National Infrastructure Plan

Infrastructure Needs Analysis

Summary of results and findings

NEW ZEALAND INFRASTRUCTURE COMMISSION *Te Waihanga*

NZ Infrastructure Commission

June 2025

Te Kāwanatanga o Aotearoa
New Zealand Government

Purpose of this document

- The **National Infrastructure Plan** lays out an approach to meeting long-run infrastructure needs in an efficient way. It is the Commission's independent advice about the steps Government can take to get us there.
- The **Infrastructure Needs Analysis (INA)** forms the basis of our forward guidance on infrastructure investment. It is our view about the level of investment that is sustainable and affordable for New Zealanders.
  - The results of the INA compose Section 3 (Establish sustainable investment: Our Forward Guidance) of the National Infrastructure Plan
- This document lays out the analysis and results that underpin our analysis for Section 3 of the National Infrastructure Plan

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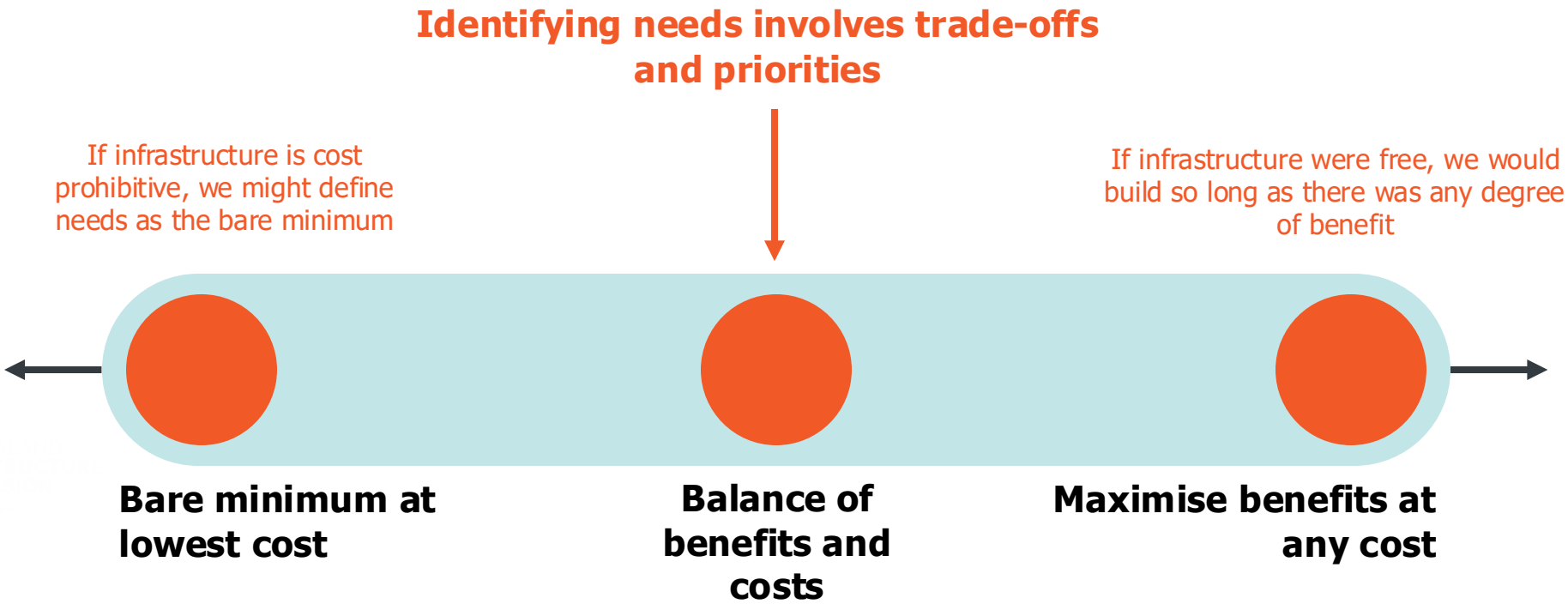
Cut to the chase

Summary of our key insights

The definition of infrastructure "need" is critical

- Our definition and approach to considering infrastructure needs involves understanding what we are willing to spend on infrastructure, the constraints we face, and the need to prioritise across sectors.
- Our approach focuses on sustainability, affordability, and prioritisation.



High-level results across sectors

More investment is needed in some sectors than others

Sector	Recent investment trends, % of GDP (2010–2022)	Forecast future investment demand, % of GDP (2024–2055)	Countries that currently invest similar shares of GDP as our forecast	Key drivers of future investment
Network Infrastructure				
Land Transport Roads, Public Transport, Rail	1.2%	0.8% ↓	France, Israel, Poland, Iceland	Decarbonisation, slowing income and population growth
Electricity and Gas	0.8%	1.4% ↑	Iceland, Costa Rica, Australia, Latvia	Technological change, decarbonisation
Water and Waste	0.6%	0.4% ↓	Denmark, Estonia, Slovakia, Poland	Renewals and natural hazards
Telecommunications	0.7%	0.8%	NZ amongst highest in the world, with Chile, Costa Rica, Slovenia, and Canada	Renewals
Social Infrastructure				
Primary/Secondary Education	0.4%	0.2% ↓	Sweden, Czechia, Belgium (primary, secondary, and tertiary combined)	Demographic change
Tertiary Education	0.6%	0.5% ↓		Demographic change
Hospitals	0.2%	0.4% ↑	Sweden, Netherlands, Czechia, Finland	Demographic change and renewals
Public Administration and Safety	0.9%	0.8%	N/A	Renewals
Social Housing	0.1%	0.3% ↑	N/A	Population growth, catchup investment
Other Public Capital	0.2%	0.2%	N/A	Renewals

International Benchmarking

High spending, not necessarily better outcomes

	NZ difference from comparator country average (based upon simple average of multiple measures)					
Network	**Investment levels**	**Quantity of infrastructure**	**Usage**	**Quality**	**Comparator countries**	**Notes**
Roads	+34%	-13%	-33%	-13%	CZE, CAN, FIN, SWE, ISL, NOR	High investment levels, low usage, high amount of fatalities on the network
Rail	-64%	-43%	-23%	-90%	CHL, GRC, JPN, ESP, FIN, SWE, ISL, NOR	Low investment levels, low usage (both passenger and freight), high emissions
Electricity	-3%	+29%	-46%	-12%	COL, CRI, CHL, CAN, FIN, SWE, NOR, ISL	Large transmission network, relatively high frequency and length of outages
Health	-25%	-10%	-2%	-13%	UK, AUS, SWE, DEN, ISL, NOR	Low amounts of some medical equipment, some higher wait times, and older hospitals
Education	+1%	-10%	+6%	+4%	CHL, FIN, AUS, ISL, NOR, USA, IRL	No clear deficits or shortages
Telecommunications	+28%	-12%	+3%	-4%	COL, CRI, CHI, CAN, FIN, SWE, ISL, NOR	High investment levels, developed fixed broadband but underdeveloped mobile broadband
Water	+70%	-3%	+99%	+9%	CHL, GRC, ESP, CZE, CAN, FIN, SWE, ISL, NOR	High levels of investment, very high usage, average levels of leakage.

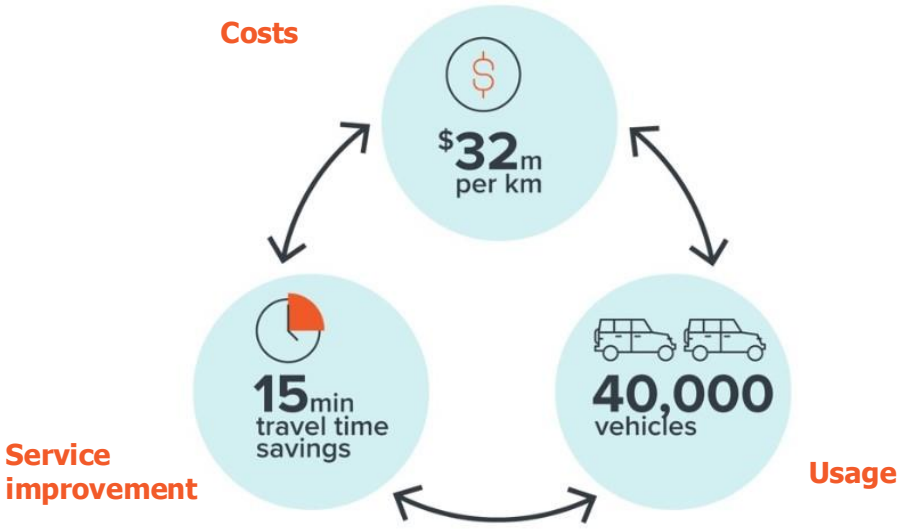
Note: the metrics and methodology for the figures in this table are available in the attached technical report on our international benchmarking work.

Opportunities to expand our needs budgets

Project quality matters more than new funding tools

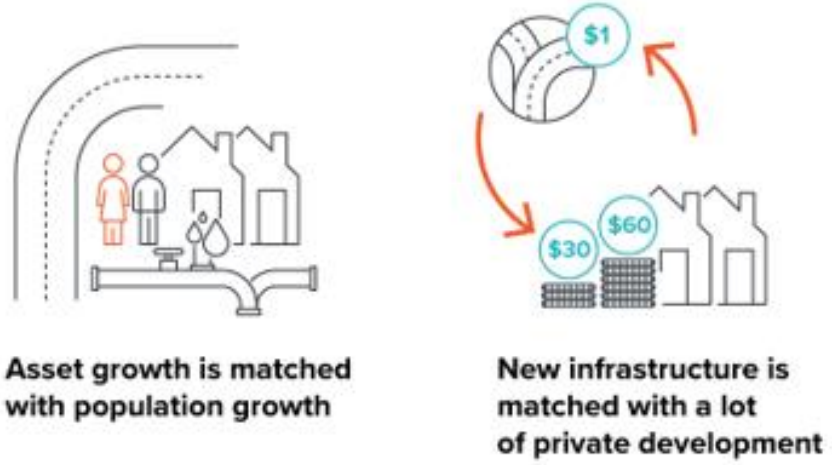
Infrastructure investment can expand our budgets to meet infrastructure needs through greater economic, productivity or population growth. But it requires building very high quality projects

When can tolling lead to cost recovery for a new road?



Source: New Zealand Infrastructure Commission Te Waihanga. 'Buying time: Toll roads, congestion charges, and transport investment'. 2024.

When can local governments more easily recover growth infrastructure costs?



Source: New Zealand Infrastructure Commission Te Waihanga. 'Paying it back: An examination into the fiscal returns to public infrastructure investment'. 2025.

Introduction:

The Infrastructure Needs Analysis and the National Infrastructure Plan

How the Plan will help

The Plan provides three pieces of advice to improve infrastructure consensus

1

What level of investment is sustainable?

The Plan provides advice on future levels of investment based upon New Zealanders' demonstrated willingness to pay for infrastructure and future changes we can foresee.

2

How can we improve the predictability areas which have broad agreement?

The Plan provides advice on investment planning (for new infrastructure and renewals), pricing, and funding, and the importance of policy consistency.

3

How can we improve the approach to investments that are more contested?

The Plan will provide advice on project transparency and assurance to help identify choices and commit to them when they are ready to succeed.

