

IN THE HIGH COURT OF NEW ZEALAND
AUCKLAND REGISTRY

CIV-2021-404-1618

I TE KŌTI MATUA O AOTEAROA
TĀMAKI MAKAURAU ROHE

UNDER

the Judicial Review Procedure Act 2016

IN THE MATTER OF

an application for judicial review

BETWEEN

**ALL ABOARD AOTEAROA
INCORPORATED**

Applicant

AND

AUCKLAND TRANSPORT

First Respondent

AND

**THE REGIONAL TRANSPORT
COMMITTEE FOR AUCKLAND**

Second Respondent

AND

AUCKLAND COUNCIL

Third Respondent

AFFIDAVIT OF JAYNE LOUISE METCALFE

December 2021

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AFFIDAVIT OF JAYNE LOUISE METCALFE

I, Jayne Louise Metcalfe, of Auckland, engineer, swear –

1. I make this affidavit in support of All Aboard Aotearoa Incorporated's application for judicial review in relation to decisions made by Auckland Transport, the Regional Transport Committee for Auckland and Auckland Council concerning the Regional Land Transport Plan for Auckland 2021.
2. I confirm that I have read and complied with the Code of Conduct for Expert Witnesses in preparing this affidavit.

Qualifications and experience

3. I am a Director of Emission Impossible Limited, a specialist air quality and emissions management consultancy. I hold the following qualifications and affiliations:
 - (a) ME (Chemical & Process), University of Canterbury, 1995;
 - (b) BE Hons (Chemical & Process), University of Canterbury, 1993; and
 - (c) Certified Air Quality Professional (CAQP), Clean Air Society of Australia and New Zealand.
4. I am a chemical engineer with more than 20 years' experience in air quality and vehicle emissions management. I was an air quality scientist at the Auckland Regional Council before becoming an independent consultant in 2004.
5. I have been involved in transport emissions inventories, emissions management, research and modelling for most of my career. I commissioned and project managed the development of the Vehicle Emissions Prediction Model (**VEPM**) when I was a scientist at the Auckland Regional Council. VEPM continues to be used by Auckland Council and Auckland Transport for estimating emissions. Some of my recent projects and experience include:
 - (a) Project lead for regular updates, technical reports and preparation of support material for the Waka Kotahi Vehicle Emissions Prediction Model.
 - (b) Providing technical support for Climate Change Commission analysis of transport mitigation options, including mitigation option analysis for battery electric trucks, battery electric buses, hydrogen trucks, mode shift of freight to rail, private travel mode shift and electrification of rail (2020).
 - (c) Preparing vehicle emission inventories for Ministry for the Environment, Auckland Council and Environment Canterbury.

- (d) Contributing author to the 2012 Updated Health and Air Pollution in New Zealand study (HAPINZ) and the current HAPINZ 3 update (publication pending).
 - (e) Member of the Technical Advisory Group (TAG) on national direction on industrial greenhouse gas emissions (2020 to 2021) for Ministry for the Environment.
 - (f) Providing energy use projections for the Ministry of Transport Vehicle Fleet Emissions Model (2016).
6. A list of my publications and reports is in the schedule to this affidavit.

Documents provided to me

7. I have been provided with the following documents:
- (a) The pleadings filed in the proceeding;
 - (b) The Government Policy Statement on Land Transport 2021 (**GPS**);
 - (c) The Regional Land Transport Plan for Auckland 2021 (**RLTP**);
 - (d) Advice prepared by Auckland Transport staff ahead of a meeting of the Regional Transport Committee on 18 June 2021 (**Auckland Transport Advice**). This advice also appears at Appendix 9 of the RLTP; and
 - (e) Various documents provided by the respondents in discovery, including emission modelling relating to the RLTP.

Instructions

8. I am instructed to address the following issues:
- (a) Regional and national targets for the reduction of greenhouse gas emissions;
 - (b) Targets for mode shift and reduction of vehicle kilometres travelled (**VKTs**);
 - (c) Modelling projections in the RLTP and how these compare with the relevant targets; and
 - (d) My response to various aspects of the Auckland Transport Advice.

