.

Question 3: Government encouragement and support for transport innovation

In respect to transport innovation, we agree with the Ministry that Government's role should include:

- Making sure regulation supports, encourages or mandates the uptake of positive innovations (and does not hinder it)
- Encouraging collaboration and stronger connections between the government and non-government sectors
- Providing targeted funding and other support for developing, trialling and supporting new technology approached. EECA's Low Emissions Transport Fund is a good example of how funding has been applied to support EV, hydrogen and biofuel proof of concepts for hard to electrify areas. The recent decision to expand remit of fund to enable a wider range of applicants (such as marine) is another good step forward. The fund has also been instrumental in building out EV charging infrastructure and helping EV adoption.

We also suggest that Government should encourage cross sector innovation, particularly between the energy and transport sectors to enable the potential for additional consumer benefits. For example, in New Zealand, innovative business models and power systems have enabled solarZero customer Timo to power his home, business and two electric vehicles through a solar and battery installation. As a result, his previously $500/month petrol bill has been reduced and are included in his total electricity costs which are around $20/week in summer and $80/week in winter (Newsroom).

Question 4: Transport, land use and urban development integration

We think the described actions broadly captures most of what the Government needs to do to better integrate transport, land use and urban development to reduce transport emissions.

An element that could be strengthened is the co-ordination required with the energy sector. While the focus on better integrating transport and urban form is on reducing the need to travel or increasing active and public modes of transport, transport and urban form planning still need to incorporate the shift to electric vehicles and ensuring local distribution businesses are enabled to deliver the right infrastructure to support charging – this is for individual EV owners and for large EV bus fleets, electrified rail and other large electricity uses such as trucking for local businesses. A shift to more active and public transport is also likely to drive more denser housing which could also have implications on the local electricity network as that means more appliances (including EVs) are plugged into the same area.

Question 5: Other travel options to encourage alternative modes of transport

We support the suite of alternative modes of transport presented and have no other travel options to add.

While we support the ambition in achieving significant mode shift or travel reduction, we emphasise the importance in ensuring New Zealand's efforts are in both mode shift and transport electrification or decarbonisation via other fuels, rather than putting more effort into one or the other.

Question 5: Pricing and demand management

We agree that demand management and pricing will play a role in decarbonising transport. Later in Question 7 we discuss pricing as one of the levers to accelerate fleet transition and encourage the shift from ICE vehicles to low emissions vehicles.

Question 7: Accelerating fleet transition

In our response to the Climate Change Commission and in our Electrification Roadmap, we supported the prioritisation of the light vehicle electrification as there are large gains to be made and the technology is already available. The policies reflected here support those presented by the Ministry.

In our view, the key observations in this area are:

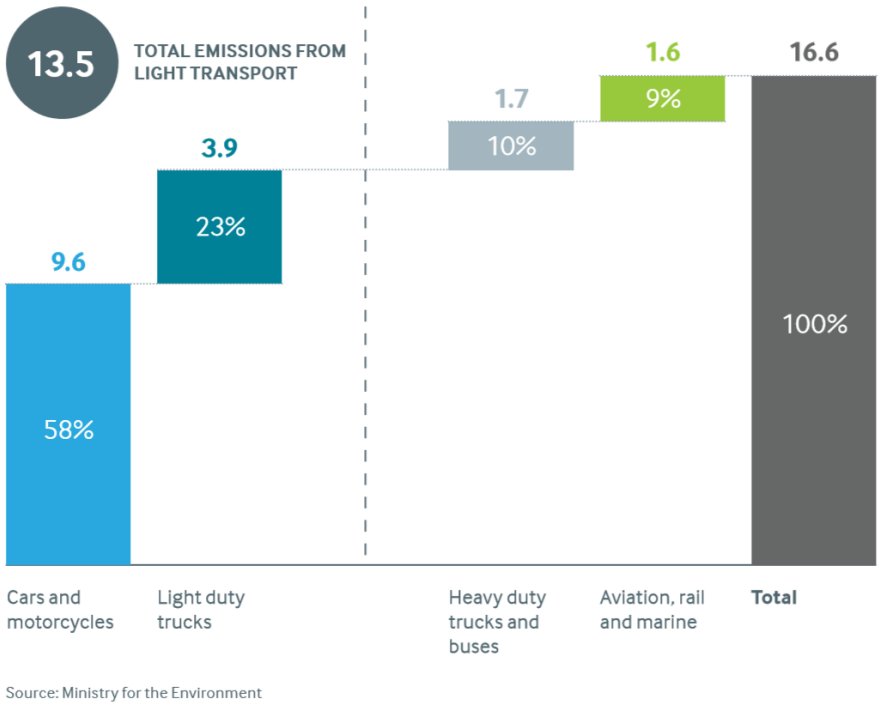
- We need to prioritise the electrification of light vehicles in the immediate term. There are large gains to be made and the technology is available;
- This is a project to bring forward a social change – the mass adoption of electric vehicles – that is already set to happen in New Zealand, but will happen too late without policy intervention;
- Bringing this social change forward can be done. The policy and technology tools are available, and other countries have already begun to stimulate mass adoption; and

- Once the adoption of electric vehicles has critical mass, with the supporting systems and feedback loops that come with mass adoption, the policy measures can be wound back.
- Key policy interventions need to address the "access" issues: New Zealand's access to the global supply market and New Zealander's access to EVs and charging

We need to prioritise the electrification of light vehicles in the immediate term

Light vehicles, including cars, vans and light duty trucks, make up close to 80% of our transport emissions. Electric alternatives for these types of vehicles are becoming more widespread and economic to run, making light vehicles the largest emissions reductions opportunity for New Zealand, especially leading up to 2025 and 2030.

