



'electrifying'

How government fleets can use new technology to drive EV adoption

An analysis of the benefits of car-share to complement the New Zealand Government's commitment to electric vehicle adoption and the flow-on effects of non-traditional attitudes towards transport.

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Preface

In December of 2020, the New Zealand Government made a commitment to a one to one transition of its fleet from internal combustion engine (ICE) vehicles to battery-powered electric vehicles (BEV). You can find the statement from Labour below¹ (and more in appendix 1*).

"We will also require some Government agencies to purchase electric vehicles for their fleets, and decrease the number of vehicles in the Government fleet."

We believe more can be done.

In this paper, we draw on local insights to highlight the benefits of car-sharing in the context of Aotearoa New Zealand. We will use this research to provide solutions that will have a positive impact on Kiwis environmentally, socially, and economically.

As we move into the 2020s, we must focus on building futuristic cities and communities, designed to last far beyond our lifetime. This includes diverse, robust, and equitable transport systems, divorced from the traditional norms we've adopted and continued over the last 135 years, since the original advent of the motorised carriage.

Climate change has been described as this generation's 'nuclear-free moment'² and implementing bold changes to our transportation system should have the same effect on our reputation as a clean green nation. However, we do not believe this policy is as radical as critics may try to make it sound. We instead believe this is simply an evidence-based approach, using technology available today, and acting with the haste and care required to address the climate crisis.

**We'd love to hear your thoughts, or if you have any questions,
please don't hesitate to get in touch with us: founders@mevo.co.nz**

1 New Zealand Labour Party, New Zealand declares climate emergency. NZ Labour Party, January 26 2021, <https://www.labour.org.nz/news-climate-emergency>

2 Amanda Larsson, Jacinda Ardern's 'Nuclear-Free Moment': Here's three things that would make it a reality, Greenpeace, February 2021, <https://www.greenpeace.org/new-zealand/story/jacinda-arderns-nuclear-free-moment-heres-three-things-that-would-make-it-a-reality/>

Summary

We have analysed New Zealand's existing (predominantly ICE) government fleet and its carbon impact. We have also further investigated the potential outcome of a full transition to BEVs, and finally, outline what a mixed-use fleet (serving both the public and private sectors) could look like. This mixed-use fleet model could be used by corporate fleets as well and will ultimately impact how Kiwis view private car ownership as a whole.

While reducing carbon emissions is one of our end goals here, we also must consider that transport itself needs to fundamentally change to support this. We are confident in our ideals that the fewer cars on the road, the better off we will be, which is why we look towards a solution that reduces overall cars as well as using BEVs where necessary.

We have found that by switching government fleets to a mixed-use model with the help of a third-party provider we save money, emissions, and stress on the behalf of the government workers trying to implement these electrification targets. You can find the potential carbon savings below, as well as our methodology and explainers on the transportation research we've relied upon.

Our modern alternative option can be adopted in a bottom-up as well as top-down fashion, allowing individual government employees to drive the change in our transport system, alongside CEOs, CFOs, procurement and fleet managers.

Potential CO₂ Emissions

16,000 vehicle NZ Government Fleet, over three years

Internal Combustion Engine vehicles (status quo)

269,872 tonnes

One for one Battery Electric Vehicle replacement (planned)

154,384 tonnes

43% reduction

30% fleet size reduction, BEV replacement, EV Car Share

76,976 tonnes

72% reduction

- 50,000 100,000 150,000 200,000 250,000 300,000

Car Ownership in New Zealand



highest rate of car ownership in the world

New Zealanders have a love affair with cars and private vehicle ownership. So much so that our country has one of the highest rates of private car ownership in the world of 802 light vehicles per 1,000 people in 2018³. This is primarily made up of internal combustion engine vehicles which release emissions into our atmosphere, further adding to the current climate crisis. An average passenger car emits approximately 4.6 metric tons of carbon dioxide each year⁴, without accounting for the carbon emissions to manufacture these vehicles.

Nearly all of New Zealand's transport is fuelled by crude oil, accounting for 21% of our country's total emissions, while less than 1% of this transport is powered by renewable energy⁵. While light passenger vehicles are considered less harmful to our environment than heavier transport options (often powered by diesel) the electric vehicle technology we have available could still be utilised to represent a significant CO₂ reduction.

As of 1 November 2020, there was a combined total of 23,046 new and used EVs on NZ roads – and we saw an increase of 1,187 new EV sales since December 2019⁶. This number is well short of the 2016 commitment New Zealand's Cabinet made to reach 64,000 electric vehicles on our roads by the end of 2021⁷.