Targets for emission reduction

9. Auckland and New Zealand have various emission reduction targets:
- (a) New Zealand previously had a Nationally Determined Contribution under the Paris Agreement to reduce net greenhouse gas emissions by 30% by 2030 (compared to 2005 gross emissions). In November 2021 that was increased to a 50% reduction in net emissions by 2030.

- (b) The Climate Change Commission's advice to Government recommends emissions budgets that would reduce net emissions by 2030 (against a 2019 baseline) by 38% in respect of long-lived greenhouse gases and by 47% in respect of carbon dioxide. [[301.0241]]
- (c) Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan (**Auckland Climate Plan**) has a goal to reduce net emissions by 50% by 2030 (against a 2016 baseline) and achieve net zero emissions by 2050. To halve overall emissions by 2030, the plan estimates that transport emissions will need to reduce by 64% by 2030 (compared to 2016). [[307.2847]]
10. One of the four strategic priorities of the GPS is "transforming to a low carbon transport system that supports emissions reductions aligned with national commitments, while improving safety and inclusive access". Section 2.6 of the GPS provides various indicators against which the strategic priority is to be measured, including "tonnes of greenhouse gases emitted per year from land transport" and "tonnes of harmful emissions per year from land transport". [[301.0154]]

Mode shift and VKT targets

11. Greenhouse gas emissions from the land transport system are affected by two key variables: VKTs and the average fuel efficiency of the vehicle fleet.
12. Measures to reduce transport emissions typically fall into three categories, known as the **avoid-shift-improve** approach. These are described by Waka Kotahi as follows:¹

AVOID/REDUCE interventions aim to avoid or reduce the need to travel, or the time or distance travelled by car while improving accessibility, e.g. through integrated land use and transport planning for urban form that supports well-connected multi-modal access to local services and employment. This is critical for long term emission reductions at a system level; and brings many other transport, public health and environmental benefits, through reduced air and noise pollution, increased levels of physical activity, reduced congestion, better connected communities and improved safety. [[303.1248]]

SHIFT/MAINTAIN interventions focus on shifting people who need to travel from cars to more energy efficient modes such as public transport and active or shared modes, e.g. through better provision of low carbon travel options and incentives to choose them.

IMPROVE interventions seek to improve the energy efficiency of motorised vehicles (e.g. through fuel standards or EV uptake); and optimise transport infrastructure and operations for more efficient vehicle movement.

13. Measures to **improve** the fuel efficiency of the fleet, such as the Clean Car Standard, biofuel mandates and accelerated uptake of electric vehicles are generally implemented by central government.
14. **Avoid and shift** measures which influence VKTs typically fall within the jurisdiction of transport agencies (national, local and regional) as well local councils (through integrated transportation and land use planning).

¹ <https://www.nzta.govt.nz/assets/About-us/docs/sustainability-action-plan-april-2020.pdf> [[303.1237]]

Decisions about transport systems, form of urban development and land use all impact each other.

15. It is widely recognised that we cannot rely entirely on **improve** measures, such as accelerated uptake of electric vehicles to achieve greenhouse gas emission reduction targets. This is because:
 - (a) The rate of fleet turnover is too slow to achieve emission reductions at the rate required to achieve targets, and
 - (b) Even if internal combustion vehicles are replaced with fully electric vehicles, there are still substantial greenhouse gas emissions from the construction and maintenance of roads and car parks, as well as the manufacture and disposal of vehicles.

16. To achieve greenhouse gas emission reduction targets at a global, national and regional level, we also need to significantly reduce VKTs. This is recognised in section 2.6 of the GPS, which includes VKTs as one of the indicators for measuring the climate change strategic priority.

17. The Auckland's Climate Plan observes that: "We need to make fundamental shifts in how we undertake personal travel, how this travel is powered, how we transport freight, and how much we travel." The plan includes indicative targets aligned to the decarbonisation pathway. Those targets include substantial increases in the share of travel by public transport, cycling and walking as shown in Figure 1 below.

18. These mode shift targets provide an indication of the extent of change that is required in Auckland to achieve emission reduction targets, even taking into account ambitious targets to improve the fuel efficiency of the fleet.