Figure 9: Breakdown of New Zealand transport emissions, 2018



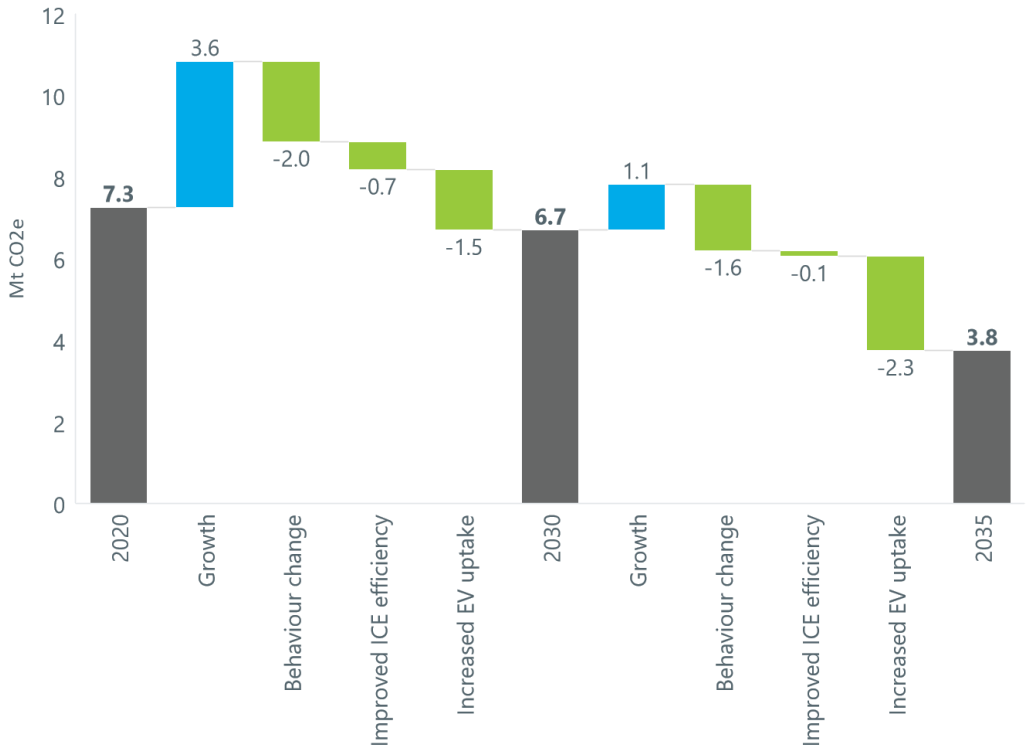
Source: Ministry for the Environment

Our remaining transport emissions from heavy duty trucks, buses, rail, aviation and marine will also need to be decarbonised in time, likely through alternative fuels such as biofuels and/or hydrogen. But because the technology is still emerging, focus within these areas should be on ensuring the settings are in place for rapid uptake once the technology is more readily available.

As a bonus, electrifying our fleet can bring economic benefits to New Zealand. Based on the Ministry for the Environment's marginal abatement cost curves and our Whakamana i Te Mauri Hiko analysis, we estimate that by accelerating the uptake of light EVs and continuing to progress the decarbonisation of heavy transport, we can reduce annual emissions by 2.1 Mt CO_2-e and generate net benefits to the economy of $0.6 billion in 2030. By 2035, annual emissions reductions increase to 6.1 Mt CO_2-e and net benefits to $1.6 billion.

We acknowledge that reducing the need to travel and shifting to alternative modes of transport will also play a role in a decarbonised transport sector. However even with material behaviour change, decarbonising our fleet will make significant progress to reducing our emissions. Our analysis of the Commission's 'Demonstration Path' scenario, as shown in Figure 10, finds that EVs can provide significant emissions reductions in light vehicles, equivalent to 3.8 Mt CO2-e by 2035, or 46% of the abated emissions. This is slightly more than behaviour change, like switching to public transport or travelling less, which can achieve 3.6 Mt CO2-e or 44% reduction by 2035.

Figure 10: Composition of light passenger transport emissions reductions based on the Commission's 'Demonstration Path' scenario



Source: Transpower analysis of Commission data.

This is a project to bring forward a social change

Left to current market and policy settings, purchase price economics will likely favour EVs towards the end of this decade and mass EV adoption will follow. But this will be too late to meet our 2030 Paris Agreement commitments.

Light passenger EVs are now readily available, with nearly 50 battery EV and plug in hybrid EV models already on our roads, with more expected as vehicle manufacturers are already shifting their businesses to meet the higher EV demand.

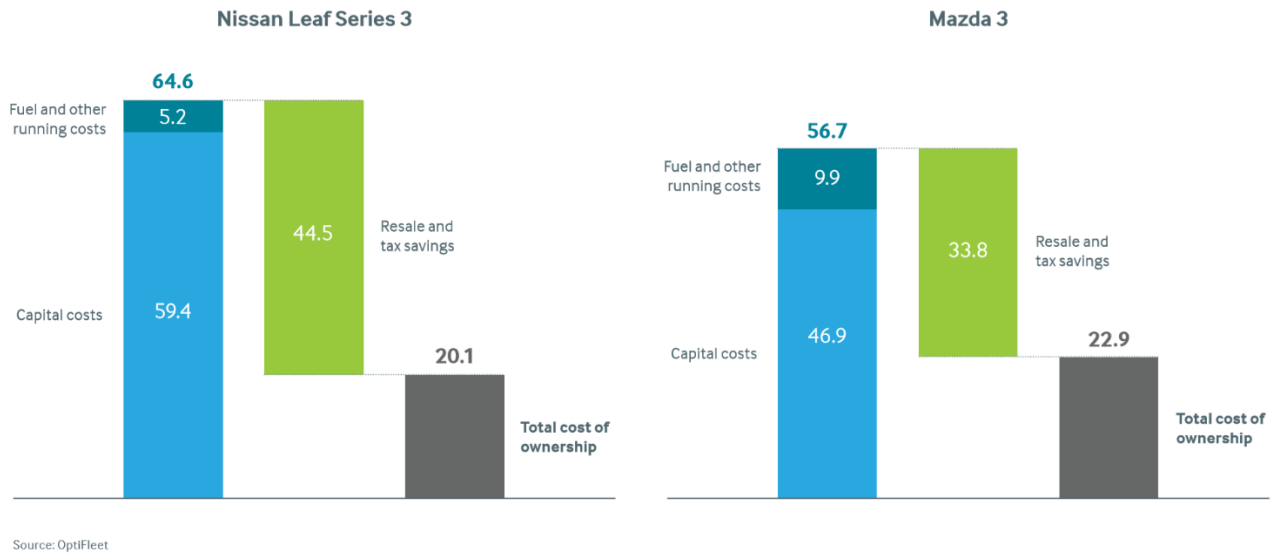
In the Electrification Roadmap, we found that under a business-as-usual scenario, EV uptake is likely to begin to accelerate around 2023 as TCO parity is reached for most EVs, driving state sector and large business fleets to begin to electrify. Uptake will then further accelerate markedly around 2028