How the Plan will help

Where the Infrastructure Needs Analysis fits in the Plan

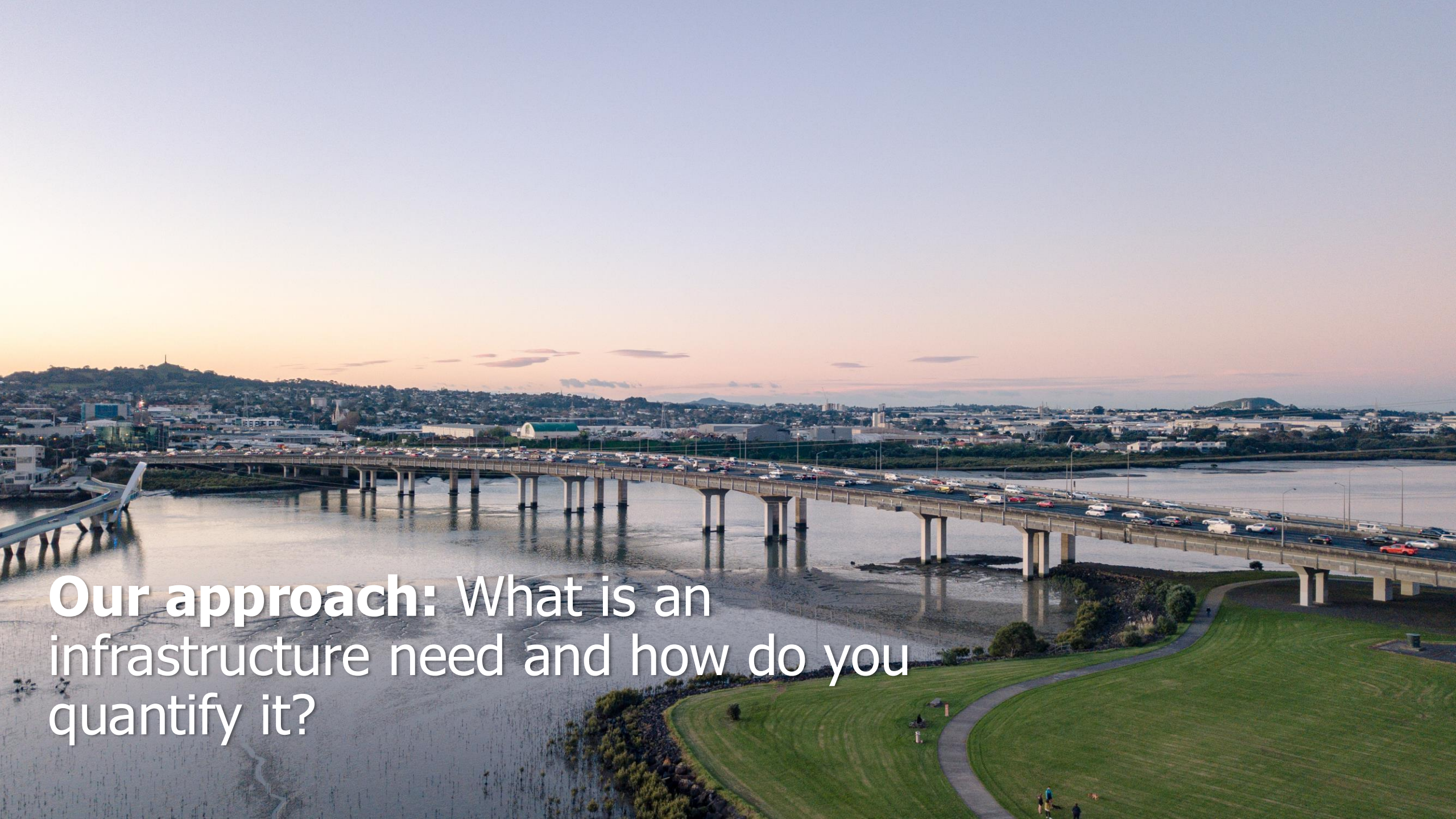
1

What level of investment is sustainable?

The Plan provides advice on future levels of investment based upon New Zealanders' demonstrated willingness to pay for infrastructure and future changes we can foresee.

The Infrastructure Needs Analysis

- The Infrastructure Needs Analysis is our advice about the level of investment that is affordable and sustainable in the long run.
- It provides a view of the mix of investment to meet long-term demands across sectors and drivers of demand such as renewals, natural hazard resilience, and population growth.
- It should be taken as 'forward guidance' on investment, rather than a precise estimate on what we should spend.



Our approach: What is an infrastructure need and how do you quantify it?

Te Waihanga Act 2019

The Commission has a requirement to think long term

9 Main function of Commission

The main function of the Commission is to co-ordinate, develop, and promote an approach to infrastructure that encourages infrastructure, and services that result from the infrastructure, that improve the well-being of New Zealanders.

10 Additional functions of Commission

The Commission has the following additional functions:

Strategy and planning functions

(a) to develop broad public agreement on the approach under section 9 and the strategy reports provided under subpart 3:

(b) to provide advice in relation to infrastructure, including (without limitation) advice in relation to—

(i) the ability of existing infrastructure to meet community expectations; and

(ii) current and future infrastructure needs; and

(iii) the priorities for infrastructure; and

(iv) matters that prevent, limit, or promote the efficient and effective delivery of infrastructure, and services that result from the infrastructure:

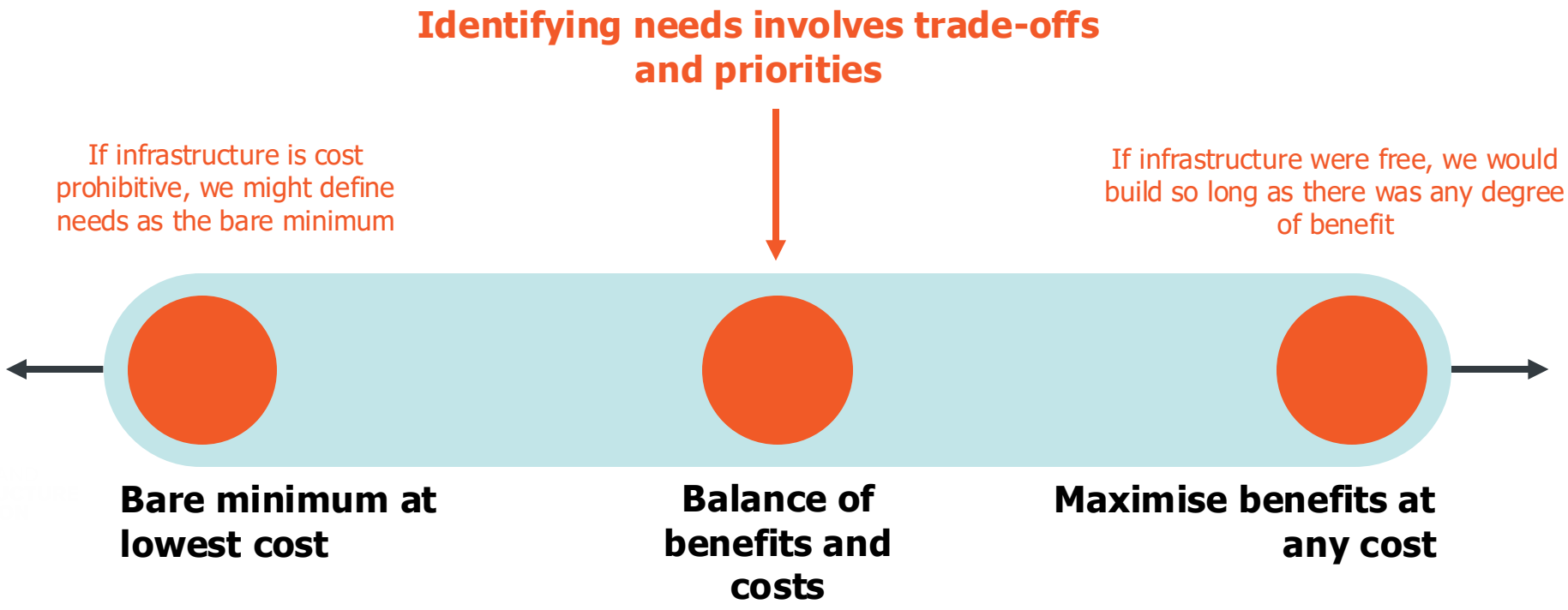
Our legislation requires us to think about long-term needs.
But how do you define "infrastructure need?"

Source: https://www.legislation.govt.nz/act/public/2019/0051/latest/whole.html#LMS155600

Key question 1: How do you define 'need?'

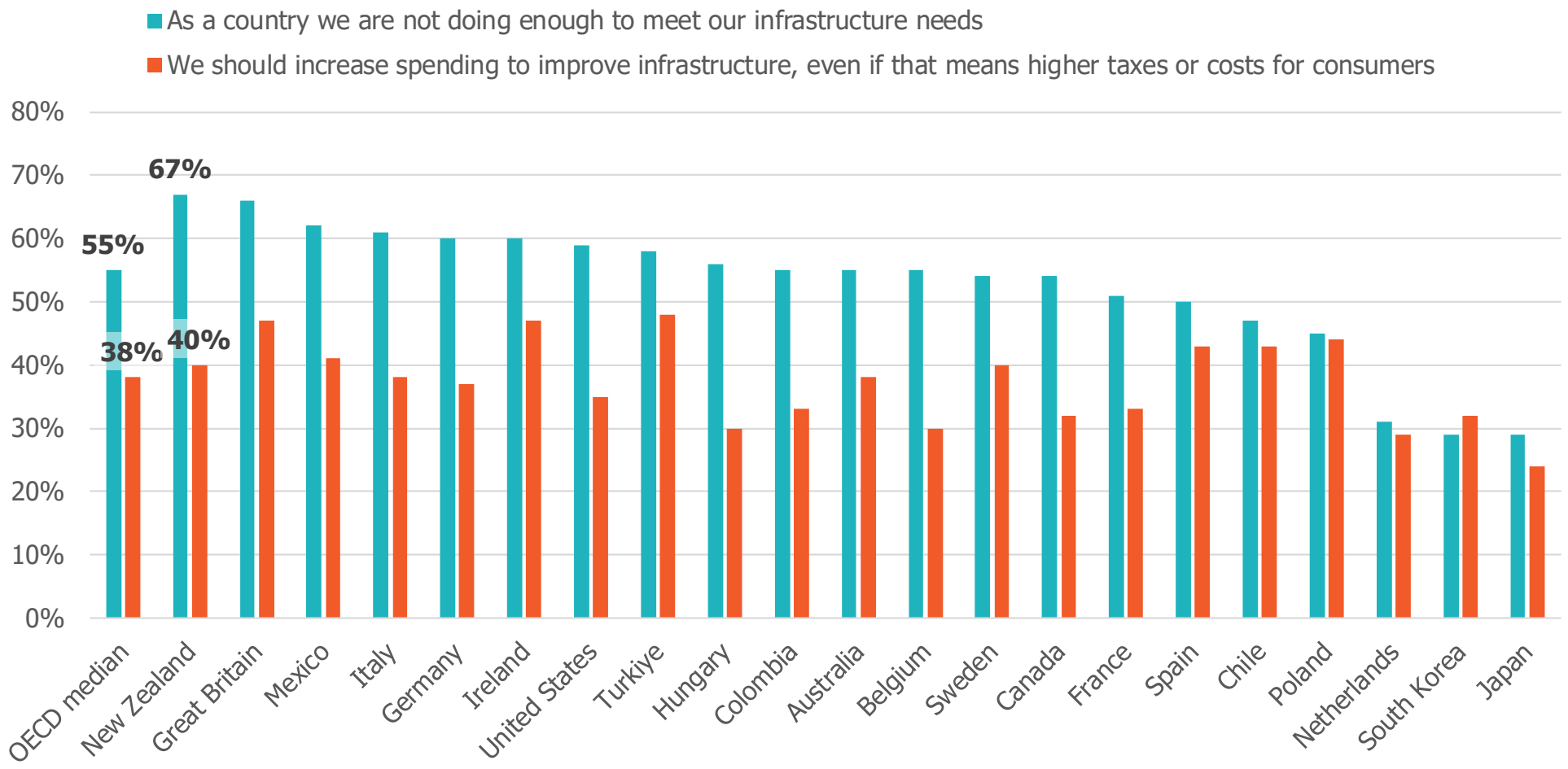
The importance of considering trade-offs

- Our definition and approach to considering infrastructure needs involves understanding what we are willing to spend on infrastructure, the constraints we face, and the need to prioritise across sectors.