3 Carolin Haenfling, Average age of vehicle fleet [Factsheet], Wellington: Environmental Health Intelligence Programme, Massey University, February 2021, https://www.ehinz.ac.nz/assets/Factsheets/Released_2020/NumberMotorVehicles_released022020.pdf

4 United States Environmental Protection Agency, Greenhouse Gas Emissions from a Typical Passenger Vehicle, United States Environmental Protection Agency, February 2021, <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

5 Energy Efficiency and Conservation Authority, Transport Fuel, Energy Efficiency and Conservation Authority, February 2021, <https://www.eeca.govt.nz/why-energy-matters/energy-opportunities/transport-fuel/>

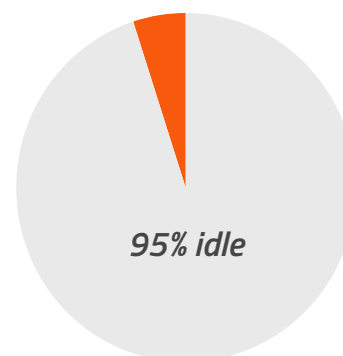
6 AA Motoring, AA Charged: What happened in 2020, and what will 2021 bring?, AA Motoring, February 2021, <https://www.aa.co.nz/cars/motoring-blog/aa-charged-what-happened-in-2020-and-what-will-2021-bring/#:~:text=As%20of%201%20November%202020,EV%20sales%20since%20December%202019>

7 Ministry of Transport, Te Hōtaka mō ngā Waka Hiko - Electric Vehicles Programme, Ministry of Transport, January 2021, <https://www.transport.govt.nz/area-of-interest/environment-and-climate-change/electric-vehicles-programme/#:~:text=Programme%20announced,by%20the%20end%20of%202021>

Traditional Attitudes

The way we own cars is extremely inefficient - most cars spend 95% of their lifetime parked⁸. However, people insist on paying a premium price for car ownership including petrol, engine maintenance, and insurance. Many peoples' private car will be their second-largest purchase after their home.

The average car is in use just 5% of the time



Not only are these vehicles inefficient in terms of usage, but New Zealand cars depreciate massively in value compared with the rest of the world. 2017 research shows that Kiwi cars with an average odometer 14,000 km per year will have depreciated by 53.67 per cent on their recommended retail prices the year they were sold⁹. This depreciation ranks higher than the United Kingdom, the United States, and Switzerland.

In addition to the costs outlined above, the cost of petrol has exponentially increased and drawn the ire of many New Zealanders. Our pre-tax fuel prices are among the highest in the OECD and have outstripped many countries in their exponential growth since 2010¹⁰.

Continued investments in roading and parking have only exacerbated the issue by continuing to promote widespread private car ownership as the default way to get around. The cost to local businesses of lost productivity resulting from congestion in Auckland alone is estimated to be over \$2bn every year¹¹.

As a nation, we have many other transport options beyond private vehicles. With public transport such as buses, trains and ferries; taxi alternatives such as Uber and Ola; car-share; and active transportation such as walking, scootering and cycling - we have more options than ever before with a lower cost of entry than private car ownership.

However, these options have failed to move the needle in reducing our emissions and

8 David Z. Morris, Today's Cars Are Parked 95% of the Time, Fortune, February 2021, <https://fortune.com/2016/03/13/cars-parked-95-percent-of-time/>

9 Rob Maetzig, New Zealand has highest car depreciation rate in the world, says study, Stuff.co.nz, February 2021, <https://www.stuff.co.nz/motoring/news/89145417/new-zealand-has-highest-car-depreciation-rate-in-the-world-says-study>

10 Commerce Commission New Zealand, Market study into retail fuel, Commerce Commission, February 2021, <https://comcom.govt.nz/about-us/our-role/competition-studies/fuel-market-study?target=documents&root=109412>

11 Karen Rutherford, Auckland congestion costing businesses \$2 billion a year, Newshub, February 2021, <https://www.newshub.co.nz/home/money/2018/03/auckland-congestion-costing-businesses-2-billion-a-year.html>

more can be done to find solutions to minimise car ownership. New Zealanders are locked into a cycle of vehicle ownership and many associated environmental indicators are moving in the wrong direction. For every electric car bought in New Zealand in 2018, kiwis bought 64 mostly-diesel double cab utes¹².

The latest data from the Environmental Health Indicators New Zealand (EHINZ) revealed that collectively, New Zealanders spent an average of 150.4 million hours travelling to work every year. Almost three quarters (73.5%) of all commuting time was as a driver of a private vehicle, and 6.4% was a passenger in a private vehicle¹³.