when sticker price parity is reached for most EVs, driving the small businesses and households who prefer new cars to electrify.

However, as most private car sales in New Zealand are second-hand, under a business-as-usual scenario, EV uptake will only become significant when the average second-hand car sticker price is affordable to the average household, which could take up to ten years. Cars bought new by fleets today will only become affordable for the average household between 2025 and 2030.

The key for light electric vehicles is that on a total cost of ownership (TCO) basis, the economics are such that EVs will become cheaper to own within the next five years, driven by cheaper running costs which offset the high EV sticker price – the cost to charge an EV is equivalent to an average of $0.40 per litre, compared to an average of $2.00 per litre of petrol. For fleet owners that have the ability to buy in bulk and have access to low cost capital, EVs can already have lower TCOs than similar petrol vehicles.

Figure 11: Example of total cost of ownership comparison ($ 000s)



Note: Corporate buyer, three-year ownership term, no fringe benefit taxes

But even when TCO parity is reached, consumers will not immediately move to buying EVs due to their high up-front capital costs, which today can range anywhere between 30-50% higher than their petrol/diesel equivalents. For some, the rationale will be not having access to the capital required to cover the sticker price. For others, 'hyperbolic discounting' will be an issue, which is the tendency for people to put disproportionate weighting on nearer term costs/benefits even if the lifetime benefits significantly outweigh the costs.

Until purchase price parity is reached, the higher up-front capital cost of EVs will be the greatest barrier for adoption, even when the total cost to own an EV will be significantly lower for most of the 2020s. This is the single most important policy question for accelerating EV adoption in the transport sector in the 2020s: where EVs offer total savings for consumers, businesses, the economy and our climate, but the up-front purchasing cost is a barrier, how can policy overcome this? Other barriers to EV adoption include 'range anxiety' which is quickly being overcome by improvements in battery technology and increasing availability of public chargers.

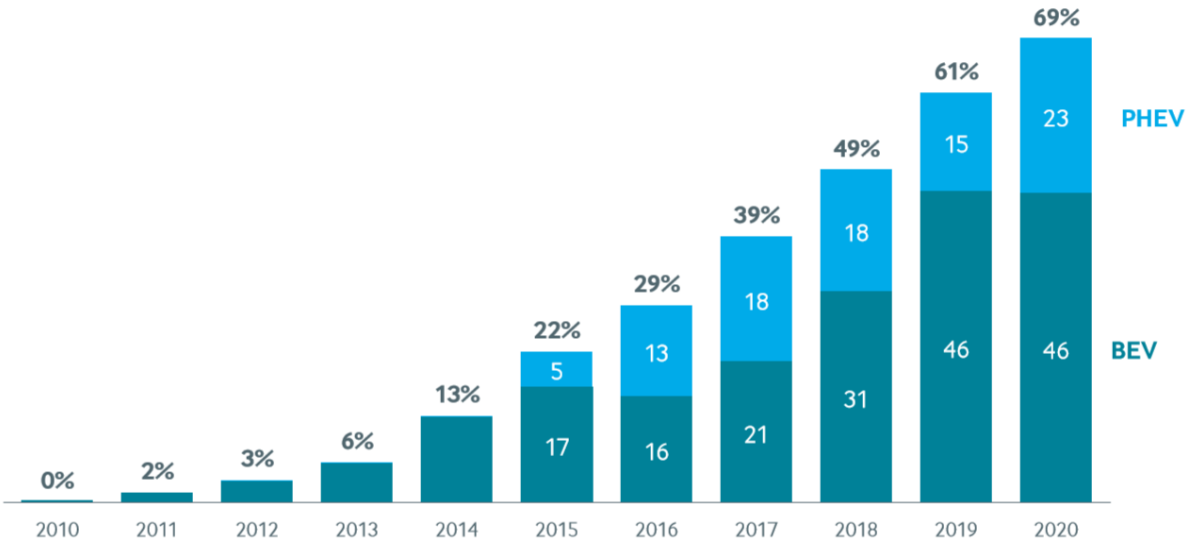
These barriers are likely to be overcome in time through technological developments and natural economics, however not at a pace we need if New Zealand is to meet its carbon targets.

Bringing this social change forward can be done

The good thing is that jurisdictions overseas have proven that a rapid uptake of EVs is possible with the support of a framework of policy, regulation and incentives.

Norway leads the world in the scale and speed of EV uptake. In 2020, EVs made up almost 70% of new car sales, up from less than one per cent in 2010. This rapid growth has been enabled by a suite of interventions.