Constraints help clarify needs

NZers want more infrastructure, but not the costs

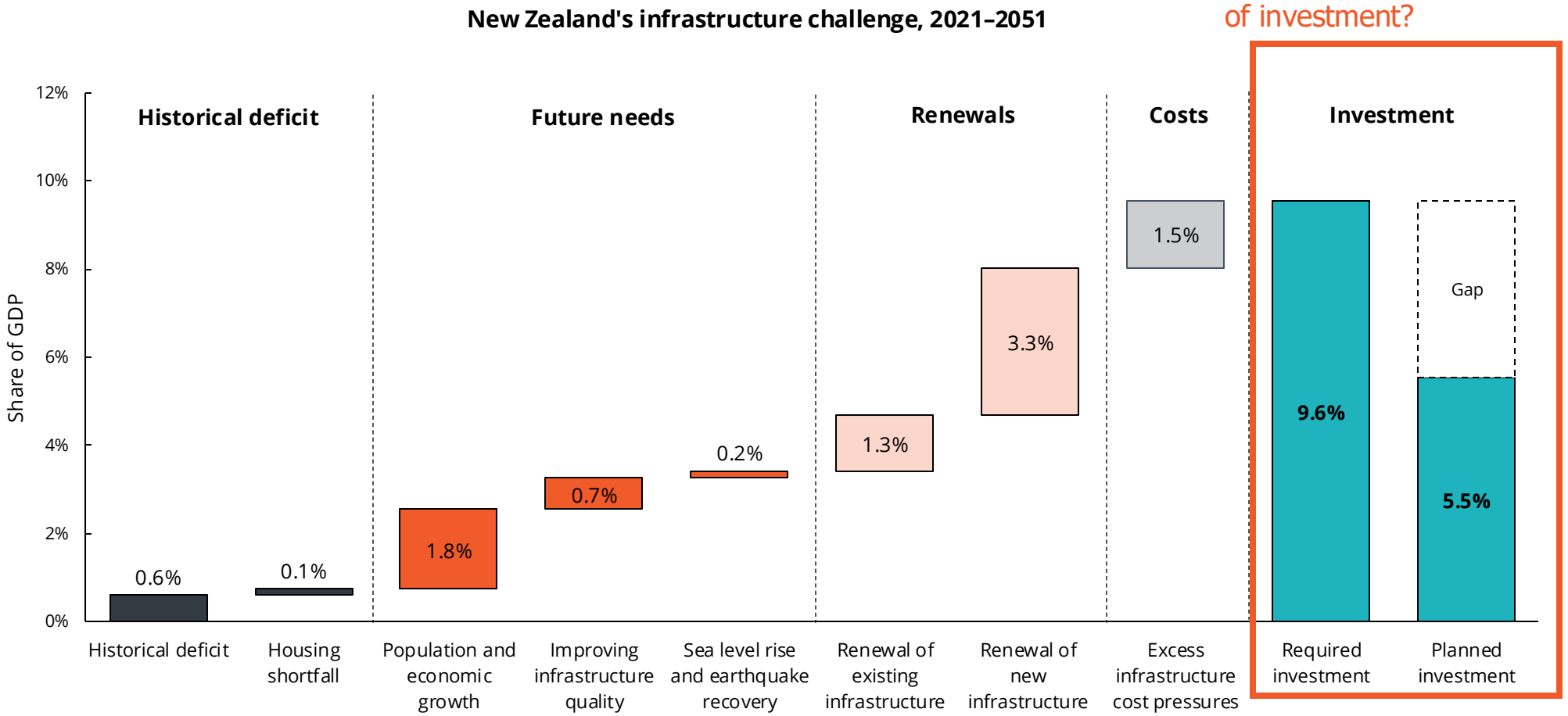


Source: Ipsos Global Infrastructure Index Survey, 2024. Note: Height of bars shows the share of respondents that strongly/tend to agree with this statement.

Our first attempt at needs analysis

The Infrastructure Challenge Report

This approach was unconstrained.
Would we be willing to pay for this level of investment?



Paying for this investment would mean one of:

- **38% increase** in user charges
- **21% increase** in income taxes
- **98% increase** in debt-to-GDP ratio

Source: Sense Partners, Infrastructure Challenge Report, 2021.

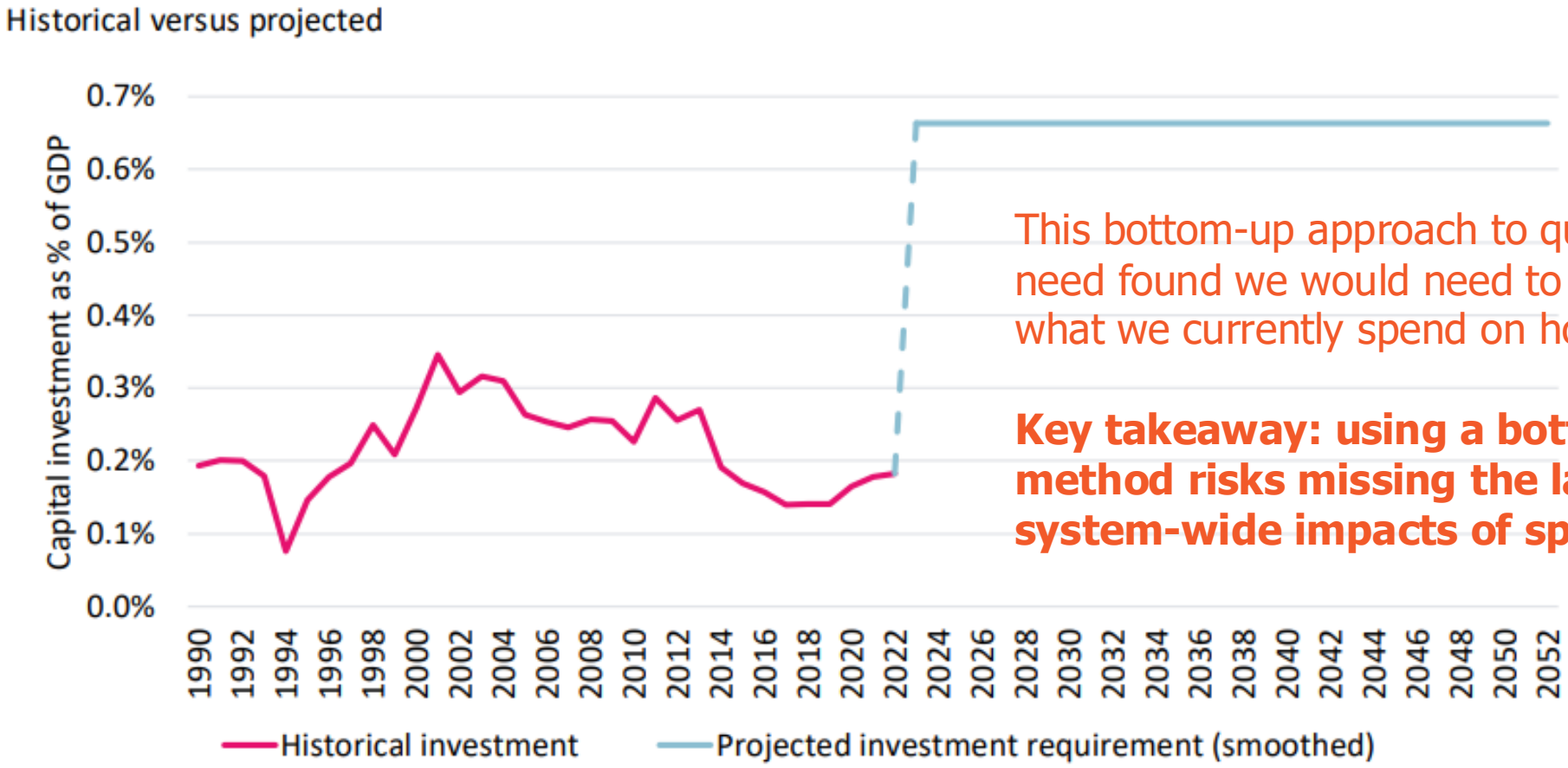
Key question #2: How do you quantify long-term needs?

Top-down versus bottom-up approaches

	Bottom-Up	Top-Down
Approach	Sector-by-sector, region-by-region survey of investment intentions/needs	Identifying what has been spent in the past and forecasting future changes
Key information	Outcomes-based assessments of needs, asset management plans, public consultation	High-level data on sector investment and depreciation levels, other key economic and demographic variables
Output	An aggregation of sector-by-sector surveys of need	An indicative forecast of projected investment demand
Examples	*Australian Infrastructure Audit* (Infrastructure Australia)	*Global Infrastructure Outlook* (Oxford Economics/Global Infrastructure Hub, 2017)

Our second attempt at needs analysis

Building a Healthy Future report on hospital needs



This bottom-up approach to quantifying need found we would need to spend triple what we currently spend on hospitals

Key takeaway: using a bottom-up method risks missing the larger, system-wide impacts of spending

Source: *'Building a healthy future'.* *https://media.umbraco.io/te-waihanga-30-year-strategy/qckkkx12/building-a-healthy-future.pdf*

The Infrastructure Needs Analysis

The pillars of our approach

- **We consider the constraints we can expect to face when investing in infrastructure.**
  - A definition of needs requires understanding the trade-offs we face and what we want to spend.
  - It also leads us towards a path of sustainable and affordable investment levels.

- **We take a system-wide, top-down view of infrastructure needs.**
  - This allows us to put different investment needs in context and see how they may fit together over time.

The three key themes of the INA

The INA explores needs through three angles

Key output:
A quantitative forecast of infrastructure investment needs, decomposed by various drivers of demand.

Key output:
A comprehensive international benchmarking analysis of our networks to understand areas of deficits.

Key output:
An analysis of our budgets for infrastructure needs and the potential to expand them through economic investments or new funding tools.

INA Investment Forecast

Our forecast quantifies these drivers of demand

Renewal of existing infrastructure

Demographic change

Economic / income growth

Construction price inflation

Resilience to natural hazards

Decarbonisation / net zero

Technology change

Shortage of existing infrastructure

These drivers of demand were identified through literature on infrastructure, stakeholder engagement, and the Commission's research.