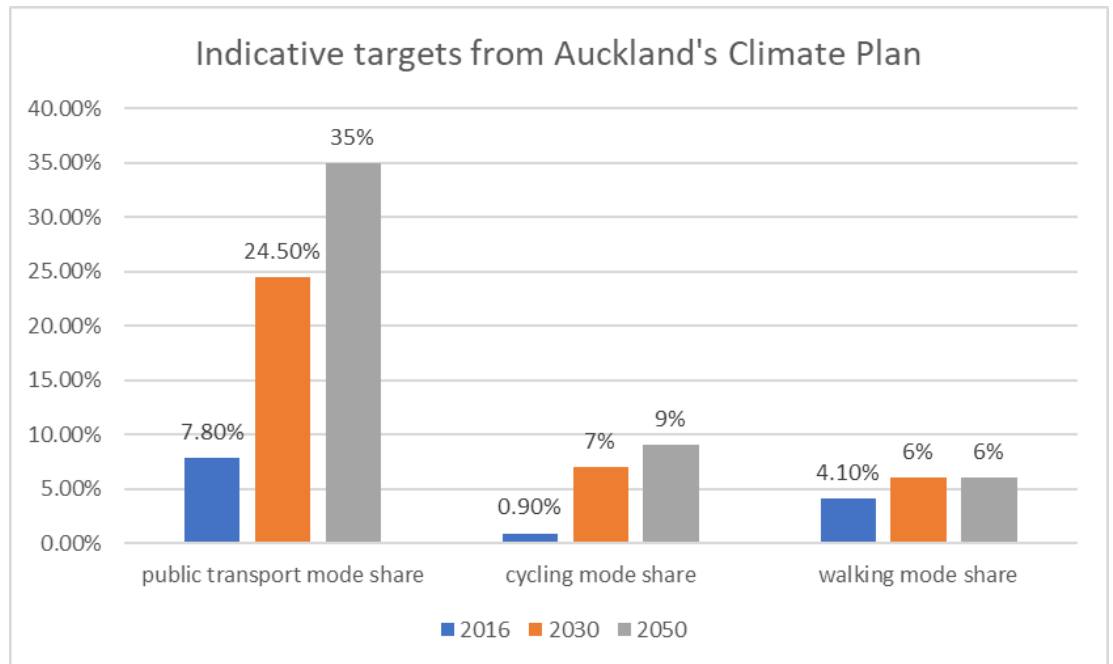


Figure 1: Indicative mode share targets from Auckland's Climate Plan.

19. For completeness, I note that Ministry for the Environment (**MfE**) has recently proposed new targets for transport to achieve the emission reductions recommended by the Climate Change Commission and to put us on a pathway to zero carbon by 2050.² These include a target to reduce VKTs by cars and light vehicles by 20% by 2035 through providing better travel options, particularly in our largest cities. MfE proposes that mode shift targets aligned with this overall national target (reducing VKTs by 20%) be established for each region through mode shift plans.
20. In its Keeping Cities Moving Plan Waka Kotahi proposes to focus mode shift efforts on larger cities where dependence on private vehicles causes the most problems and the scale of demand can support high quality public transport.³ Faster growing areas are also prioritised as these will see the most pressure on their transport networks, as well as having an acute need to support and enable a vibrant and liveable urban form. In general, urban areas provide the greatest potential for mode shift. This means that the VKT reduction target for Auckland will be substantially higher than the national target of 20% by 2035.

RLTP modelling projections

21. The RLTP provides results of modelling of the RLTP investment package, which I summarise as follows:
- (a) The share of distance travelled by public transport is expected to increase from 12% to 20% in the morning peak, and from 5% to 10% in the interpeak period between 2016 and 2031. An 80% growth in cycling is expected between 2020 and 2031.
 - (b) VKTs are predicted to *increase* by 22% between 2016 and 2031, roughly in line with expected population growth.
 - (c) The overall effect of increased VKTs combined with expected improvements in vehicle fuel efficiency is a 6% increase in emissions between 2016 and 2031.
 - (d) Expected government interventions that are not captured in the RLTP modelling are predicted to deliver an additional reduction equivalent to 7% of annual emissions in 2031. These interventions include a biofuels mandate and the Clean Car Standard. The combined effect of these government interventions with the RLTP package is an overall decrease in emissions of 1% between 2016 and 2031.
 - (e) The RLTP suggests that additional government policies, including the Climate Change Commission recommendations to accelerate EV uptake, might result in an additional decrease in emissions of up to 12% between 2016 and 2031.