Figure 12: Percentage of new Norwegian cars that are EVs



Source: Inside EVs, World Economic Forum, European Alternative Fuels Observatory

For a country fuelled mostly by hydroelectricity (much like New Zealand) it has made environmental sense for Norway's transport fleet to rapidly electrify, and the Government has had incentives in place since the 1990s. Back then, the Norwegian Government introduced a temporary, and later permanent, exemption from Norway's vehicle purchase tax, making the price of EVs fall below that of petrol- and diesel-powered vehicles. Since then, EVs have been given the right to park for free in some municipal car parks, drive in bus lanes, take ferries without a ticket and drive toll-free. Norwegian EV users are not required to pay VAT on their cars, or road tax, and company EVs are taxed at a lower rate than petrol or diesel-powered vehicles.

It is worth noting that if New Zealand were to adopt similar EV policies to Norway, we could improve on these policies by having a stronger focus on distributional equity impacts. Because Norway has an exemption for EVs for its vehicle purchase tax this provides increasing cost relief as the car becomes more expensive. This is economically regressive and disproportionately impacts less well-off consumers. The feebate proposed by the Productivity Commission is a good example of a policy that would achieve the same outcomes as Norway's policy but with a much fairer outcome in terms of

distributional impacts. As the rebate for EVs would be flat, it would ensure that the lower the cost of the car, the greater the percentage of upfront cost relief for the EV.

Other countries are also ramping up their efforts with the formation of the Zero Emissions Vehicles Transition Council by the UK COP26 in November 2020, which aims to strengthen cooperation between governments and large automotive markets. The council is made up of Ministers and representatives from California, Canada, Denmark, European Commission, France, India, Italy, Japan, Mexico, Netherlands, Norway, Spain, South Korea and Sweden, the United Kingdom.

Similarly, in February 2021, the World Economic Forum launched the Zero Emissions Urban Fleets network, a forum for public and private actors to sync and synergize related global initiatives. The group's focus for 2021 is to place European city actors on a path to achieve 50% and 100% electrification by 2025 and 2030 respectively.

What is encouraging is that investment in EV enabling interventions, which comes at an initial cost to the economy, does not need to be sustained out to 2035. Norway has already begun winding back their support as natural economics has taken over, and we can expect other countries who are well on their way to electrifying their fleet to do the same.

Left to its own devices, rapidly improving economics will eventually deliver the switch from fossil fuels to clean energy in transport. Under current conditions, mass adoption of EVs in New Zealand is likely to occur around the end of this decade. That will be too late, however, for New Zealand to realise the economic benefits of decarbonisation and meet our Paris commitments.

Each year of delay in electrifying transport will increase New Zealand's cumulative emissions and transport costs by 1% and $1 billion respectively to 2050.

What is needed now is a kick start to accelerate electrification of transport. With clear, transitional policy and market settings in place in 2021 that specifically target the high upfront capital cost of EVs and getting supply of EVs into New Zealand, we can bring forward mass adoption of EVs by five years to around 2025 and begin wholesale transformation of our transport sector around the end of the decade.

This is an opportunity we cannot afford to miss. But we need to act now. In our Electrification Roadmap, we set out seven areas that need to be addressed together to enable the transport electrification we need to meet our emissions reductions targets. The first two areas are of particular importance:

- Improve immediate access and availability of EVs;
- Reduce up-front capital cost barriers and improve access to capital;
- Reduce operating cost barriers;
- Create behavioural incentives;
- Enable access to EV charging;
- Ensure uptake is supported by electricity infrastructure; and
- Support alternative fuels for heavy vehicle decarbonisation.

These recommendations align with those made by Commission and we will speak to these in more detail in the following sections. Specific policy measures are summarised in the table below:

Figure 13: Options for transport decarbonisation

Focus area	Options to accelerate transport electrification
 **Improve immediate access and availability of EVs**	• Implement the Government's proposed Clean Car Standard with long-term signals and regular reviews for progressively tightening standards • Automotive industry and Government work together with vehicle manufacturers and suppliers to increase EV supply into New Zealand Government and local government fleets as soon as possible • Strengthen economic incentives for commercial fleets to electrify • Set an import ban deadline on petrol and diesel-powered light vehicles to enable vehicle manufacturers, importers and dealers time to transition
 **Reduce up-front capital cost barriers, improve access to capital**	Implement solutions to overcome upfront capital cost barriers, for example: • The Ministry of Transport's Clean Car Discount (feebate scheme) • Low cost finance to spread out upfront capital cost of EVs. For example, through scaling up New Zealand Green Investment Finance funding • Business model innovation for alternative ownership models that address upfront capital costs. For example, fleet-as-a-service for corporates, car subscription services, car share pools, and transport-as-a-service for consumers • Developing corporate purchasing pools or car buyer clubs to drive purchasing scale to access discounts and to cut out intermediaries • Banks and traditional lenders to incentivise EV uptake through sustainability-linked lending, particularly to assist commercial fleets to electrify • EECA grants for heavy vehicle (hydrogen, biofuel and electric) proof of deployment
 **Reduce operating cost barriers**	Implement solutions to reduce operating costs, for example: • Extension of Road User Charge exemption • Fringe Benefit Tax exemption or reduction for corporate purchasers of EVs • Electricity market regulation to promote increased offering of peak/off-peak electricity pricing and targeted EV electricity offerings
 **Create behavioural incentives**	Implement behavioural incentives: • Use of transit lanes • Free or discounted parking • Preferential car parks in public and private carpark buildings • Free or discounted access to ferries
 **Enable access to electric vehicle charging**	Improve the availability and speed of public charging infrastructure: • Implement and incentivise widespread fast charging network expansion with government co-investment where required • Support rollout of on-street charging infrastructure for locations without off-street parking
 **Ensure uptake is supported by electricity infrastructure**	Ensure the electricity sector can enable electrified transport: • Implement standards for EV chargers to ensure that they are 'smart' and can provide services back to the electricity grid • Increase uptake by electricity networks of demand response in order to use EV batteries to effectively defer network investment • Drive collaboration between network owners and charging infrastructure owners • Upgrades to distribution and transmission networks to increase capacity when required • RMA reform to ensure that new renewable power plants and their transmission lines can built in step with increasing electricity demand
 **Support alternative fuels for heavy vehicle decarbonisation**	Ensure the heavy vehicle sector can decarbonise through: • Ensuring the development of fast charging heavy EV infrastructure • Clarify settings around Road User Charges for heavy vehicles • Support the development of green hydrogen supply chains, including refuelling infrastructure