The Infrastructure Needs Analysis

Frequently asked questions

- **Does the forecast tell us how much and when we should be spending to meet infrastructure needs?**
  - The forecast is the Commission's forward guidance on investment levels and mix. It is designed to be directive, not prescriptive. Overall investment decisions are not expected to follow our forecasts exactly. Rather, it is designed to help inform policy-makers and infrastructure providers about the relative priorities and users/taxpayer willingness to pay for more investment overall.

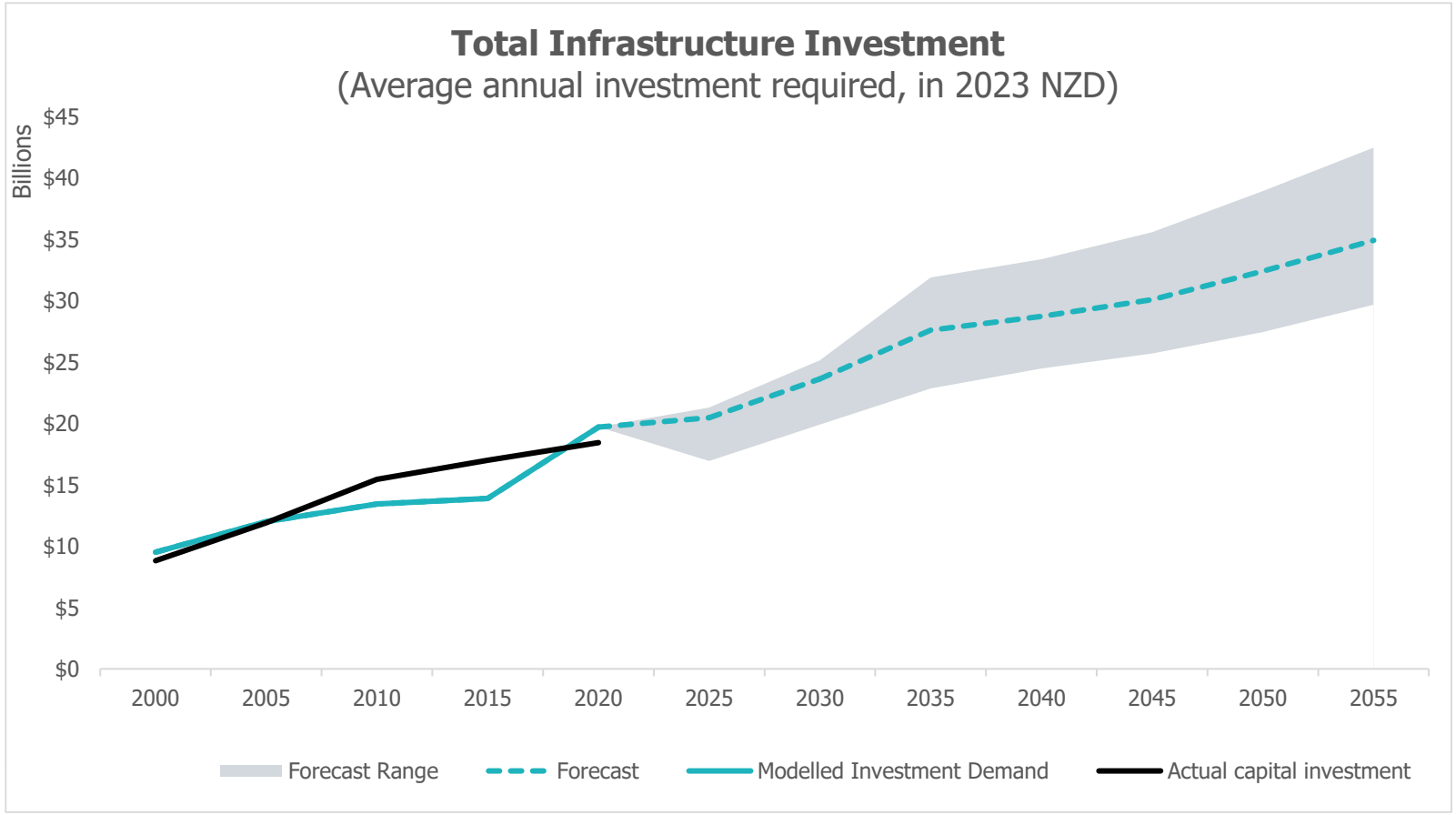
- **Does the forecast reflect increases in levels or service expectations or improvements in standards for infrastructure?**
  - Yes. As infrastructure networks become more mature, people tend to be willing to pay higher levels of services or quality on those networks. We reflect this in our forecast through multiple drivers of demand. For instance, the income driver of demand is designed to inform infrastructure providers about people's demonstrated willingness to pay for more or better infrastructure as their incomes improve.

- **How does the international benchmarking relate to the forecast?**
  - One way to identify needs is to compare the quality of New Zealand's infrastructure relative to its peers. The benchmarking is designed to give us a more holistic view of needs, alongside our forecast. For example, if our forecast identifies a sector with needs, we might also see this manifest as a network that is behind our peers.
  - It is important to note that the international benchmarking analysis does not assume that other countries have the optimal or most efficient approach to infrastructure in a given sector.

High-level overview of the Infrastructure Needs Analysis

Our forward guidance on investment

Required investment rises in dollar terms



Our investment forecast projects total annual infrastructure capital investment rising from about $24 billion in 2022, to almost $35 billion by 2055.

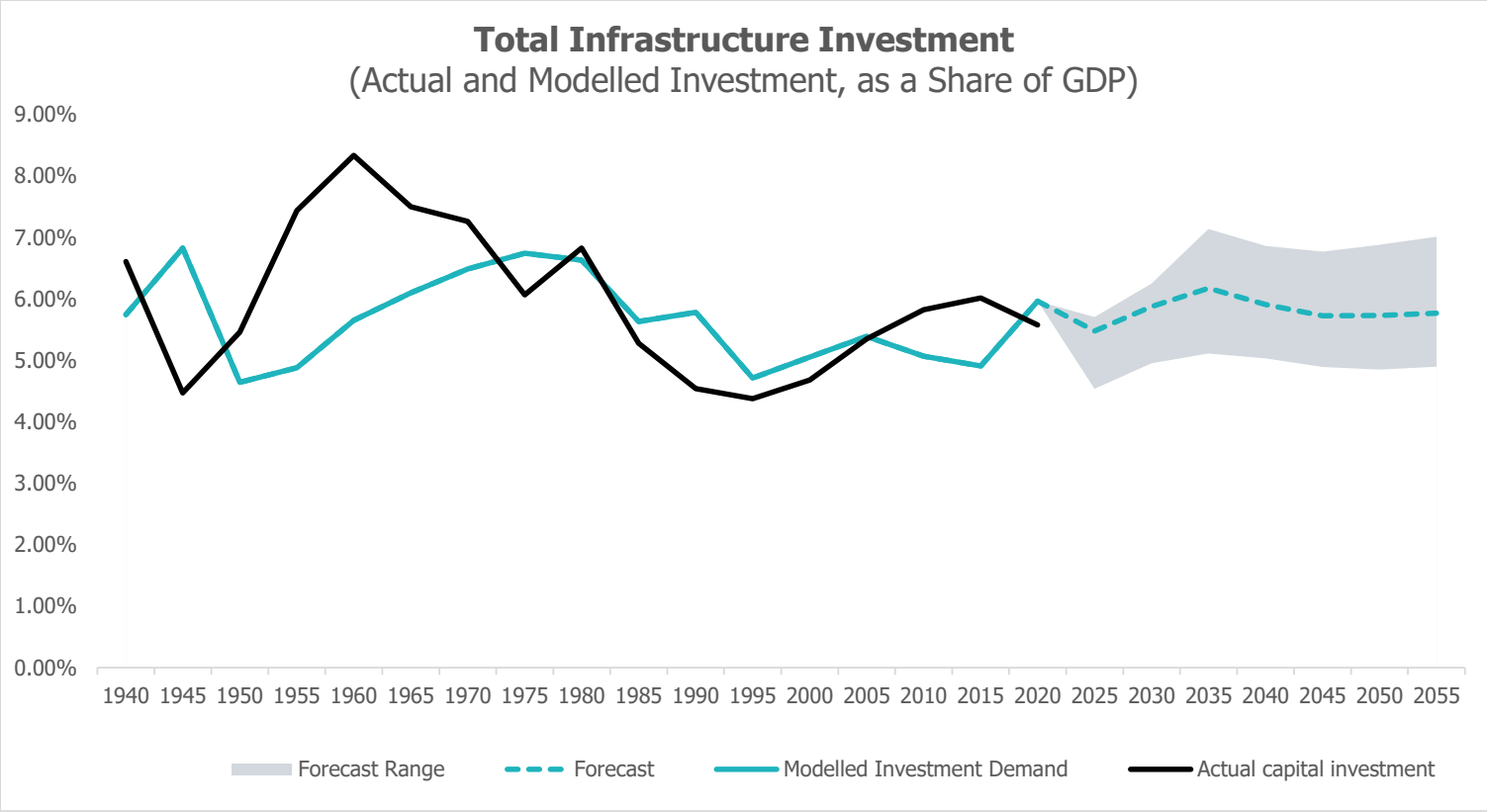
Forecasts are inherently uncertain. Investment could be higher or lower than our central scenario. However, we expect that by 2055, investment will fall somewhere between $30 and $43 billion.

The upper bound of our forecasts represent a scenario with fast population growth, higher income growth, rising quality expectations, and natural hazard risk.

The lower bound, on the other hand, represents slower population growth, lower income growth, little change in quality expectations, and steady natural hazard risk.

