

Travel demand in New Zealand 2050

Consultation on a topic for a Long-term Insights Briefing

Consultation document
Not Government policy
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Introduction

Our role

The Ministry of Transport (the Ministry) is the government's system lead on transport. We provide advice about how the transport system can better support the New Zealand economy and the evolving transport needs of New Zealanders, including improving our understanding of the factors that might influence transport over the next 20 to 30 years.

Purpose of this paper

The Ministry is consulting the public on the proposed topic for our next Long-term Insights Briefing (LTIB). We are seeking feedback on the topic and any key issues we should focus on. This paper defines an LTIB, outlines our proposed topic and how we will develop the LTIB, and explains how you can provide feedback.

What is a Long-term Insights Briefing?

Under the Public Service Act 2020, agencies are required to develop an LTIB at least once every three years. The purpose of an LTIB is to publish:

- a information about medium- and long-term trends, risks and opportunities that affect or may affect New Zealand and New Zealand society; and
- b information and impartial analysis, including policy options for responding to these trends, risks and opportunities.

LTIBs are not government policy and must be developed independently of Ministers. The subject matter of an LTIB is the sole discretion of Chief Executives.

Agencies are required to publicly consult both on the topic and on the draft LTIB (the Ministry plans to do this in April 2025). The final LTIB will be tabled in the House of Representatives by the Minister of Transport, likely in June or July 2025.

Indicative timeframes of the Long-term Insights Briefings process

1	2	3	4	5	6	7	8
Gather intelligence about the future	Consider topic and potential for joint Briefings	Engagement on proposed subject matter	Develop draft Briefing content	Engagement on draft Briefing	Present final Briefing to the House	Select committee examination	Conduct review activity
April to May 2024	May to June 2024	June to Sept 2024	August 2024 to April 2025	April to July 2025	June to July 2025	July to Nov 2025	January to March 2026

Source: DPMC, *Long-term Insights Briefing Process Guide*, February 2024

What topic are we proposing?

The Ministry is proposing an LTIB focusing on travel demand in 2050. The LTIB will respond to the following question:

What are the drivers and trends that will most directly influence demand for land-based transport in New Zealand over the next 25 years, and what are the range of feasible options for responding to this demand?

We will use a combination of horizon scanning and scenario development to support our analysis, and we will draw on the Ministry of Transport's in-house agent-based transport model. The national transport model is a machine-learning tool that can simulate the transport activities undertaken by a virtual population (based on the Census), including travel routes, departure times, and mode of transport. The model can also compare a base case to a counterfactual (where a policy or infrastructure intervention has been made). Further detail is provided below and in Appendix One.

Why is this topic important?

Transport is an important enabler of economic and social outcomes. It contributes to economic growth and the living standards of New Zealanders. Understanding the drivers of future transport demand and how they might influence travel choices is critical for developing a responsive and productive transport network. The insights gained through this research will support the Ministry's role as steward of the transport system.

This topic is also important as it provides an opportunity to improve understanding within the transport sector of how agent-based modelling can support decision making.

What issues will we consider?

Proposed scope

New Zealand's transport system is complex. It encompasses land (road and rail), air, and sea modes, physical and digital infrastructure, vehicles, transport services, and the institutions and regulatory systems that influence how the system functions and develops.

We are proposing to limit our research to land transport, including movement of both goods and people. Most government spending relates to land transport, which means we have relatively direct levers to effect change. New Zealanders also use land transport much more frequently than air or sea transport.

Many trends and uncertainties will influence future travel demand. These include the demographic and spatial profile of the population, economic drivers such as income levels and employment rates, technological advancements, environmental and other policies, and consumer preferences.

While the paper will cover a range of potential drivers, the focus will be on those with direct influence on land transport demand, those for which we have robust data projections, and/or those that can be used to alter the parameters in a simulation run in the Ministry's transport model. We anticipate a focus on demographic and economic drivers.

We are interested in hearing from stakeholders on the drivers and trends that are likely to have the most direct influence on demand for land-based transport over the next 25 years. In particular, we would like to hear views on how the LTIB should address the impact of technology on demand,

given uncertainty around the pace, scale and type of technological advancement (e.g. connected and automated vehicles, mobility as a service (MaaS), AI and alternative fuels).

How we plan to approach our analysis

We will use a range of analytical tools to develop insights on future demand for land-based transport, including methods such as horizon scanning. This will enable us to identify and analyse emerging trends, potential disruptions, and uncertainties that could influence travel demand. We will also use scenario planning to explore various possibilities and their implications.