Key policy interventions need to address the 'access' issue

In the Electrification Roadmap, we identified 'access' as one of the key barriers to EV uptake:

- New Zealand's access to global EV supply
- New Zealanders' access to EVs
- New Zealanders' access to EV charging

Below, we detail how different measures can address these barriers.

Ensuring New Zealand can access global EV supply

New Zealand is a small player in the global vehicle market. We currently have around 3.5 million passenger cars on our road, less than 1% of the 1.4 billion cars worldwide. For this reason, there is real potential for constrained supply of EVs into New Zealand, both new and second-hand, as other countries also move to electrify their transport systems. New Zealand must ensure that it is well positioned now to import enough EVs to meet what needs to be rapidly growing demand.

Globally, New Zealand needs to be a destination of choice for electric vehicle suppliers by providing the right incentives and market signals to only attract increasingly clean vehicles into the country. There are three key interventions that could help New Zealand achieve this:

- Implement the announced Clean Car Standard, which would require vehicle importers to bring in progressively more fuel efficient and electric vehicles. Without a form of regulation or policy intervention, by 2025 New Zealand's cars will produce twice the emissions levels of EU vehicles and the incentives on vehicle importers will remain inconsistent with our climate goals. The Clean Car Standard could outline a long-term pathway with targets becoming more stringent over time.

- Place a time limit on light vehicles with internal combustion engines (ICE) entering, being manufactured, or assembled in New Zealand.

  On the supply side, setting a ban date would signal to global car suppliers (both new and second hand) that New Zealand's demand for imported ICE vehicles will decline significantly while the demand for EVs is growing. In response, suppliers are then likely to begin shifting their business models and processes to ensure sufficient EV supply into the country by the ICE ban date, otherwise they risk losing a part of their business.

  On the demand side, a ban date signals to consumers that policy and infrastructure are transitioning to support EVs and are reducing support for ICE vehicles. This gives consumers the confidence to buy EVs ahead of the ban date, and also makes buying new ICE vehicles closer to the ban date more unattractive. A ban date will also deliver clear signals to developers of long-term infrastructure, like EV charger providers and network companies to invest in infrastructure that will enable EV uptake. Concept Consulting and Retyna's *Shifting Gear* study concludes that New Zealand could ban new entry of light ICE vehicles as early as 2032.

- Explore the potential to 'pool' or bulk purchase EVs, especially for government and commercial fleets, to enable purchasing savings. A bulk purchase would strengthen New Zealand's negotiating position and signal that there is a strong demand for electric vehicles.

Such interventions are not a world first and what's reassuring is that vehicle manufacturers are already shifting their businesses to meet the higher EV demand:

- Tesla intends to ramp up output from 499,550 in 2020 to 20 million annually by 2030
- General Motors plans to exclusively offer electric vehicles by 2035
- Ford intends to sell only electric vehicles in the European market by 2030
- Volvo will only make electric vehicles by 2030
- BYD, a Chinese EV manufacturer looking to enter the Australian and New Zealand markets, is targeting sales of 400,000 BEV/PHEVs in 2021

Ensuring New Zealanders can access EVs

Supply focused interventions will not be enough. New Zealanders also need to be encouraged to transition to EVs (where public or active modes are unattractive) to build local demand. Currently, even as the total cost of ownership of EVs are falling and are on track to save New Zealanders' money, the largest barrier to adoption is the high up-front cost of electric vehicles. Consumers either do not have access to the capital or exhibit 'hyperbolic discounting' which is the tendency to disproportionately weight decisions towards near term costs/benefits even if the lifetime benefits significantly outweigh the costs.

Therefore, to build local demand for EVs and help New Zealanders overcome the capital cost barrier, we recommend the following capital cost mechanisms:

- Implement the announced Clean Car Discount (feebate) scheme to bring down the upfront cost of an EV. US studies have shown that for every US$1,000 provided as an EV rebate there is a correlated 7.7% increase in EV sales. Point of sale schemes like the feebate scheme were shown to have the most effective impact on lifting sales. The feebate also has the additional benefit of disincentivising the purchase of ICE vehicles;
- Continue to explore potential new or extension of co-funding and grants such as EECA's Low Emissions Transport Fund, and low-cost loans such as via New Zealand Green Investment Finance that enable buyers to more easily spread out the payment of up-front capital costs;
- Also, as New Zealand's banks increasingly commit to sustainable finance and shifting away from fossil fuel exposure there are opportunities to develop new lending options for EV purchasers, thus improving access to capital and the upfront economics.

EV uptake rates would benefit from these interventions being in place immediately to encourage uptake while EVs still cost more than ICE equivalents. Once sticker price parity is met, then interventions can start to be wound back. We expect sticker price parity for most light vehicles to occur between 2025 and 2030. Consistent support through to the time of sticker price parity appears to be critical for fleet transformation. For example, the Chinese government cut EV incentives in July 2019, because it believed the costs of EVs had decreased sufficiently. However, this caused sales of hybrid and EVs to decline by 34% in September 2019 and 46% in October 2019.