Our forward guidance on investment

Long-term investment is forecast to be stable as a share of GDP



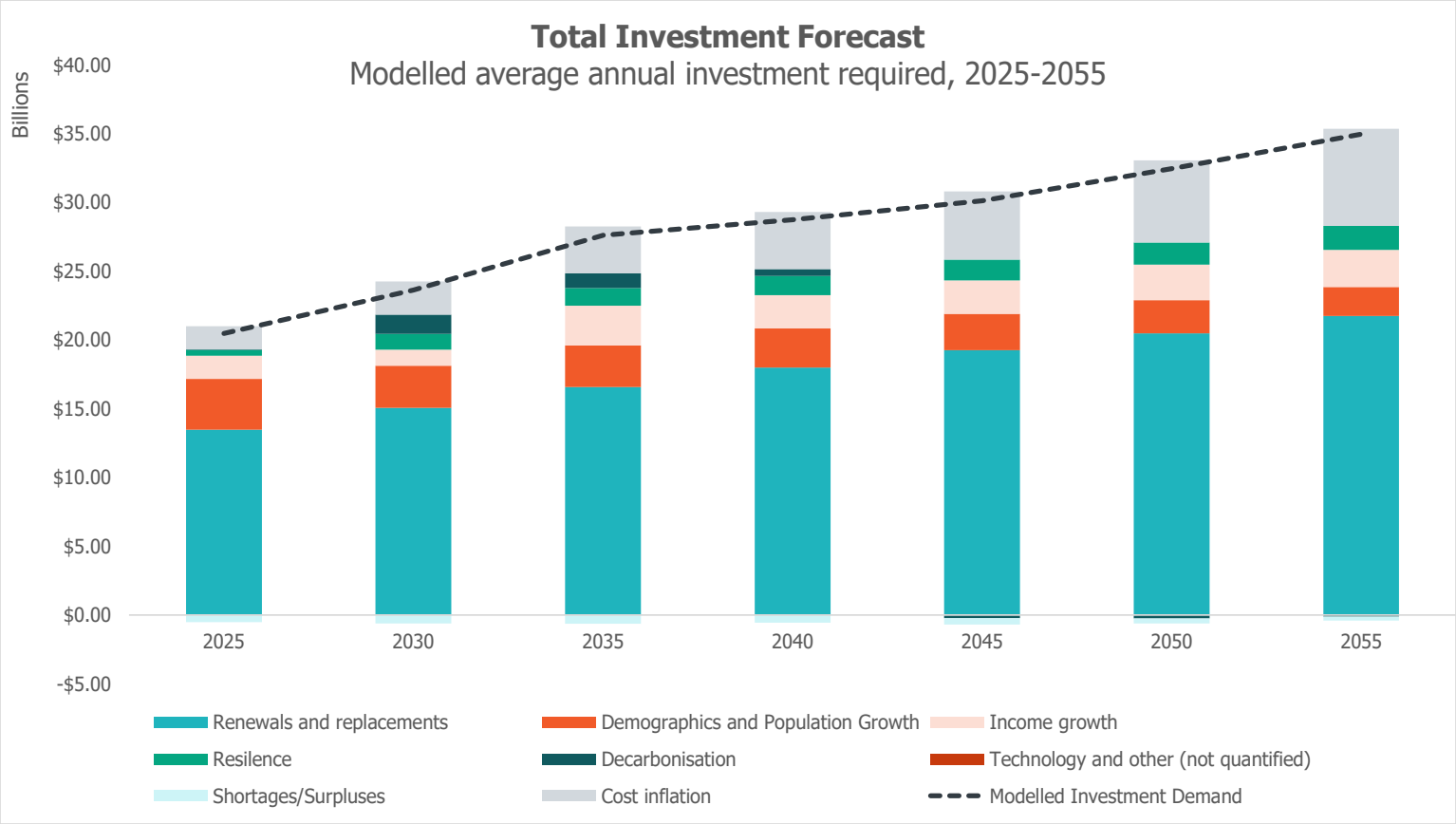
While our investment forecast rises in dollar terms, as a share of GDP, it is relatively steady.

We forecast that investment as a share of GDP should range between 5% to 7% for the next 30 years, with a central estimate of 5.8% of GDP.

This is roughly in line with what we've spent on infrastructure over the past 150 years (5.6% of GDP).

Our forward guidance on investment

Renewing what we have will be the biggest need



Our investment forecasts investment rising from about $18 billion a year in 2023 to almost $40 billion per year in 2055, in inflation-adjusted terms.

We forecast that simply replacing what we have will consume more than 60% of total investment required. This speaks to the scale of the infrastructure networks we have built-up over time, a direct result of our relatively high levels of investment as a share of GDP compared to other countries.

Our modelling also suggests there are significant gains to be made if we can improve overall construction productivity and bang-for-buck. If recent trends continue, delivering infrastructure needs will require a substantial amount of money (up to one-fifth of our future forecast spending in later years) purely due to inflation in costs.

Finally, we foresee the population's willingness to pay for improvements in levels of service or standards above current levels to be relatively constrained by modest income growth.

High level results across sectors

Spending needs will be higher in some sectors, lower in others

Sector	Recent investment trends, % of GDP (2010–2022)	Forecast future investment demand, % of GDP (2024–2055)	Countries that currently invest similar shares of GDP as our forecast	Key drivers of future investment
Network Infrastructure				
Land Transport Roads, Public Transport, Rail	1.2%	0.8% ↓	France, Israel, Poland, Iceland	Decarbonisation, slowing income and population growth
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Hospitals	0.2%	0.4% ↑	Sweden, Netherlands, Czechia, Finland	Demographic change and renewals
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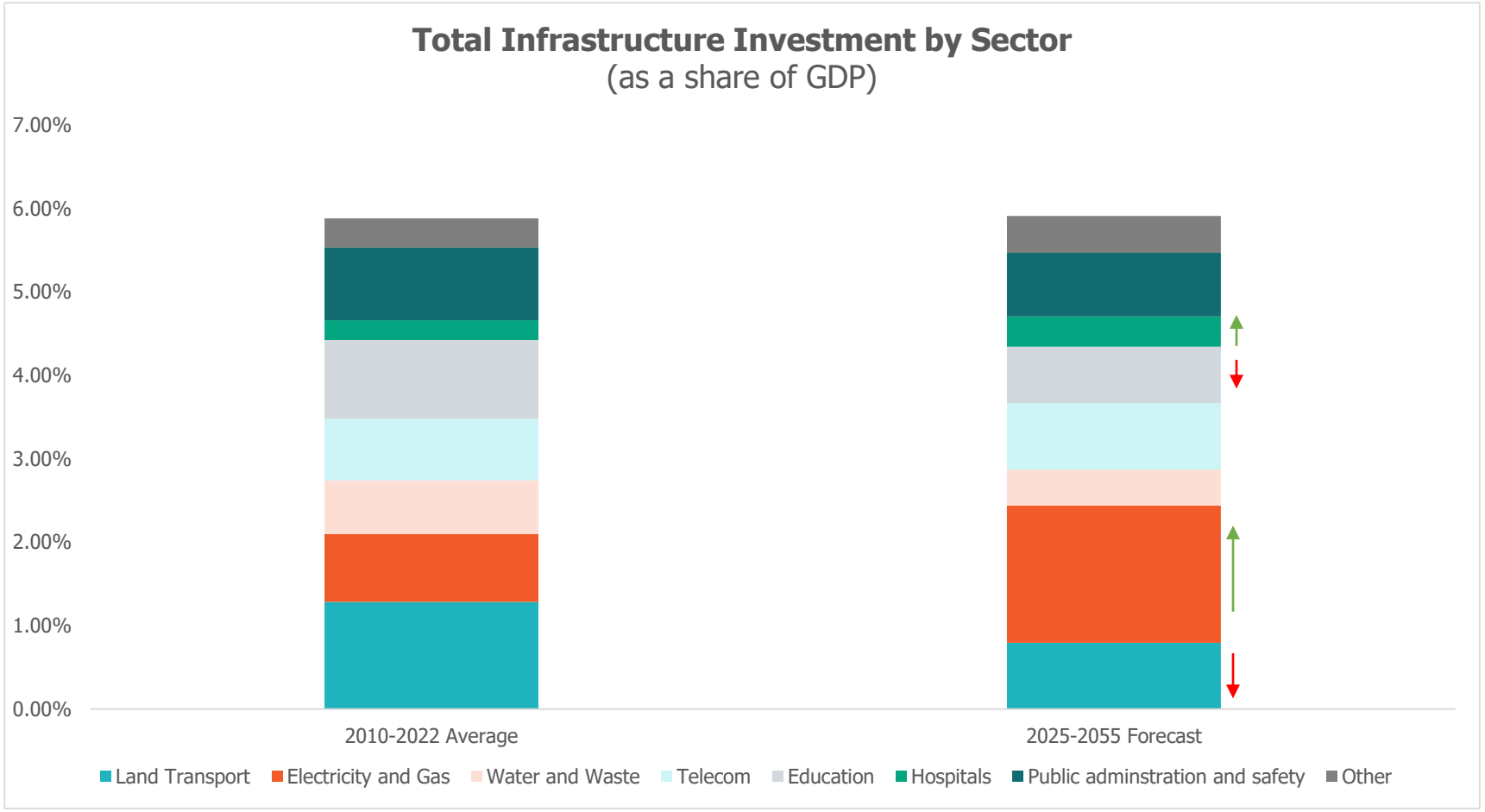
Other Public Capital	0.2%	0.2%	N/A	Renewals

Shifting investment priorities

Our analysis suggests a reprioritisation of investment



International Benchmarking

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	NZ difference from comparator country average (based upon simple unweighted average of multiple measures)					
Network	**Investment levels**	**Quantity of infrastructure**	**Usage**	**Quality**	**Comparator countries**	**Notes**
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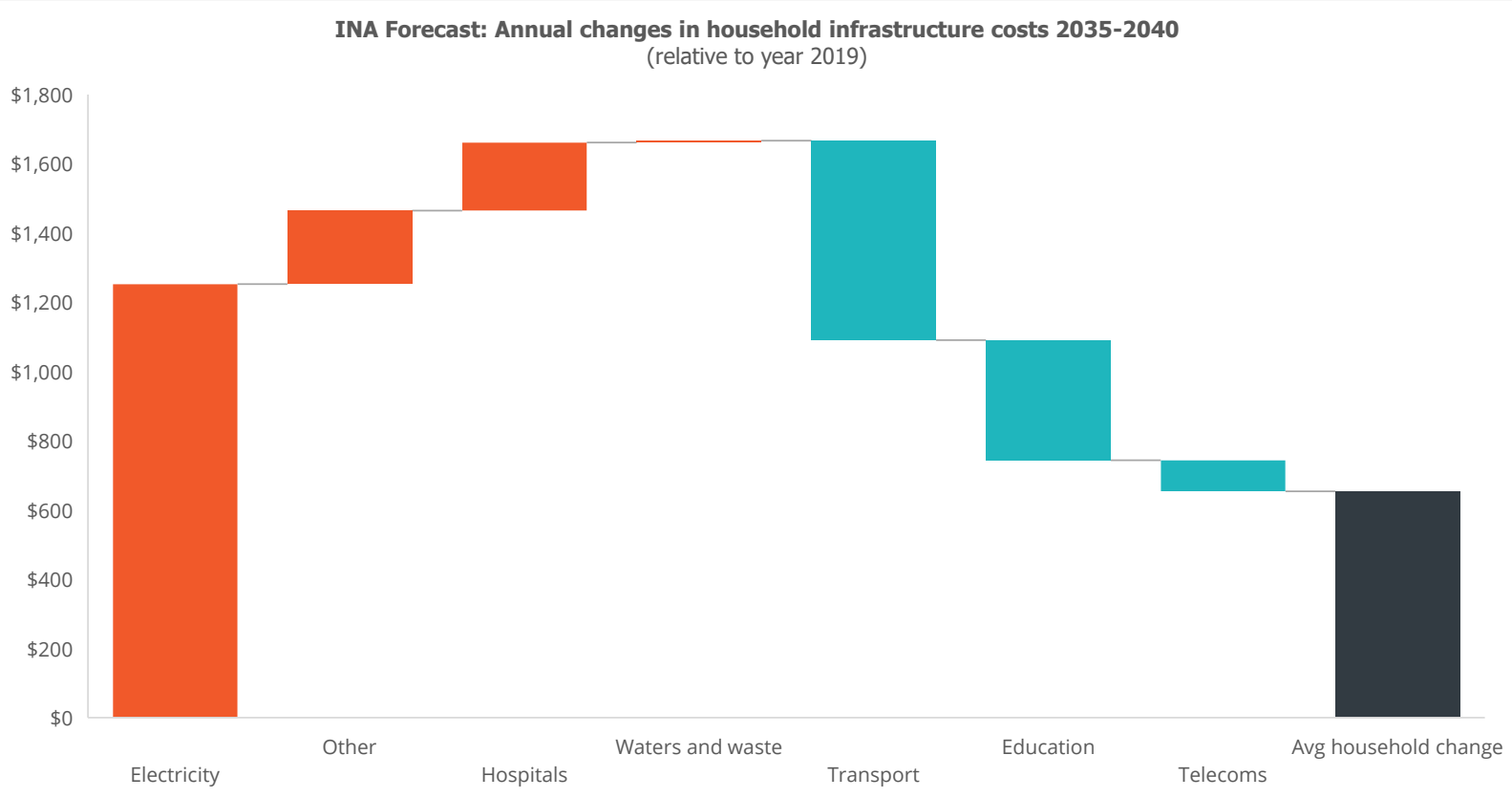
Note: the metrics and methodology for the figures in this table are available in the attached technical report on our international benchmarking work.