This percentage is significant when compared with pedestrian travel (9.2%), public transport (6.5%) and bicycle travel (2.1%). However, we have seen that the appetite for multi-modal transport is there with Auckland Lime users taking more than 2 million trips within a year of Lime's launch¹⁴. This diverse transport profile primarily applies to condensed, inner-city areas since public and active transport in rural parts of New Zealand is not yet fit for purpose.

Under-investment in public transport is compounded by our private car obsession; why take the bus to work if it's expensive, infrequent, and crowded, when you already own a car? Conversely, high rates of private car ownership make the case for public transport investment difficult if nobody is riding it. Solutions are needed that provide a true alternative to private car ownership, without the sunk-cost effects of actually owning a car; that is, that driving it for all your journeys comes at a low perceived cost.

Encouraging Kiwis to rely on multi-modal transport and getting rid of individually owned private vehicles as the default standard will have a positive impact on our emissions profile and the health of every day New Zealanders. Continued investment in public transport, cycling and walking infrastructure must be paired with creative solutions to provide access without ownership to private cars for when it's required.

Almost **80%** of New Zealand's commuting is as the driver or passenger of a private car



12 Bernard Hickey, NZ's addiction to double-cab utes is going to make carbon neutral by 2050 impossible, The Spinoff, February 2021, <https://thespinoff.co.nz/business/04-11-2018/nz-has-a-double-cab-ute-addiction-and-its-killing-our-climate/>

13 Patrick Hipgrave, Commuting time by mode of transport. [Factsheet], Wellington: Environmental Health Intelligence Programme, Massey University, February 2021, <https://www.ehinz.ac.nz/indicators/transport/main-mode-of-transport-to-work/>

14 Laine Moger, Lime e-scooters one year on: More than two million trips in the first year, more to come, Stuff.co.nz, February 2021, <https://www.stuff.co.nz/auckland/116493077/lime-escooters-one-year-on-more-than-two-million-trips-in-the-first-year-more-to-come>

Our Existing Government Fleet

New Zealand's Government agencies currently have a fleet of approximately 16,000 vehicles, the majority of which use internal combustion engines. While accurate usage information from our government fleets isn't readily available, we estimate from our analysis that much like private vehicles, the government fleet is likely only being used 5% of the time.

While many departments may report an internal utilisation of around 20-30%, typically this is measured as a percentage of office hours - excluding evenings and weekends, when the vehicles are parked. Across a whole week, this results in a real utilisation of 5-7% - not materially better than the average car. This is a result of a lack of alternative options for peak use times, meaning fleets must be procured with extra capacity.

In the below example, we examine low carbon transition options in a fictitious scenario of a government department with a fleet composed of 100 vehicles. This fleet uses only ICE vehicles, in line with the most recent government fleet findings where electric vehicles made up less than one per cent¹⁵. We use hypothetical data which mimics the data we would find when doing an emissions audit on any government department (data sources and carbon equivalents can be found in *Appendix 2).

Current state emissions of an ICE fleet

The department has data which shows that 40 of their fleet cars travel 20,000km per year, 30 cars travel 15,000km per year, and 30 cars travel 10,000km per year. It will retain its fleet for three years before rolling it over. Additionally, the department spends approximately \$1.5m per year on taxis, travelling around 500,000km, and the same distance again in rental cars.

We calculate the department's total travel distance over a three-year period:

Source	Quantity	Km/Year	Years	Total (km)
Fleet Car	40	20,000	3	2,400,000
Fleet Car	30	15,000	3	1,350,000
Fleet Car	30	10,000	3	900,000
Taxi Travel	1	500,000	3	1,500,000
Rental Car Travel	1	500,000	3	1,500,000

¹⁵ New Zealand Government Procurement, Reducing government fleet emissions, New Zealand Government Procurement, February 2021, <https://www.procurement.govt.nz/broader-outcomes/reducing-emissions-and-waste/reducing-government-fleet-emissions/>

And subsequently the total carbon emissions over the three-year period, including 20% of the vehicles' built carbon cost, based on a 15-year average lifespan:

Source	Unit	Quantity	kg CO ₂ -e/unit	Total CO ₂ -e (t)
Fleet Cars	Car	100	1,315	131.5
Fleet Car Travel	Km	4,650,000	0.198	920.7
Taxi Travel	Km	1,500,000	0.225	337.5
Rental Car Travel	Km	1,500,000	0.198	297.0
			Total (t)	1686.7

Current carbon impact

We see that if this department continued in a business as usual scenario with its combustion-engine fleet, it would emit a total of **1,686.7t** CO₂-e over the next three years, made up of **131.5t** of built emissions from its fleet vehicles, and **1,555.2t** of operating emissions from its fleet, taxi, and rental car travel.