An important consideration for creating access to EVs is the fact that most private passenger vehicle purchases in New Zealand are second hand. Therefore, much of the focus of the interventions described is to enable those who usually purchase newly imported vehicles (e.g. commercial fleet operators) to buy electric so that they feed into the second-hand market. This is how the second-hand ICE market already operates, so it is a matter of ensuring the new vehicles cycling through are EVs.

The government should target the electrification of government and commercial fleets to build demand for EVs in New Zealand. These fleet owners also tend to have lower up-front cost barriers due to the access to lower cost capital, the ability to access mechanisms that spread out upfront capital costs like competitive leasing arrangements and the ability to procure in bulk. Business and government fleets can also help raise public awareness and trust in EV technology by giving their drivers the experience of driving EVs. Brand association also boosts public perception of reliability.

Experience in Denmark has shown that if corporates are excluded from an initial incentive regime, fleet transition stagnates. Fringe Benefit Tax (FBT) reductions or exemptions could be particularly valuable in incentivising the uptake of electric vehicles by commercial fleets. As commercial fleets typically turn over their fleets every three to four years, this would be effective at seeding the second-hand EV market, improving EV access to consumers. While the FBT is technically an operating cost, a reduction in FBT can have similar economic effects to a reduction in the upfront capital costs for corporates who access vehicle leasing.

It will also be important to focus on how to stimulate the availability of affordable second-hand EVs for different uses (e.g. SUVs, wagons, utes, vans) and at different price points (e.g. three-year, five year, ten-year-old EVs) to ensure that different customers' needs and preferences can be met.

Ensuring New Zealanders can access charging

Accessible charging infrastructure will be a critical enabler for rapid uptake of EVs. We supported the Climate Change Commission's recommendation to develop a charging infrastructure plan for the rapid uptake of EVs and commend the Government for announcing the plan to have fast EV chargers every 75km along most state highways.

Two of the top three concerns for EV adoption, charging and range anxiety are addressed by an effective network of public and private charging options, with direct correlation shown internationally between EV adoption uptake increases and the number of chargers available per 100,000 people. We must invest in a sustained way in the charging infrastructure to be ready to enable what needs to be a wave of new EVs in New Zealand.

The plan should consider the differing roles of government, the private sector and individual EV owners. The government may not necessarily need to be responsible for the whole delivery of a nationwide charging infrastructure network, but rather could play an enabling role, or leverage partnerships with the private sector.

For a successful nationwide charging network, it is important that the different charging demand profiles and behaviours are understood, as these will have implications on the location of chargers, the different capacities required and the impact on the electricity system.

For example, everyday EV drivers are likely to plug in their vehicles when they get home in the evening and let them slow charge overnight, which may not require any new technology to the user but may have implications for the local distribution network. Other EV drivers may not have access to charging at home and will therefore require charging infrastructure close to home. Every now and then, an EV driver may go on a long trip such as from Auckland to Wellington and will require fast charging during a driving break.

Buses and heavy trucks have different charging behaviours. These vehicles usually have high utilisation and require fast charging at high capacities, which will have significant infrastructure needs and may require local electricity network upgrades. Smaller commercial vehicles may have lower utilisation and are able to charge at the workplace. Small numbers of vehicles at the workplace may not require a site upgrade for electrical capacity, but larger fleet operators may need to upgrade their electrical capacity.

Charging infrastructure for different charging needs is already emerging in New Zealand. For example, ChargeNet's charging network, hyper chargers, Tranzit's 450 kW, Wellington City Council's charging for those with no off-street parking. These are the types of infrastructure that will need to be ramped up to meet growing EV uptake.

Because a lot of EV charging happens at home or on site at a workplace, there also needs to be a component of the charging infrastructure plan that focuses on better enabling EV owners (both residential and commercial) to install and manage their own charging, especially as many have limited experience of interfacing with the electricity system.

Our interviews with commercial fleet owners revealed that there are still a number of information gaps across the installation process that result in sub-optimal solutions, unexpected additional costs and prolonged timelines. For example, during its heavy EV freighter trial, ALSCO discovered that a second charger needed to be installed to speed up truck charging. As this required a second charging station at each of the four locations, the sites unexpectedly needed to be upgraded to accommodate charging infrastructure. New Zealand Post underwent a similar exercise and shared their experience in the form of an EV charging installation guide. The recently released EV charging standards for commercial applications begins to address this information need.

Key to a fast and smooth installation of charging will be the building and sharing of planning knowledge and technical capability. Industry and government coordination across charger installers, suppliers, network operators, local government and landowners will be required.

The development of a national charging network will need to be in close co-ordination with the electricity sector. As discussed in the introduction of this report, a critical element of the charging network will be the electricity network's capability to support vehicle charging. Smart charging of EVs provides an opportunity for energy consumption to be shifted away from peaks and, in doing so, offers an opportunity to decarbonise our economy most affordably. If not managed carefully, non-smart EV charging has the potential to materially increase demand peaks in distribution networks and the grid, resulting in avoidable expense in the network infrastructure, the cost of which then falls on the end user.

Other policy incentives to drive uptake

There are other policies available that can further make the switch to EVs attractive for consumers. These are interventions that could lower the operating costs for EV owners, and in turn make the total cost of ownership more attractive (e.g. the existing road user charge exemption), or act as a behavioural incentive (e.g. free public parking). As discussed earlier, because of the nature of consumer decision making, up front capital costs will still be the largest barrier, therefore mechanisms to target capital cost barriers should be prioritised over operating cost barriers.