What does this mean for households?

Higher electricity charges, less transport costs



There are choices about how we fund and finance our forecast investment path. But regardless, New Zealanders will have to pay.

Our modelling indicates that meeting investment needs will require higher charges or taxes in the short and medium term (relative to 2019 levels) (figure left).

This is largely due to the increased investment need in electricity, which is primarily funded by user charges. Central government can help mitigate this increase by adjusting charges and taxes in response to moderating demand for transport and education infrastructure.

The exact impact on household budgets will vary considerably depending on how we finance this investment. Because meeting our decarbonisation goals will require more investment in the short term, financing it to spreads might mitigate the impact of increases in charges.

We have also not modelled the impact on household budgets from changes in operating expense. For instance, higher charges for electricity investment might be offset by lower petrol and diesel purchase costs.

Sector-by-sector results and discussion

Road Transport

Investment requirements are expected to moderate

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$1.49	$1.64	$1.75
Demographics	$0.59	$0.51	$0.41
Income growth	$0.51	$0.57	$0.58
Resilience	$0.24	$0.27	$0.29
Decarbonisation	-$0.12	-$0.37	-$0.61
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	-$0.45	-$0.28	-$0.18
Cost inflation	$0.28	$0.41	$0.52
Total	$2.53	$2.74	$2.78
Average 2010–2022	$3.02		

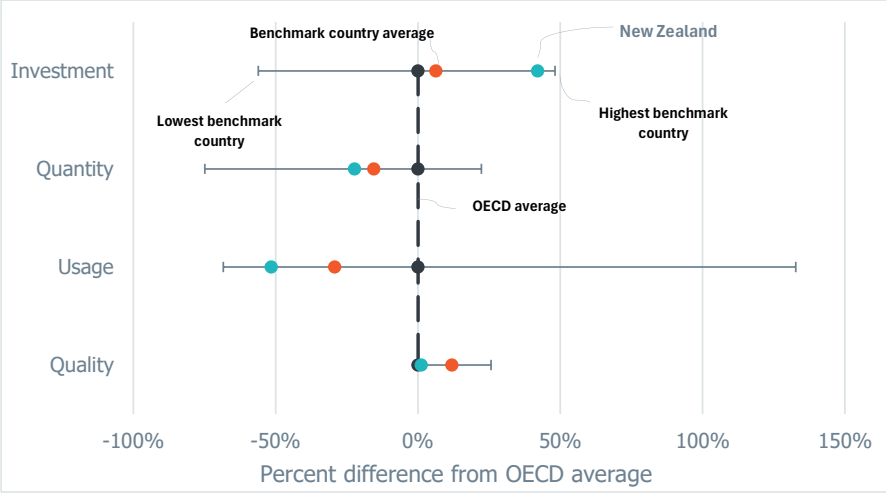
After more than a decade of elevated land transport spending (>1% of GDP), meeting long run road investment needs will mean a normalisation of spending, towards about 0.6% of GDP (or approximately $2.7 billion per year). This is roughly the same level of investment France invests in its roads, and what we spent in the early 1980s.

The investment wave over the last 15 years drives large renewal needs over the next 30 years. Over the same period, base willingness to pay for new roads (population growth, income growth driving higher levels of service) is expected to be subdued.

The need to decarbonise our economy will require putting downward pressure on new road investment. From 2025 to 2055, we estimate that the network-wide need to relieve congestion (from population growth) will be almost entirely offset by the impacts of decarbonisation. This means future travel demand will need to be accommodated by demand management (congestion charging) or shifting modes of transport, rather than additional road capacity. This is particularly true for state highway investment, which has been historically much more sensitive to increases in travel demand than local roads.

International benchmarking of road networks

Comparator countries: CAN, CZE, FIN, ISL, NOR, ESP, SWE



While New Zealand has a roughly average-sized road network, our investment levels are comparatively high: more than our average comparator country, and well above the OECD average.

New Zealand's roads are sparsely used, overall, for both freight and passenger travel. For instance, on a per kilometre of road basis, passenger volumes in New Zealand are almost a third of the average OECD country, and freight volumes are about half. But this is also the case with our comparator countries.

Across several different metrics of quality, including congestion, speeds and road smoothness, our network is about average. Where we are behind is the safety of our roads, which have notably higher fatality rates than our peer countries, although addressing this isn't necessarily solved entirely with infrastructure.

Rail Transport

If we want to keep what we have, it will require investment

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$0.41	$0.55	$0.68
Demographics	$0.07	$0.06	$0.06
Income growth	$0.04	$0.07	$0.08
Resilience	$0.07	$0.12	$0.15
Decarbonisation		See following page	
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	-$0.12	-$0.03	-$0.01
Cost inflation	$0.05	$0.14	$0.22
Total	$0.52	$0.91	$1.17
Average 2010-2022	**$0.44**		

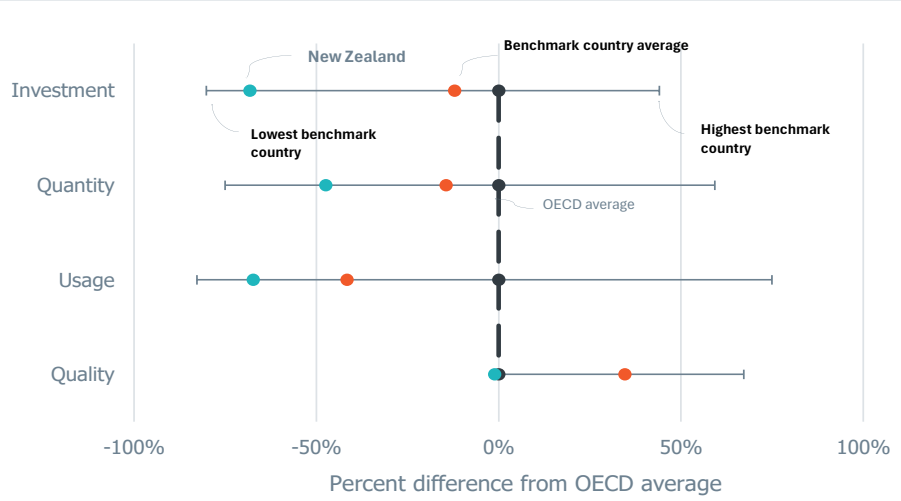
Investment in New Zealand's rail network peaked just before the turn of the 20th century and since then, has not kept pace with renewal needs, a trend that accelerated after the expansion of the road network in the 1940s and 1950s. However, investment in rail in recent years is the highest it has been since the 1970s.

Our modelling of investment demand across all sectors assumes renewals of existing assets. As such, our rail network investment forecast lays out rising investment requirements almost entirely driven by renewal needs and the need to protect the network from natural hazard risk. While growing in dollar terms, this investment forecast is still only about half the level observed in recent years as a share of GDP.

We also forecast relatively subdued willingness to pay for new rail investment as a result of future population and economic growth (manifesting largely as increased freight volumes). It is important to note that our forecast does not delineate between freight and metro rail networks. Since both are network infrastructure, optimal investment between those parts of the network should be guided by prices and user willingness to pay.

International benchmarking of rail networks

Comparator countries: CHL, FIN, GRC, ISL, JPN, NOR, ESP, SWE



New Zealand's rail network is characterised by very low levels of investment. In terms of length of track, it is similar to its peer countries, but the share of the network which is electrified is by far the lowest.

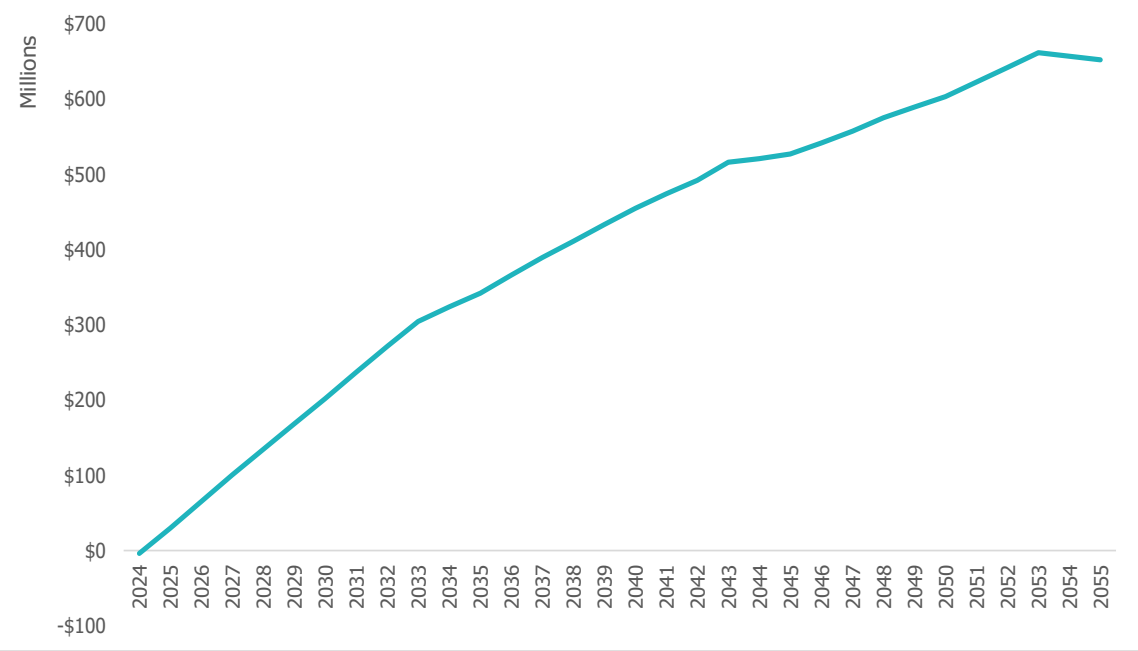
The rail network carries hardly any passengers relative to our peers, and freight volumes are below average. Other countries, such as Norway and Sweden carry similar amounts of freight, but they also carry more passengers on a per-kilometre of track basis.

The quality of New Zealand's rail services is rated relatively poor according to surveys by the World Economic Forum, but not the worst in our comparator set of countries. However, emissions per capita emitted by locomotives in New Zealand are the highest amongst our comparator countries by a large margin.

Public Transport and Active Modes

Increasing investment needed to meet decarbonisation goals

Annual public transport/active mode investment required above baseline levels to meet decarbonisation needs



Source: Motu Institute modelling of Climate Change Commission scenarios for the New Zealand Infrastructure Commission.

According to the Climate Change Commission, meeting the Fourth Emissions budget will require a change in how we travel. Specifically, to meet our decarbonisation goals, growth in private vehicle travel will need to moderate in favour of other modes of transport, such as public transport or active modes*.

We quantified this shift and its implications for infrastructure investment. In short, over the 30-year period, we forecast that nearly $13 billion (in 2023 NZD) will need to be spent on new public transport or active mode infrastructure, an annual average of approximately $378 million per year (Figure left). This is investment over and above business-as-usual levels of investment.