Where appropriate, our analysis will be supported by the use of agent-based modelling.

What is an agent-based model?

An agent-based model (ABM) simulates the behaviour and interaction of individual 'agents' within a virtual environment. In a transport context, agents are individual users of the transport system, and the virtual environment is a digital representation of the network and transport modes. The model simulates the choices that agents make in undertaking their daily transport activities.

More information on agent based modelling and the Ministry's national transport model is available in Appendix One.

How you can provide feedback

We welcome your comments on the proposed LTIB topic, and on our approach. The specific consultation questions set out below can be used to frame your submission. Feedback can be provided either:

- through the online survey available on the Ministry's website: <https://consult.transport.govt.nz/policy/long-term-insights-briefing-consultation>; or
- via e-mail to LTIBconsultation@transport.govt.nz

The deadline for making a submission is 5pm, 10 September 2024.

Consultation questions

Question 1: Do you agree that 'travel demand in New Zealand in 2050' is a worthwhile topic for the Ministry's LTIB?

Question 2: Do you agree that a time horizon of 25 years is appropriate?

Question 3: Do you agree that the scope should be limited to demand for land-based transport?

Question 4: Which drivers and trends are likely to have the most direct influence on demand for land-based transport over the next 25 years? What data and information about those drivers and trends should we draw on to create a baseline scenario for 2050?

Question 5: Given uncertainty around the pace, scale and type of technological advancement, how should our analysis of future scenarios factor in technology?

Question 6: If we model alternative scenarios for 2050, which key assumptions do you think we should alter from a baseline scenario? (For example, assumptions about overall population growth, assumptions about geographic population distribution etc.)

Your submission is public information

Please note your submission may become publicly available. The Ministry may publish any information you submit and may identify you as the submitter should it publish your submission. Therefore, **please clearly indicate if your comments are commercially sensitive or should not be disclosed for another reason, or the reason why you should not be identified as the submitter.** Any request for non-disclosure will be considered under the Official Information Act 1982.

Appendix One: The Ministry's National Transport Model

What is an agent-based model?

As noted in the body of this paper, an agent-based model (ABM) simulates the behaviour and interaction of individual 'agents' within a virtual environment. In a transport context, agents are individual users of the transport system, and the virtual environment is a digital representation of the network and transport modes. The model simulates the choices that agents make in undertaking their daily transport activities.

ABMs are fast becoming best-practice to understand how transport policies and interventions affect demand. They are more sophisticated than traditional transport models, which consider aggregated blocks of time and traffic flows between zones. One of the main benefits of ABMs is their ability to simulate the behaviour of individuals with complex behaviours, preferences, and attributes over a chosen time period. Simulations of how agents behave at the micro level help us to understand what is happening at a macro level, e.g. traffic congestion patterns can be observed from simulation runs.

The Ministry's national transport model

The Ministry has its own national agent-based transport model (currently known as Monty). Monty works by combining a virtual population (based on data from Statistics New Zealand) with a digital representation of the supply of transport across the country (road, rail and ferry).

Individual agents have characteristics based on demographic information including age, sex, income, location, and household type. Each agent has a daily activity plan (e.g. travel to and from work, school, and leisure activities) which is informed by data in the Household Travel Survey. The travel choices of agents are mostly economically driven in terms of the cost and time spent using a particular mode of transport and taking a particular route. As the simulation progresses, agents can learn from previous experience and alter their mode, route and/or departure time. Monty also simulates the behaviour of freight agents by drawing on data from EROAD, one of the approved electronic system providers for road user charging.

How we could use the national transport model to inform the LTIB

Once we have identified the key drivers of transport demand over the next 25 years, we will use relevant projections (e.g. where people will be living in 2050) to update the population and/or network in Monty. This will give us a 2050 'base case' simulation.

For example, we could run a simulation that updates the population, but keeps the network (i.e. the supply side) stable. This would help us to understand where the pinch points would be if transport investment was minimised. We could then contrast this with plausible alternative scenarios, e.g. increased investment, differing regional versus urban population growth tracks, etc.

The simulations will offer insights into how different drivers of demand for transport might create inefficiencies in the system, and test the impact of potential interventions to address those inefficiencies. For example, Monty could simulate how the agent behaviour might change in response to road pricing, improved public transport, and/or improved or modified infrastructure.

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