An analysis of a 1:1 switch

While switching our fleets from ICE to BEVs is a great first step, this government commitment also represents a huge opportunity for world-leading change. A one to one transition will rob us of the chance to fundamentally shift our attitudes towards vehicle ownership, especially with one of the highest rates of private vehicle ownership per capita in the OECD.

To understand the effects of a fully BEV government fleet, we must look at the emissions we are likely to save. It is important to remember that the aim of these measures is to meet New Zealand's national targets under the Paris Climate Accord¹⁶.

Estimated EV fleet emissions

If the department replaces its ICE cars with BEVs, it can reduce its emissions substantially. While BEVs have no tailpipe emissions, we include carbon as a result of electricity generation and delivery, and, as with our ICE example, 20% of the vehicle's built carbon cost (accounting for 3 years of an average vehicle's 15-year life).

The department selects the Hyundai Ioniq as it's preferred vehicle - a mid-range, battery-electric vehicle with more than 300km range from each charge.

¹⁶ Ministry for the Environment, About New Zealand's emissions reduction targets, Ministry for the Environment, February 2021, <https://www.mfe.govt.nz/climate-change/climate-change-and-government/emissions-reduction-targets/about-our-emissions#:~:text=New%20Zealand's%20target%20under%20the,levels%20for%20that%20same%20period.&text=Find%20out%20more%20about%20the%20Paris%20Agreement>

If the department changes only the model of its fleet cars to BEV, we can calculate the emissions over a three-year period below:

Source	Unit	Quantity	kg CO ₂ -e/unit	Total CO ₂ -e (t)
Fleet EVs	Car	100	2,141	214.1
Fleet EV Travel	Km	4,650,000	0.025	116.3
Taxi Travel	Km	1,500,000	0.225	337.5
Rental Car Travel	Km	1,500,000	0.198	297.0
			Total (t)	964.9

The potential impact of a fully-EV fleet

We see that by making the switch to EVs, this department emits a total of **964.9t** CO₂-e, made up of **~214t** of built emissions from its fleet vehicles, and **~750t** of operating emissions from its fleet, taxi, and rental car travel.

Our example department has reduced its ground transport emissions by almost **43%** by making this change, avoiding around **720t** of CO₂-e emissions over a three-year period. While its operating emissions have reduced by just over 50%, the built emissions of their new EVs are higher than the ICE vehicles they replaced.

Further emission reductions are possible as taxi and rental car suppliers make the move to BEVs over time.

Cost to facilitate this transition:

One thing to be aware of is the cost of installing electric vehicle chargers in government buildings, and the administration this kind of undertaking can bring. In this scenario, the government department has installed 100 EV charging stations to facilitate this transition, at a cost of between \$10,000-20,000 each (\$1-2m project cost), on top of the approximate incremental \$1.5m on the purchase of the BEV vehicles.

Positive impacts of free-floating car share

Free-floating car-share is a concept that has existed in Wellington since 2018. This model of transport allows users to rent a car for as little time as they like for a fixed minute, hourly, or daily rate. The cars can be returned anywhere within a large area of the city, in nearly any council parking space, allowing users to leave cars behind for others to use, and limiting the amount of time these cars spend idle. Users can also use these cars for trips from the CBD to the airport and vice versa, which is ideal for travellers who only need a car for a short amount of time.

The pricing of a free-floating car-share includes all operating costs and admin involved with insurance, recharging (or fuelling for hybrids), and parking. Within a given city, the vehicles can usually be found within a short walk, and the positioning of cars is actively managed by the provider to position them close to businesses who are using them.

Research from the Wellington City Council has shown that for each free-floating car-share vehicle that is available, approximately 11 private cars are taken off the road¹⁷, reducing traffic congestion and emissions. This is possible because free-floating shared cars are frequently in use over 30% of the time - or around 8 hours per day - taking 3-5+ trips from as many different drivers in this time.

Our solution - reducing the size of the government fleet and incorporating a third party car-share manager

Government departments could save money, reduce emissions, and streamline many of their operations by adopting any of the following approaches:

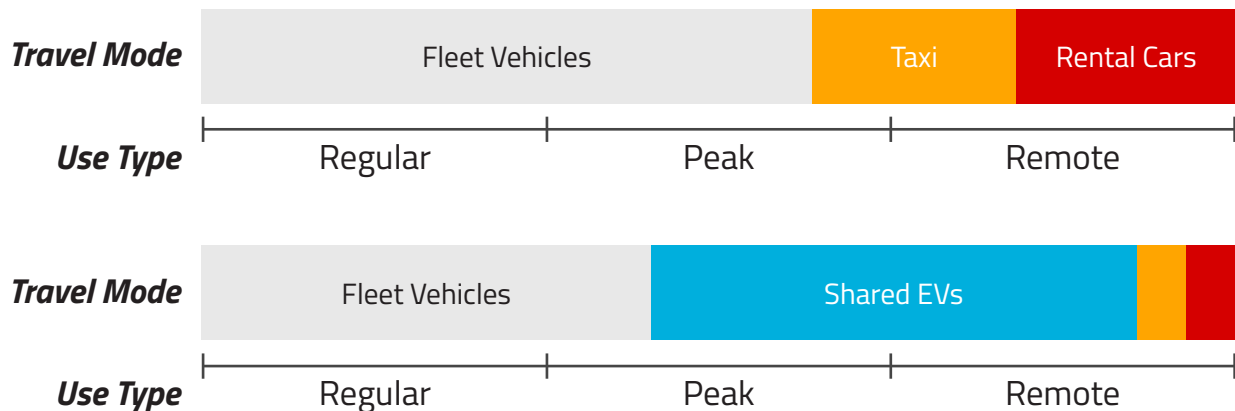
1. Downsizing fleets as they move to electric vehicles, supplementing the delta with access to a free-floating EV car-share. The magnitude of any Government Department fleet downsizing should depend on the relevant use case, and heavier downsizing can be performed over time as existing vehicles reach end-of-life.
2. Adopting EV car sharing to replace some portion of their taxi and/or rental car spend, and accessing immediate cost savings of up to 30%.
3. Installing technology into their remaining fleet vehicles to allow for app-based access, live battery level monitoring, and detailed usage statistics. By aligning their vehicle technology supplier with their shared EV supplier, departments can additionally benefit from a shared user experience across their fleet.

17 Wellington City Council, Car share schemes driving force for eco-city status, Wellington City Council, February 2021, <https://wellington.govt.nz/news-and-events/news-and-information/news/2020/09/car-share-schemes>

For our fictitious government department, we can broadly categorise three types of vehicle use when analysing a potential transition:

- **Regular use** is composed of trips that occur on a repeated basis and can be forecast well ahead of time e.g. quarterly site visits.
- **Peak use** is composed of trips that are sporadic and can't be well forecast e.g. supplier or client meetings.
- **Remote use** covers trips that can't usually be done in a fleet car, e.g. city to airport (taxi) or travel in a different city (rental car).

The chart below shows an example before and after comparison of adopting a shared EV solution to supplement lower-used fleet vehicles, and replace most taxi and rental car travel.



We can observe several key benefits of this approach:

- Immediate cost savings of ~30% from reduced taxi spend
- Comparable costs for rental car replacement, while maintaining a single supplier and user experience
- An approximate 30% smaller required fleet base, delivering savings both in the capital and operating cost from fewer required parking spaces and less management overhead

Additionally, if the incoming fleet EVs are fitted with new technology, multiple benefits can mitigate fleet electrification challenges:

Driver experience

- App-based booking and lock/unlock for fleet EVs.
- Single interface and user-experience for a majority of vehicle use (fleet and shared EVs).
- EV route planning including charging station stops, live battery levels, and instructional information on charging the selected EV.

Battery management

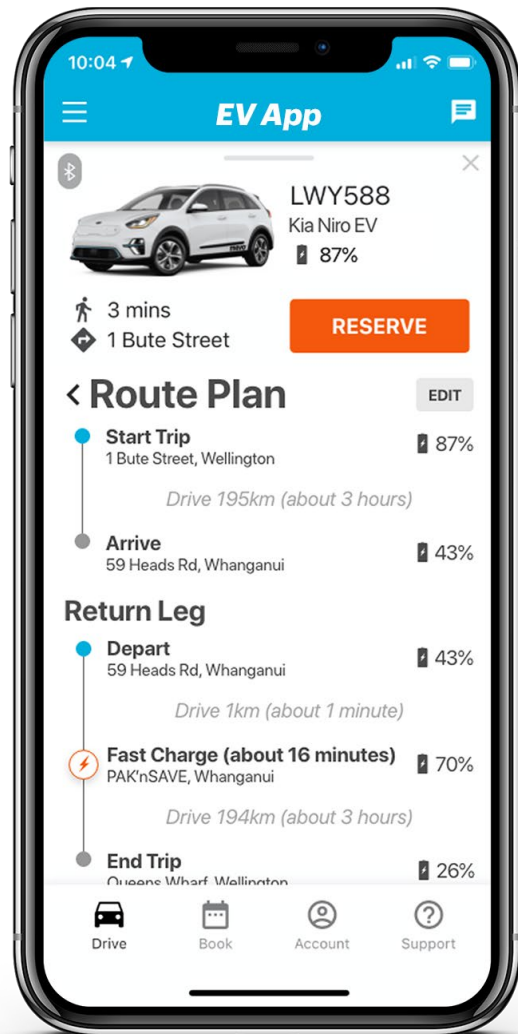
- Live battery readouts of fleet vehicles, and whether they are plugged in and charging.
- Allocation of drivers to vehicles based on the planned route and current charge level.
- Automatic scheduling of charging time between trips, based on projected use and battery level.