² *Te hau mārohi ki anamata: Transitioning to a low-emissions and climate-resilient future: Have your say and shape the emissions reduction plan.* Discussion document prepared by Ministry for the Environment, October 2021

³ <https://www.nzta.govt.nz/assets/resources/keeping-cities-moving/Keeping-cities-moving.pdf>

22. As with any modelling exercise, the results are subject to significant uncertainty and limitations. In particular, the effect of potential government interventions to improve vehicle fuel efficiency, mandate biofuels and increase the uptake of electric vehicles cannot be modelled with any certainty while these policies and interventions are still being developed. This means the extent that any government interventions might offset the modelled 6% increase in emissions under the RLTP programme is highly uncertain.
23. Notwithstanding these limitations, the modelling very clearly demonstrates that emission reduction targets will not come close to being met under the RLTP investment programme. To summarise:
- (a) Under the Auckland Climate Plan Auckland has committed to reducing net emissions by 50% by 2030 (versus 2016), and by 64% for transport.
 - (b) The Climate Change Commission has recommended reducing net CO₂ emissions by 47% by 2030 (versus 2019).
 - (c) New Zealand previously committed to reducing emissions by 30% by 2030 under the Paris Agreement (versus 2005), which has now been increased to 50%.
 - (d) In contrast, modelling results presented in the RLTP predicts that under the RLTP programme, Auckland's transport emissions will increase by 6% by 2031 (versus 2016), and VKTs will increase by 22% in line with expected population growth.
 - (e) Any decrease in Auckland's transport emissions during this period will be due to measures that improve the fuel efficiency of the fleet, which are the result of central government interventions, rather than investment decisions made under the RLTP.

Failure to take account of lifecycle emissions

24. The emissions modelling presented in the RLTP estimates tailpipe emissions from vehicle use only. Significant mode shift away from private vehicles towards shared and active modes would reduce embodied and operational emissions from construction, maintenance, and operation of roads and car parks as well as reducing tailpipe emissions.
25. The Auckland Climate Plan includes actions to ensure that new infrastructure is planned and designed:
- (a) To minimise climate risks and lifecycle emissions (Action B2); and
 - (b) To assess climate change impacts for all new developments and infrastructure, starting at the business case stage, to identify to what degree a proposal supports or conflicts with our climate goals over its lifecycle (Sub-action B2).

26. Significant mode shift away from private vehicles towards shared and active modes would also reduce greenhouse gas emissions from vehicle and fuel lifecycles. A 2015 report prepared for EECA estimates that on a lifecycle basis, emissions from conventional petrol vehicles are 0.26 kgCO₂-e per km and from electric vehicles are 0.11kg CO₂-e per km⁴. So, while electric vehicles are significantly better than conventional vehicles, there is still a significant amount of carbon associated with manufacturing, shipping and recycling of electric vehicles.
27. The RLTP includes no discussion or assessment of infrastructure lifecycle emissions. This assessment would be necessary to identify to what degree infrastructure funded by the RLTP package supports or conflicts with climate goals over its lifecycle.

Auckland Transport Advice

28. The Auckland Transport Advice suggests that “there is little ability to further reduce overall emissions through RLTP direct investment in infrastructure and services”. It also suggests that: [[309.4183]]
- (a) “Fundamentally, investment in infrastructure or services only has a very minor impact on total emissions, whether positive or negative”;
 - (b) “It is not a given that roading projects will automatically lead to increased tailpipe emissions”; and
 - (c) “In practice, it is also likely that gains from deterring car travel through lane reallocation alone would be largely offset by the increase in emissions associated with increased congestion and diversion amongst the remaining traffic.”
29. I disagree with these assertions for the reasons that follow.
- Investment in infrastructure only has a very minor impact on emissions*
30. It would be more correct to say that Auckland Transport’s modelling *predicts* a very minor impact on emissions from investment in infrastructure. In reality, we know that no mitigation option or intervention will achieve substantial emission reductions in isolation. Significant change will only be achieved through an integrated approach across the transport system and the wider land use and infrastructure system.
31. By way of example, an OECD modelling study⁵ predicts the effect of a policy package promoting public transport in Auckland. The predicted effects in 2050 relative to a reference scenario are an increase in public transport mode share from 8% to 33%, and greenhouse gas emission reduction of 40%. The package includes significant increases in private vehicle taxes, the introduction of cordon tolls in central Auckland, and a