Norway is a good example of how such mechanisms have resulted in an increased uptake of electric vehicles. Since the 1990s, the Norwegian Government first introduced an exemption from Norway's vehicle purchase tax, making the price of EVs fall below that of petrol- and diesel-powered vehicles. They later introduced the right for EV owners to park for free in some municipal carparks, drive in bus lanes, take ferries without a ticket and drive toll-free. Norwegians are not required to pay VAT on their cars, or road tax, and company EVs are taxed at a lower rate than ICE equivalents. The suite of interventions has enabled an increase in share that EVs make of new vehicle purchases – from 2% in 2011 to 70% in 2020.

What is also evident in the Norway example, is that pricing mechanisms do not necessarily need to be permanent but can be rolled back over time once the costs of EVs come down. Norway has been incrementally phasing out interventions such as reduced company tax, free public parking and road toll exemptions without reversing any of the EV growth.

In New Zealand, one of the transformative operating cost opportunities is in the Fringe Benefit Tax on businesses. For businesses, reaching TCO parity is heavily dependent on the fringe benefit tax (FBT) regime. The FBT is currently a disincentive for commercial fleet conversions to EVs as the value of the FBT is proportionate to the capital cost of the vehicle. As the up-front capital cost of EVs is currently substantially more than for a petrol equivalent, the FBT perversely penalises an organisation for buying a cleaner vehicle. For many organisations, this FBT voids the economic case for EVs.

Similar issues exist overseas and have been addressed – for example, the United Kingdom introduced company tax incentives for EVs in 2020 that have improved the economic case for conversion to electric fleets. As the up-front capital cost of EVs continues to fall the UK intends to wind back the level of tax incentive.

Certainty around policy settings for FBT is now important in supporting the electrification of the light vehicle fleet as businesses account for a material proportion of New Zealand's annual new car registrations. Increased uptake of new EVs by businesses now will feed into the second-hand car market in time to provide greater variety and opportunities for household consumers to purchase used EVs.

Question 8: Public transport fleet

We support the key actions outlined in the report. Further electrification of the bus fleet and passenger rail will play a key role in transport decarbonisation, especially when New Zealand achieves significant mode shift.

We commend the mandate for local government to procure only electric buses by 2025, which will help accelerate clean public transport, however this needs to be supported with funding and technical capabilities. In our Electrification Roadmap, interviews with Tranzit suggest that it would be difficult to justify buying an electric bus without a road user charge exemption and/or co-funding from EECA's Low Emission Transport Fund.

Question 9: Domestic aviation emissions

We broadly support the need to investigate the use of sustainable aviation fuels, or electricity where possible, as well as improving aviation energy efficiency. Because of the large costs associated with building new infrastructure for upscaling alternative fuel solutions, the marginal cost of CO_2e abatement will be an important indicator of whether a solution should be pursued at a wide scale.

We note that there some short distance, smaller passenger planes that are already electrifying, and any policy to encourage aviation decarbonisation should support continued innovation in this space:

- ElectricAir is a Christchurch start-up that operates the Pipistrel Alpha Electro, a two seat aircraft manufactured in Europe which has a 90 minute flight time.
- Sounds Air is aiming to become the first regional airline in New Zealand to offer zero-emission flights, having signed a letter of intent to purchase electric planes from Sweden. These 19-seat planes are expected to be available for commercial flights in 2026.

Question 10-11: Freight supply chain, modes and fuels

We broadly support the need to increase the use of low carbon fuels to decarbonise trains, ships, heavy trucks and planes.

As stated earlier, because zero carbon 'heavier' transport (i.e. non-light transport) is still developing in technology, more costly to abate and accounts for only 20% of New Zealand's transport emissions, light vehicles should remain the top priority for electrification in the immediate future leading up to 2025.

Figure 14: Transport Marginal Abatement Cost Curve for 2030 - public benefit basis, Ministry for the Environment

That being said, 'heavier' transport decarbonisation efforts in the near-term should focus on ensuring the policy settings are configured such that the sector is able to transition in an efficient and timely manner once the technology is more readily available. We expect that some additional rail and some short distance trucking can and will be electrified.

Question 12: A Just Transition

We strongly support the need for a well-planned transition. Clear direction and a stable policy environment are vital for businesses to be confident in making long lived decisions about their assets and associated investments. The transition will also need to ensure New Zealanders can access good transport outcomes without being adversely affected in other areas of their lives.

In the Electrification Roadmap, we drew particular attention to the fact that while many New Zealand households will be able to afford an EV over the next ten years, lower income households are at risk of being left behind. This will have the perverse effect of increasing social and economic inequity because those who are last to electrify are also last to benefit from the savings gained from EVs. Achieving a just transition to a lower emissions future in which everyone in New Zealand can benefit will be a critically important measure of our decarbonisation success.

We must make sure that lower income households and other communities that may not have easy access to vehicles are supported to electrify as well. There is international precedent here that is worth our attention: work is being done around the world to co-design electrification and transport solutions with communities to provide transport security while addressing climate change. EV ride-

sharing programmes, electrified school transport options and multifamily domestic charging solutions are being developed in order for EVs to support a just transition to a low carbon future.

Part of the solution will be ensuring the second-hand market has sufficient volumes of low-cost electric vehicles. Second hand electric vehicles are expected to become affordable to the average household after ten years of ownership. Because of this lag time it is important that New Zealand begins seeding a diverse and liquid second hand EV market immediately by accelerating the uptake of new EVs now. Fleet owners such as the government and businesses are best placed to begin this transition due to their tendency to purchase vehicles based on the total cost of ownership rather than upfront costs. As TCO parity between EVs and ICE vehicles is already being met in some instances, and is imminent in others, the transition can begin now.

With energy bills making up a material proportion of living costs, it is lower income households that are positioned to benefit the most from lower energy costs associated with electrification of transport. By 2035, we estimate that a two-car household with two EVs will halve their annual total energy bill.