Charging station installation

Optionally, departments could choose to leverage third-party ground operations teams to manage some or all of their operational needs, resulting in:

- Fewer or no charging stations needing to be installed (EV charging managed off-site).
- Monitoring and management of onsite charging stations (ensuring vehicles are connected etc).
- Optional management of fleet EV cleanliness and servicing.

Government departments using travel booking platforms can also leverage this technology to present their fleet vehicles as travel options for appropriate trips. This presents additional opportunities for savings by redirecting travel that would have gone to a third-party on to internal assets.



Emission reductions from shared EVs

Our example government department decides to replace a portion of its fleet, taxi, and rental car use with shared EVs. Analysing its fleet data, it assesses that it can comfortably lose the 30 least-utilised fleet cars from its Wellington office building (30% of its fleet) and that 75% of its taxi and rental car use is able to be replaced by free-floating car-share in Wellington and Auckland.

While total travel distances remain unchanged, we can see the new distance from each source:

Source	Quantity	Km/Year	Years	Total (km)
Fleet EV	40	20,000	3	2,400,000
Fleet EV	30	15,000	3	1,350,000
Taxi Travel	1	125,000	3	375,000
Rental Car Travel	1	125,000	3	375,000
Shared EV (Fleet Replacement)	1	300,000	3	900,000
Shared EV (Taxi Replacement)	1	375,000	3	1,125,000
Shared EV (Rental Car Replacement)	1	375,000	3	1,125,000

Resulting in emissions over a three-year period:

Source	Unit	Quantity	kg CO ₂ -e/unit	Total CO ₂ -e (t)
Fleet EVs	Car	70	2,141	149.8
Fleet EV Travel	Km	3,750,000	0.025	93.8
Taxi Travel	Km	375,000	0.225	84.4
Rental Car Travel	Km	375,000	0.198	74.3
Shared EV Travel	Km	3,150,000	0.025	78.8
			Total (t)	481.1

Leveraging shared EVs to reduce fleet size and consolidate its ground transport, this department emits a total of **~481t** CO₂-e, made up of **~150t** of built emissions from their fleet vehicles, and **331t** of operating emissions from its fleet, taxi, rental car, and shared EV travel.

In this example, our department has reduced its ground transport emissions by **71.5%** and its operating emissions by almost **78%**, compared with an ICE fleet option.

Compared with an EV fleet option, the total carbon emissions are reduced by almost **50%**, and operating emissions are reduced by around **56%**.

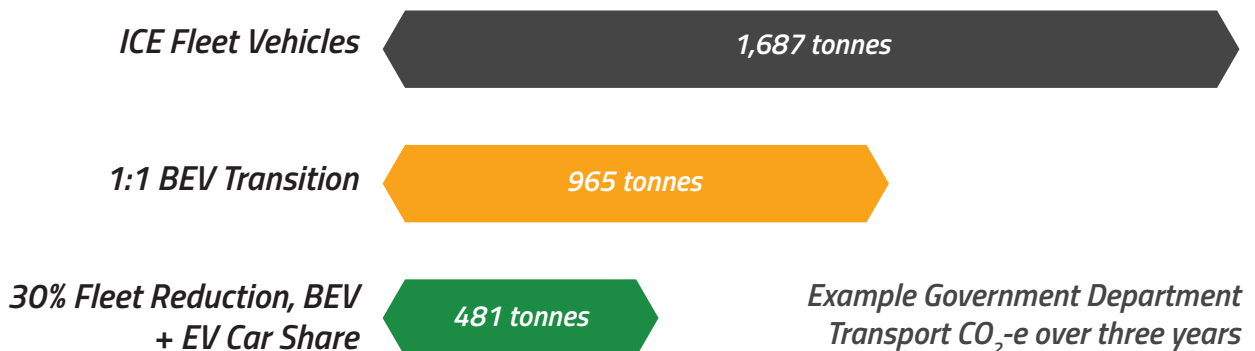
Fewer vehicles need to be purchased and maintained by the department, saving additional money on charging stations, parking spaces, and maintenance. The department also benefits from around \$330k in annual savings from switching the bulk of their taxi spending to shared EVs.