⁴ Energy Efficiency and Conservation Authority. Life Cycle Assessment of Electric Vehicles. Final Report, November 2015.

⁵ Decarbonising Urban Mobility with Land Use and Transport Policies: The Case of Auckland. OECD 2020.

significant subsidy to public transport. This type of package, which substantially increases the cost of private vehicle travel, would only be tenable if there are good alternatives to private vehicle travel.

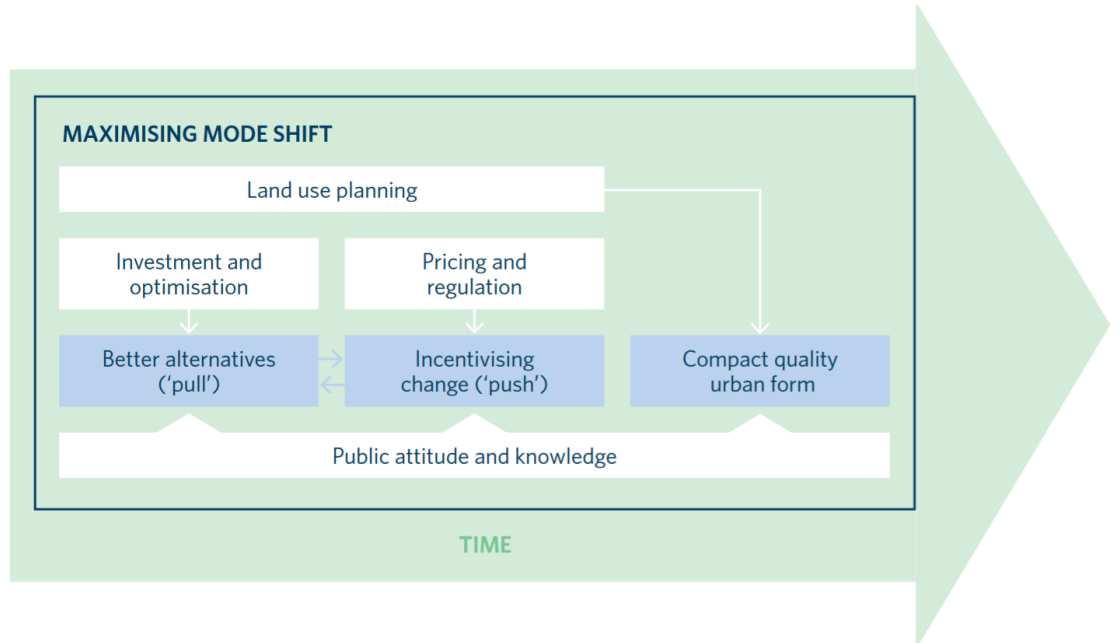


Figure 2: Mode shift interventions over time. Source: Waka Kotahi’s Keeping Cities Moving Plan.

32. Figure 2, which is copied from the Waka Kotahi Keeping Cities Moving Plan, illustrates the integrated approach that is required to maximise mode shift. With respect to providing better alternatives, the plan states that:

giving people safe, efficient, reliable, affordable and convenient travel choices is an essential pre-requisite to achieving mode shift and reducing car dependency. This means making walking and cycling more attractive for short journeys and public transport more attractive for longer journeys, especially to higher intensity areas like city centres.

[[303.1064]]

33. Figure 2 illustrates the role of investment in providing better travel alternatives. We cannot provide safe, efficient, reliable, affordable and convenient travel choices without good infrastructure.