There is also a significant opportunity to reduce electricity costs for all electricity consumers across New Zealand. An important concept to understand is that both transmission and distribution networks are built to meet peak demand capacity. Network costs are driven by the capacity (MW) of the infrastructure, but consumers are often charged by their retailer on a usage ($/MWh) basis. Therefore, if peak demand is maintained but energy consumption grows (i.e. more electricity is used to charge EVs during the off-peak period), then network charges to all electricity consumers, not just EV users, can be reduced on a per unit basis.

Question 13: Four potential pathways

Four pathways have been presented by the Ministry to illustrate how varying the level focus between the levers might collectively decrease emissions from New Zealand's transport system. We have two key concerns with the pathway outcomes.

Firstly, Pathway 4 is the only pathway that demonstrates an emissions trajectory that meets the emission reduction required by the Commission's emissions budgets. The remaining three pathways fall short of the emissions reductions required. We think it is only acceptable to pursue a pathway that can bring New Zealand's transport emissions down in line with the expert advice provided by the Commission. Ignoring this expert advice would be requiring other sectors (e.g. agriculture) to make deeper emissions cuts than recommended by the Commission.

Secondly, we believe that the balance of reductions weighs too heavily on behaviour change and mode shift and significantly underestimates the impact that electrification of the light and heavy fleet can have on emissions.

In its final advice, the Commission's Demonstration Path still sees electric vehicles making up 36% of the light vehicle fleet by 2035 (a reduction from 41% in its draft advice). This is significantly higher than the 20-27% proposed in the Ministry's pathways. Our own Whakamana i Te Mauri Hiko modelling is consistent with the Commission's modelling.

Furthermore, the Commission's modelling shows that even in the scenarios with the most ambitious behaviour change, total light vehicle travel is still higher in 2035 compared to 2018-2019 levels. In 2035, there is a ~20% reduction in light vehicle travel relative to the current policy reference case due to behaviour change which is half of what is modelled in Pathway 4. We think this is more realistic because of the time it takes to deliver the infrastructure required to materially shift travel behaviours.

By underplaying the potential of electrification, we risk not putting in strong enough policy settings to encourage EV uptake and therefore risk our ability to achieve a net zero carbon transport system by 2050. Ambitious electrification of transport also mitigates the risk of vehicle kilometre travelled reductions not materialising as much as envisaged.

Figure 15: Vehicle-kilometres travelled by light vehicles

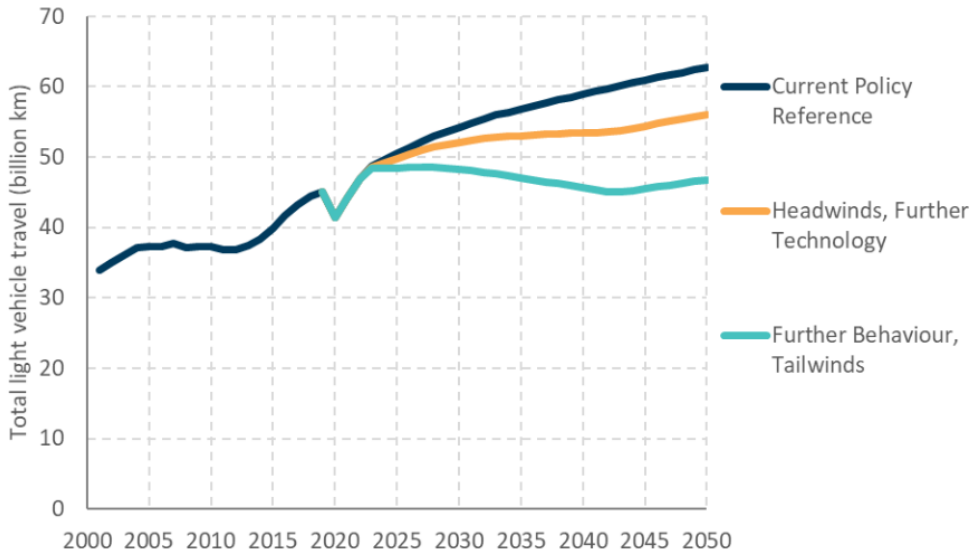


Figure 12.13: Vehicle-kilometres travelled by light vehicles

Source: Commission analysis

New Zealand needs to pursue a pathway that weights all of 'avoid', 'shift' and 'improve' as high or very high. This is the ambition required to kickstart transport decarbonisation across the system.

By tackling the issue from all fronts, we reduce the risk of failing to meet our emissions targets if one fails – for example, if we are not able to reach the required vehicle kilometres travelled reduction from mode shift, then strong EV policy can ensure that emissions reductions are achieved. Conversely, if New Zealand is unsuccessful in securing all of the modelled EV supply then strong urban form and transport policy can ensure reductions are achieved through travel reduction or mode shift.

Because of the challenges around achieving a fundamental shift in how people and goods travel around the country and uncertainty surrounding the EV supply market – we need to be making

efforts on all fronts today. Policy measures can be wound back should we find ourselves in a fortunate position in the future where we are ahead of the track towards a net zero transport system.

Question 14: First emissions budget policies

We support the policies proposed in the first emissions budget.

One area that is currently not addressed by the proposed policies is the end of life of EV batteries. EV batteries typically need replacing every 5-8 years, which means that if we begin to accelerate EV uptake now, then in 5-8 years, we will start seeing a wave of batteries requiring replacement. The absence of strong policy or market incentives for battery reuse or recycling may lead to these batteries being sent to landfill.

In our submission to the Climate Change Commission, we supported the need to develop EV battery refurbishments, collection and recycling systems to support sustainable electrification of the light (and later heavy) vehicle fleet. The Ministry should consider what kinds of policy could be implemented in the first emissions budget such that by the second emissions budget, New Zealand's EV battery reuse and recycling system is equipped to handle the first large wave of EV batteries coming up to replacement.

TRANSPOWER