This department's transition - replacing 30% of their fleet travel, and 75% of their rental car and taxi spend - has underwritten around 150 shared BEVs across two cities. These vehicles, however, are able to be used by other departments and businesses, encouraging them to also go electric. Notably, these vehicles are also able to be used by the public - instead of sitting idle in a garage during the nights and weekends.

And since each of the ~150 shared EVs replaces about 11 private cars, this results in **more than 1500 cars being taken off the road for good.**

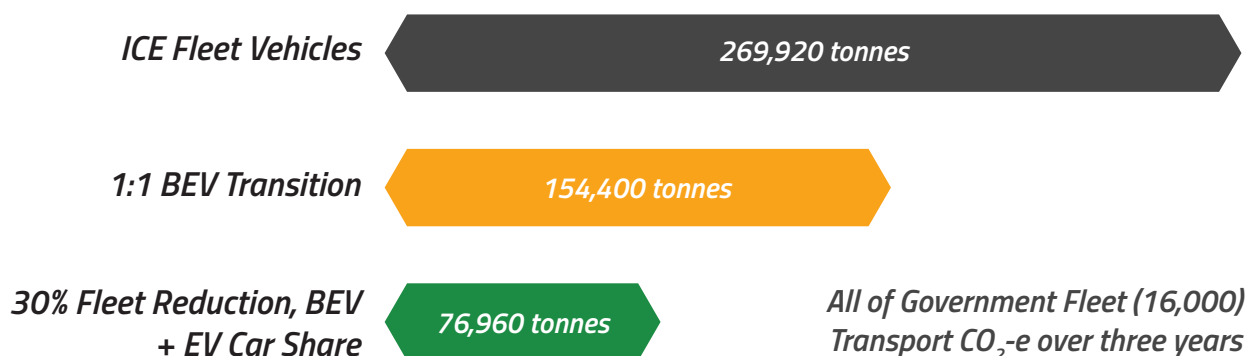
Emissions Comparison

The below table summarises and compares the possible carbon emission reduction for our fictitious Government Department within these three scenarios:



The Solution in Context

The example calculations in this document are based on a fleet of 100 cars. This makes the numbers absolutely gargantuan when applying the emissions profile to our 16,000 strong government fleet:



The transformative effects of this solution are made possible by focusing on using **fewer vehicles** as well as using cleaner vehicles. Sharing vehicles across Government Departments, the private sector, and members of the public, means that **each vehicle is much better utilised**. Sharing the sunk cost of vehicles means that other, more environmentally friendly transport choices are encouraged alongside shared car use.

A government-wide transition to EV car-sharing as outlined (30% of fleet vehicles, majority of taxi and rental car spend) would subsidise around 25,000 shared EVs across every major centre in New Zealand, and **take more than a quarter of a million private cars off the road**.

Ripple Effects of Our Solution

The three scenarios we've explored represent significant savings in both carbon emissions and government spending, but there are further benefits to this scheme.

- The flow-on benefits to the second-hand BEV market of a government transition are significant in a 1:1 scenario and increased in the case where the government leverages EV car-share. Car share vehicles are replaced more often than fleet vehicles, leading to higher turnover and more availability on the second-hand market
- By leveraging an EV car share to supply a percentage of its fleet, taxi, and rental car demand, the government is able to underwrite shared electric vehicles that can be used by the public in the evenings, weekends, and holidays, massively accelerating EV uptake and taking thousands of vehicles off the road for good.
- Government use will require dedicated electric vehicle chargers all across the country, meaning our charging infrastructure will boom for everyone's benefit.
- By contracting the technology in government fleet EVs to a third party, government

workers receive 24/7 support from dedicated experts on BEVs. This will alleviate anxiety around using BEV technology for drivers and managers.

- This third party technology will also help those government workers that aren't well-versed in BEVs plan their journeys and be more aware of their vehicle's charge so mishaps are less frequent.
- Car-sharing complements both public transport and active forms of transportation. A recent study in the United States from Car2go found that 20% of respondents reported an increased level of walking when using the car-share service¹⁸.
- And as mentioned previously, by being the first country to introduce this type of scheme we will solidify our place as one of the most committed countries to addressing climate change.

Conclusion

The climate emergency is upon us, and with every day we delay action, the eventual cost to overcome it increases. Conversely, evidence-based, actionable solutions with order-of-magnitude impacts exist - if only we can stop to reimagine the future.

In this paper, we have outlined how pragmatic changes to how the New Zealand Government resources its ground transportation can generate enormous change; environmental, financial, and social. But, the opportunity for this change isn't limited to the public sector - any business or individual can choose to be part of the climate solution, and re-design the way they move.