It is not a given that roading projects will increase tailpipe emissions.

34. Roothing projects which increase the capacity of the road network will generally increase emissions eventually. The recently released MfE draft emissions reduction plan⁶ recognises that investment in urban highways and road expansion can induce private vehicle travel, and proposes to “require further roadway expansion and new highways to be consistent with climate change targets”, which is encouraging.

⁶ See footnote 2 above.

35. The Auckland Transport Advice provides an example that is said to support the assertion that building new roads will not automatically increase tailpipe emissions:

For example, Penlink is likely to result in a net reduction in tailpipe emissions as it significantly shortens the connection to the North Shore and reduces congestion while managing demand through tolling. As an illustration, a modelling test for the 2031 year shows that removal of the Penlink and the full Mill Road project (as originally announced in the NZUP package) would lead to a very small (0.15%) increase in CO2 emissions due to an increase in total VKT and higher congestion.

[[309.4183]]

36. I do not know what particular modelling Auckland Transport was relying on in making that statement about those two roading projects, but it seems likely that the modelling results would be sensitive to assumptions (for example, assumptions around the effect of tolling on demand). It is also important to note that the statement appears to relate to tailpipe emissions only. If lifecycle emissions were considered (including embodied and operational emissions for both the infrastructure and the vehicles using it), then it is very unlikely that removal of these roading projects would actually result in an overall increase in emissions, as Auckland Transport suggests.

Gains from deterring vehicle travel through lane reallocation would largely be offset by the increase in emissions associated with increased congestion and diversion of traffic

37. I disagree with this statement. Effective road space reallocation would, in fact, reduce emissions by reducing vehicle kilometres travelled.
38. I note that Auckland Council and Auckland Transport staff presented to the Environment and Climate Change Committee on 10 June 2021 in respect of the Ministry of Transport's discussion document *Hikina te Kohupara – Kia mauri ora ai te iwi: Transport Emissions: Pathways to Net Zero by 2050*.⁷ The paper presented says:

Hikina te Kohupara found that street level changes to support public transport and active travel could be undertaken swiftly given the potential to reallocate space on existing roads without necessarily building new infrastructure.

[[308.3447]]

Officers support this view as road space reallocation through the provision of bus priority measures and safe active mode infrastructure can be a relatively cost-effective means of encouraging mode shift and has the potential to yield more timely results than other interventions.

39. I agree with that advice. I am unaware on the basis for Auckland Transport's subsequent assertion that reallocating road space would increase congestion and emissions. It is possible that it is based on a very narrow interpretation of traffic modelling results. This over-reliance on traffic models is acknowledged by Auckland Council and Auckland Transport, in their submission on Hikina te Kohupara on 25 June 2021,⁸ which states:

⁷ Auckland Council Environment and Climate Change Committee, Open Agenda, Thursday 10 June 2021 (AC.ALL.004.0003).

[[308.3441]]

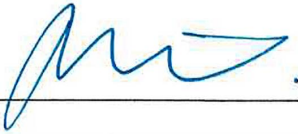
⁸ Auckland Council and Auckland Transport Submission to Hikina te Kohupara – Kia mauri ora ai te iwi: Transport Emissions: Pathways to Net Zero by 2050. Ministry of Transport Discussion Document (AC.ALL.004.0002).

[[310.4564]]

An over-reliance on traffic models by road controlling authorities and Waka Kotahi in the implementation of street changes means that priority is often placed on general traffic level of service over safety and access for non-motorised users. As such, despite mode shift being a priority for central and local government, solutions that increase capacity for cars (or at least not reduce it) tend to be favoured, leading to more driving and reduced access to alternative transport choices.

[[310.4570]]

SWORN at Auckland this 21st day of
December 2021 before me:



Jayne Louise Metcalfe

A solicitor of the High Court of New Zealand


Baird

PF-Dollai

SCHEDULE – JAYNE METCALFE PUBLICATIONS AND REPORTS

Hales S, Atkinson J, Metcalfe J, Kuschel G & Woodward A (2021). Long term exposure to air pollution, mortality and morbidity in New Zealand: Cohort study. *Science of the Total Environment* 801 (2021).

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