Based upon scenarios provided by the Climate Change Commission, this investment requirement is expected to be steadily growing, closely aligning with the downward investment effect of decarbonisation on road investment. In fact, the increased investment requirements for public transport and active modes are almost completely offset by downward investment pressure for roads.

What this implies is that to mitigate the costs of decarbonisation on households, central and local government will need to shift the mix of land transport investment from roads to other modes of transport, or manage demand for growing road capacity.

*See Final reports and modelling on the Fourth Emissions Budget: https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/preparing-advice-on-emissions-budgets/advice-on-the-fourth-emissions-budget/modelling-and-data-final-report/

Electricity and Gas

Technology change and decarbonisation will lift investment

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

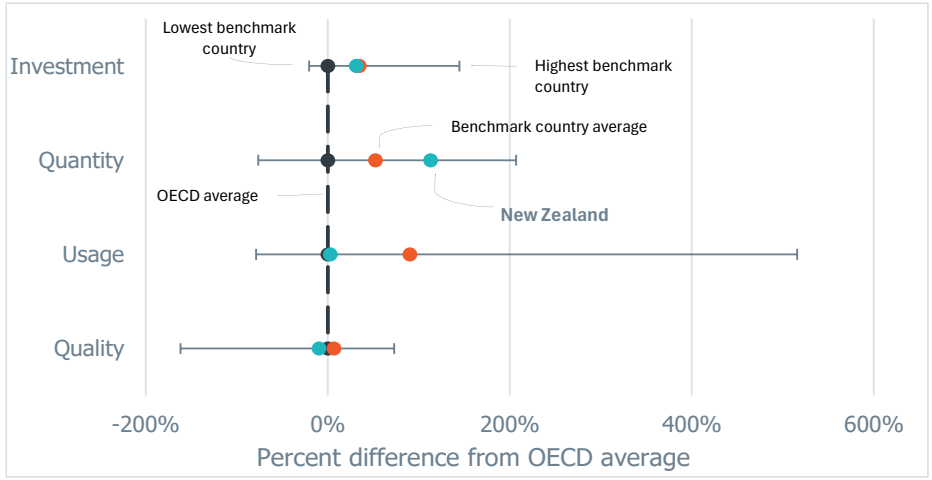
Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$2.91	$4.05	$4.93
Demographics	$0.97	$1.00	$0.84
Income growth	$0.46	$0.63	$0.73
Resilience	$0.33	$0.47	$0.57
Decarbonisation	$1.33	$0.51	$0.43
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	$0.41	$0.10	$0.02
Cost inflation	$0.83	$1.26	$1.87
Total	**$7.25**	**$8.02**	**$9.40**
Average 2010–2022	**$2.37**		

Decarbonising our economy is expected to required a sizeable, but not insurmountable, uplift in electricity investment. Over the 30 year period, based upon Climate Change Commission pathways, we estimate that this will require approximately $24 billion worth of capital investment above base level demand, or just over $700 million a year on average. Most of this investment (90%) will be in new generation, and the remaining will be in the transmission and distribution network. The timing of the investment is front-loaded in the next 10 to 15 years, with the remaining years of the forecast containing considerably less. This uplift in investment leads to an increased renewal requirement shortly thereafter, which flows into the later parts of the forecast. While this is a lift in investment, as a share of our GDP, it is well-below our peak (1960s and 1970s) and around the levels we were investing in the early 1980s.

Absent the requirement to decarbonise, capital investment requirements in the sector are relatively muted. We estimate that non-decarbonisation related demand for electricity investment and its subsequent renewal requirement would have totalled between $2 to $4 billion each year, which is only modestly higher than our average annual investment over the last 10 years.

International benchmarking of electricity networks

Comparator countries: CAN, CHL, COL, CRI, FIN, ISL, NOR, SWE



New Zealand's electricity network is somewhat unique. Our investment levels are about average compared to our peer countries. However, we have a very large transmission network (reflecting the large distances between where we generate and use electricity) and average sized-distribution networks. New Zealand also does not export any electricity, leading to average levels of energy generation on a per capita basis.

Reliability is a key quality metric in electricity, and on this measure, outages in New Zealand appear to be more frequent in number and duration than peer countries and among the highest in the OECD. However, electricity generation in New Zealand produces very low emissions relative to the OECD average and its comparator countries.

Water and Waste

An area to monitor

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$1.26	$1.39	$1.54
Demographics	$0.29	$0.25	$0.21
Income growth	$0.10	$0.11	$0.12
Resilience	$0.23	$0.25	$0.28
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	-$0.30	-$0.17	-$0.09
Cost inflation	$0.20	$0.34	$0.50
Total	**$1.78**	**$2.17**	**$2.56**
Average 2010–2022	**$1.74**		

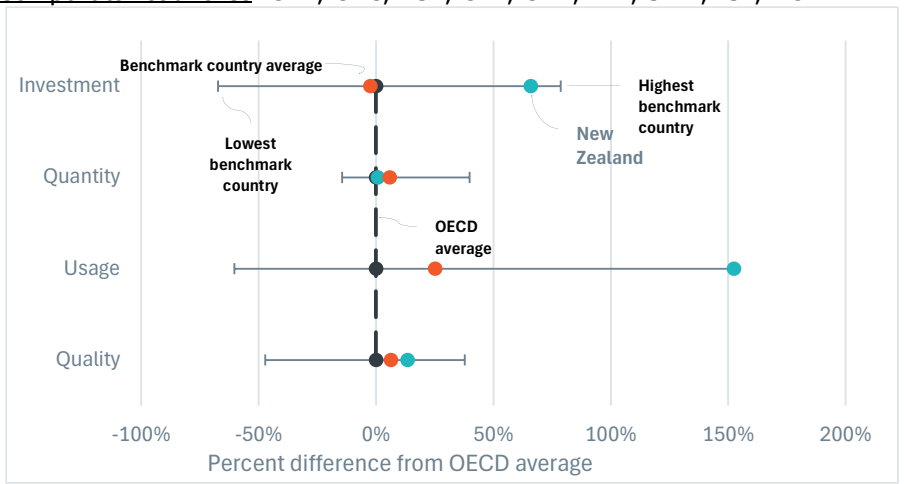
Investment in water and waste infrastructure has been elevated as a share of GDP for the last 20 years (about 0.6% of our GDP on average), following a period of clear underinvestment that occurred during the 25-year period from 1975 to 2000. In recent years water investment as a share of GDP has been the amongst highest levels in our history.

Some of this could be in response to backlogged renewal requirements, but our investment modelling suggests the current level of spending must be explained by some other factors, such as rising environmental quality standards.

Renewals are the largest driver of future demand. Expanding water networks to meet population growth will be a large driver in the near term but growth becomes less important over time. Water infrastructure is relatively exposed to natural hazard risk, particularly from flooding and earthquakes, so preparing for these events drives a sizable investment requirement over the next 30 years.

International benchmarking of water networks

Comparator countries: CHL, GRC, ESP, CZE, CAN, FIN, SWE, ISL, NOR



After being one of the lowest spending countries among its peers from 1980 through 1995, since 2013, New Zealand's investment in water is one of the highest in the OECD, and much higher than most of our comparator countries.

New Zealand's water network is appropriately sized in terms of length, but it has relatively few connections despite this high level of investment. Only 88% and 86% of New Zealand's population is connected to public water and sewerage respectively, which is low compared to its peers.

The average New Zealander uses 253 cubic metres of water per year, which is second highest in the OECD and higher than almost all its peers by a considerable margin.

While the network has reasonably high leakage rates, it isn't any worse than the average comparator country. Water network outbreak fatality rates are modestly higher than our comparator countries, however.

Primary and Secondary Education

Subdued investment need aside from renewals of existing schools

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$0.81	$0.81	$0.86
Demographics	-$0.11	-$0.02	$0.07
Income growth	$0.14	$0.15	$0.15
Resilience	$0.03	$0.03	$0.04
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	-$0.15	-$0.09	-$0.05
Cost inflation	$0.09	$0.17	$0.26
Total	**$0.83**	**$1.06**	**$1.33**
Average 2010–2022	**$1.05**		

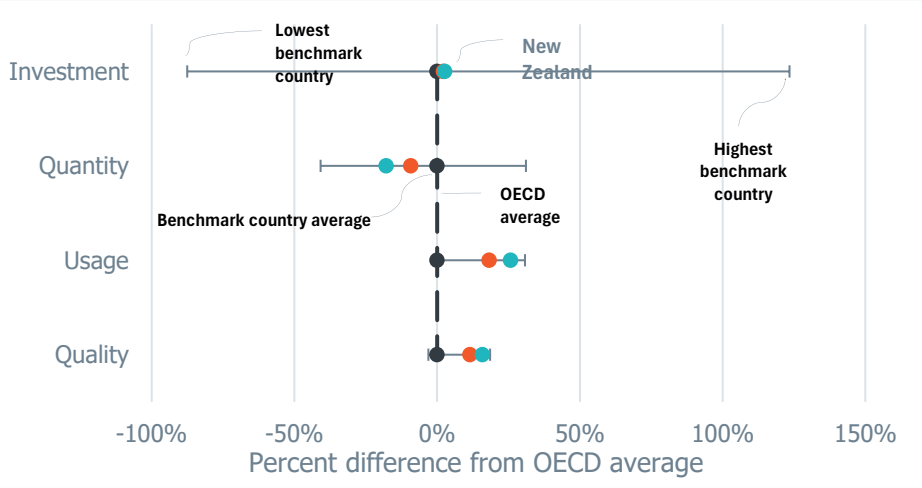
Historically, investment in schools is closely linked to demographic trends. From the mid 1950s through the late 1970s, the number of school-aged children grew from about 360,000 to 756,000. To accommodate this growth, we invested record amounts on building over 200 schools. As the number of children dropped through the 1980s and 1990s, spending dropped and many schools closed.

The projected ageing of our population over the next 20 years is reflected in our forward guidance for primary and secondary school investment. We forecast investment pressures for new or expanded schools to be concentrated in specific locations experiencing high population growth, but subdued for the country as a whole. Demographic trends mean that Māori students will make up a rising share of all students.

However, while this demographic shift is happening, many primary and secondary schools built during the 1970s are coming due for renewal, so renewal needs are relatively high in the first 10 years of our forecast. Once this renewal wave ends, overall demand for capital investment is expected to remain modest due to demographic trends.

International benchmarking of primary and secondary education

Comparator countries: CHL, FIN, AUS, ISL, NOR, USA, IRL



New Zealand spends a slightly higher share of its GDP investing in school infrastructure, similar to Nordic countries like Norway and Finland. On a per-student basis, we spend approximately the average.

The average New Zealand primary and secondary school has 358 students, slightly above the OECD average and in the middle of our comparator countries.

The overall quality of school infrastructure over does not appear to be affecting the quality of education in New Zealand relative to other countries. The share of school principals reporting a lack of, or poor quality, infrastructure affecting students education is relatively low in New Zealand, in line with our peer countries and lower than the average OECD country.