We invite you to join us in building a better transport future: one where we use resources more efficiently, get people where they need to go more effectively, and live in our cities and communities more sustainably.

Start a conversation with us: founders@mevo.co.nz

Acknowledgements

Rhiannon Hughes and Sam Sinnott from Sling & Stone, for pulling it all together. The Mevo Team, Board, Partners and Members for making it all possible.

¹⁸ Elliot Martin & Susan Shaheen, The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities, Innovative Mobility Research, February 2021, http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_FiveCities_2016.pdf

Appendices

Appendix 1: New Zealand's history of climate commitments

1992	New Zealand signs the United Nations Framework Convention on Climate Change, committing to undertake voluntary actions to reduce emissions to 1990 levels by 2000 ¹⁹ .
1997	New Zealand signs the Kyoto Protocol. Legally binding emission reduction targets are applied to individual developed countries.
2010	New Zealand joins 89 other countries in making a voluntary pledge to reduce or limit greenhouse gas emissions by 2020 as part of the Cancun Agreements.
2011	New Zealand pledges to reduce greenhouse gas emissions to 50% below the 1990 levels by 2050 at the Durban conference.
2013	New Zealand announces a target to reduce greenhouse gas emissions to 5% below our 1990 emissions by 2020 in line with the updated Kyoto Protocols.
2015	New Zealand finalises our nationally determined contributions (NDC) with a target of reducing greenhouse gas emissions to 30% below 2005 levels by 2030. The target is equivalent to an 11% decrease below 1990 levels and represents a progression on our target for the period to 2020 (which was -5%).
2016	New Zealand ratifies the Paris Agreement which will take effect from 2020. Our NDC will therefore apply from 2021 ²⁰ .
2019	New Zealand passes the Climate Change Response (Zero Carbon) Amendment Act with a target of net zero carbon emissions by 2050 ²¹ .
2020	New Zealand's government declares a climate emergency, joining at least 38 other countries across the globe. In this announcement the government commits to electrifying its vehicle fleet and becoming carbon neutral by 2025 ²² .

19 New Zealand Foreign Affairs and Trade, Our climate change targets, New Zealand Foreign Affairs and Trade, February 2021, <https://www.mfat.govt.nz/en/environment/climate-change/meeting-our-targets/>

20 Ministry for the Environment, About the Paris Agreement, Ministry for the Environment, February 2021 <https://www.mfe.govt.nz/climate-change/why-climate-change-matters/global-response/paris-agreement>

21 Ministry for the Environment, Climate Change Response (Zero Carbon) Amendment Act, Ministry for the Environment, February 2021, <https://www.mfe.govt.nz/climate-change/zero-carbon-amendment-act>

22 Labour Voices, New Zealand declares climate emergency, NZ Labour Party, February 2021, <https://www.labour.org.nz/news-climate-emergency>

Appendix 2: CO₂ and vehicle data sources

Sourced from The Ministry for the Environment's [Emission Factors Guide 2020](#):

- Operational emissions of a "Medium" combustion engine vehicle (Toyota Corolla) used for fleet combustion-engine and rental car per-km figure: **0.198kg CO₂-e/km**
- Operational emissions of a "Large" battery electric vehicle (Hyundai Ioniq) used for fleet and shared EV per-km figure: **0.025 CO₂-e/km**
- Operational emissions of Taxi Travel, per-km figure: **0.225 CO₂-e/km**

Sourced from [The Car Guide](#):

- [Toyota Corolla](#) kerb weight: **1,315kg**
- [Hyundai Ioniq](#) kerb weight: **1,529kg**

Sourced from the [Environmentally Best Cars 2019 Report](#) produced by [Green Motorists](#) (Sweden):

- Combustion engine cars, built emissions per kg of kerb weight: **5kg CO₂-e** (heading 4.3.1, page 8), resulting in built emissions of **6,575kg** for Toyota Corolla at 1,315kg kerb weight
- Battery electric cars, built emissions per kg of kerb weight: **7kg CO₂-e** (heading 4.3.2, page 8), resulting in built emissions of **10,703kg** for Hyundai Ioniq at 1,529kg kerb weight

Sourced from [Ministry of Transport](#):

Average age of a light passenger vehicle in NZ as 14.4 years, rounded to **15 years**, meaning 20% of a vehicle's built emissions are costed in its three-year use by our example Government Department:

- **1,315kg CO₂-e** built emissions for a Toyota Corolla over three years
- **2,141kg CO₂-e** built emissions for a Hyundai Ioniq over three years

Sourced from Mevo internal data:

- Average customer savings vs taxi for short trips in Wellington: **30%**