Tertiary Education

A renewal wave, but modest demand for investment otherwise

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$1.69	$1.81	$1.89
Demographics	$0.13	-$0.03	-$0.01
Income growth	$0.10	$0.11	$0.11
Resilience	$0.02	$0.02	$0.02
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	-$0.06	-$0.02	-$0.01
Cost inflation	$0.24	$0.35	$0.49
Total	**$2.11**	**$2.24**	**$2.49**
Average 2010–2022	**$1.61**		

Like primary and secondary schools, investment in tertiary education facilities is closely linked to demographic trends. The same demographic wave that saw primary school numbers increase during the 1950s through 1970s continued into the 1990s as tertiary student rolls greatly expanded, and with it, investment in tertiary education institutions. That enrolment peaked in the early 2000s and has declined slowly since.

Demographic trends suggest this decline in tertiary students will continue, putting downward pressure on investment demand over the next 30 years. Most of the investment demand will be in renewals of existing stock built during the 1990s and early 2000s. Tertiary education infrastructure has a higher depreciation rate than primary schools, which means that buildings and facilities are not nearly as long-lived, and require earlier replacement or renewal.

International benchmarking of tertiary education

We plan to investigate further international benchmarking on tertiary education networks after the publication of the draft plan. Information on education infrastructure that shows tertiary-only infrastructure is relatively limited in international databases like the OECD.

Over the last 10 years, New Zealand has invested about 0.6% of its GDP in tertiary education infrastructure, which is higher than the share of GDP invested in primary and secondary education infrastructure. There were just under 330,000 tertiary students in New Zealand, down from a peak of 430,000 in 2005. There are 8 universities in New Zealand and over 240 tertiary education organisations, according to the Tertiary Education Commission.

As part of our benchmarking for primary and secondary education, we gathered information on student numbers in tertiary education. Initial results show that the share of New Zealand's population that is enrolled in tertiary education is relatively average for its peers.

Telecommunications

Stable investment demand with technological uncertainties

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD			
Driver of demand	**2025–2035**	**2035–2045**	**2045–2055**
Renewals/replacements	$2.51	$2.95	$3.36
Demographics	$0.21	$0.19	$0.16
Income growth	$0.21	$0.25	$0.27
Resilience	$0.00	$0.00	$0.01
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	$0.00	$0.00	$0.00
Cost inflation	$0.36	$0.60	$0.86
Total	**$3.30**	**$3.99**	**$4.66**
Average 2010-2022	$2.14		

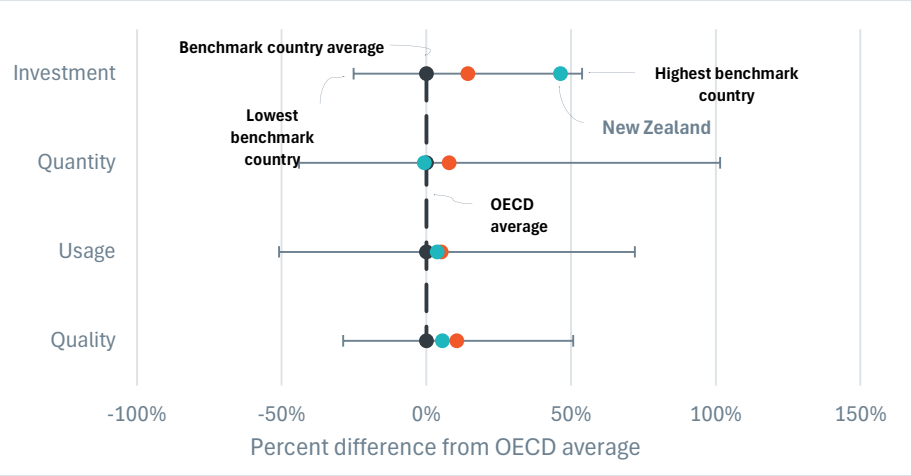
The telecommunications sector is characterised by technological innovations leading to rapid deployments of new networks and retirements of existing technologies. Telegraph networks gave way to landline telephones which gave way to mobile telephone and broadband networks. The sector has been in an investment boom since the 1980s, although peak levels of investment occurred in the 1990s and early 2000s. This rapid technological progress makes forecasting investment demand challenging.

Innovations in artificial intelligence and mobile phone technologies suggest that technology will continue to drive elevated investment in the sector.

Outside of technology, we forecast renewals or replacements of existing stock built up during the last 30 years will drive a significant amount of demand. Outside of that, a slower growing and ageing population might be a headwind for overall demand for investment.

International benchmarking of telecom networks

Comparator countries: COL, CRI, CHL, CAN, FIN, SWE, ISL, NOR



Over the past 10 years, New Zealand is one of the highest spending countries on telecommunications infrastructure as a share of our GDP, even when compared to our peer countries.

New Zealand's telecommunications performance relative to its peers can be divided into two separate networks: fixed broadband and mobile broadband. On fixed broadband, we perform roughly average against peer countries. However, our mobile broadband networks appear underdeveloped. This is particularly true of our 5G network, with only 14% of our population covered, one of the lowest in the OECD and well behind our peers. This underdeveloped network plays out in our usage, where New Zealanders use a very low amount of mobile data compared to our peers.

Notwithstanding the relatively underdeveloped nature of our mobile broadband networks, internet speeds on our broadband networks are on par with our peers.

Hospitals

Rising investment required to meet aging population needs

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

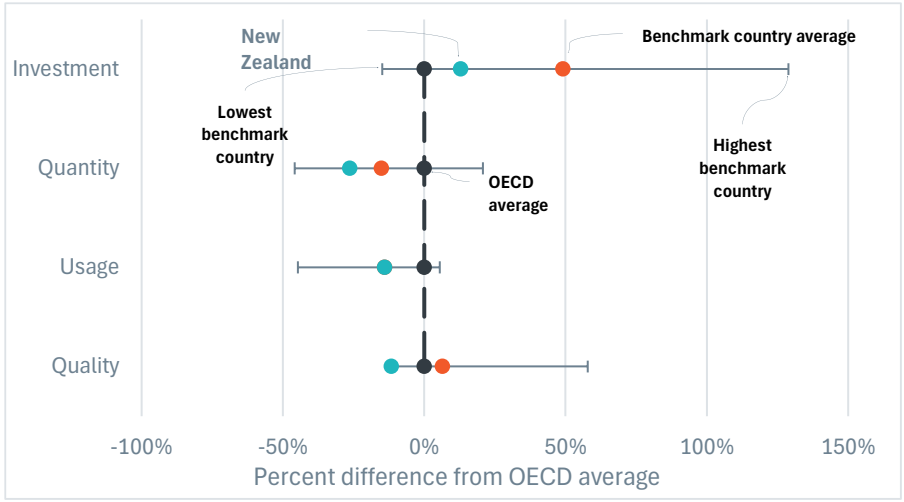
Driver of demand	2025–2035	2035–2045	2045–2055
Renewals/replacements	$0.83	$1.07	$1.27
Demographics	$0.35	$0.33	$0.22
Income growth	$0.10	$0.12	$0.14
Resilience	$0.02	$0.03	$0.03
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	$0.05	$0.01	$0.00
Cost inflation	$0.17	$0.29	$0.41
Total	**$1.52**	**$1.86**	**$2.07**
Average 2010–2022	$0.75		

Investment in health infrastructure is driven by several factors, including population and demographics, income and standards growth, technological change and systems for health delivery. Hospital investment in New Zealand experienced a boom from 1945 through the mid-1980s, at first in response to population growth, but over time driven by improving the quality of existing capacity, which may be a response to medical innovations. Over the past 10 years, hospital investment has slowed to near-historical lows.

We forecast a significant uplift in investment to meet need, largely driven by two factors. First, renewals of existing stock built during the boom period will drive a large portion of demand. Second, a rapidly ageing population is expected to put upward pressure on hospital investment demand. Technological change and more efficient delivery systems may reduce this future need, although this is comparatively more uncertain.

International benchmarking of health infrastructure

Comparator countries: UK, AUS, SWE, DEN, ISL, NOR



Our benchmarking analysis focused largely on health infrastructure measures, rather than overall health system measures. With this focus, for the metrics we gathered, New Zealand generally underperforms its peer countries across the four key areas we studied, but not to a large degree.

On a per-person basis, our level of infrastructure spending is below average relative to our peers. New Zealand has a relatively low number of hospital beds, although this may reflect how countries deliver healthcare.

We also appear to have low amounts some medical equipment, like PET scanners or gamma cameras, compared to our peer countries. Waiting times for elective surgeries, which could reflect infrastructure availability (operating theatres, equipment), are higher than most of our peer countries.

Hospital usage in New Zealand is relatively low in New Zealand and the rate of in-hospital infections is low. There is also evidence that our hospitals are older relative to the UK, one of our comparator countries.

Public Administration and Safety

A renewal wave, but stable investment demand otherwise

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$2.51	$2.81	$3.07
Demographics	$0.21	$0.10	$0.03
Income growth	$0.19	$0.22	$0.23
Resilience	$0.13	$0.14	$0.15
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	-$0.12	-$0.05	-$0.02
Cost inflation	$0.36	$0.57	$0.80
Total	**$3.28**	**$3.80**	**$4.27**
Average 2010–2022	**$2.80**		

Public administration and safety is a broad category of infrastructure that includes central and local government administration buildings, courthouses, prisons, and defence infrastructure. It is a large sector, composed of over $30 billion worth of assets (excluding land), and some of the subsectors are significant; defence and corrections infrastructure are worth over $9 billion and $4 billion, respectively.

These sectors are currently grouped together in our analysis due to the way that historical statistics that we used to develop this forecast were compiled and reported. We are considering options for disaggregating this data.

Our forward guidance for this sector is largely stable. The focus of investment in the next 10 to 20 years should be on renewals of the stock built during the 1980 through the 2000s. Like other networks however, demand from population and income growth is expected to be relatively modest.

Demand for justice, corrections, and defence is hard to predict. Policy and geopolitical factors play an outsized role in determining investment needs. As such, our investment forecasts for this sector are subject to considerable uncertainty.

As a share of GDP, our investment forecast for the sector corresponds to what we've invested on average of the last 120 years (0.7%), a period that has also contained policy and geopolitical uncertainty.

International benchmarking of public administration and safety

We did not complete international benchmarking of public administration and safety networks. This is due to the lack of consistent benchmarking data on infrastructure in this sector, but also because this sector includes different and distinct types of infrastructure (administration buildings, justice buildings, prisons, and defence infrastructure).

In future versions of the Needs Analysis, we hope to have more data by each of the subsectors contained within public administration and safety. This will give us a clearer view of the level of investment and quantities of infrastructure within each subsector to do international benchmarking.

Social Housing

Investment demand that reflects overall housing needs

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$0.52	$0.68	$0.82
Demographics	$0.20	$0.22	$0.16
Income growth	$0.08	$0.10	$0.12
Resilience	$0.05	$0.07	$0.08
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	$0.15	$0.04	$0.01
Cost inflation	$0.13	$0.21	$0.29
Total	**$1.13**	**$1.31**	**$1.48**
Average 2010–2022	**$0.51**		

Producing forecasts for public housing investment is difficult because it relies upon assumptions about the composition of the overall housing (public versus publicly provided), and how governments respond to housing needs. Across time and countries, governments have opted to construct more or less social housing alongside the private market. It is also unclear whether the full investment of Kāinga Ora has been included in official Stats NZ data in recent years. As such, our forecasts for social housing should be taken with caution.

What is clear is that the New Zealand public sector's position in the overall housing market has changed dramatically over the past 80 years. In the immediate post-war period (1945–1955), the government was spending more than 1.2% of GDP on social housing, more than we currently spend on transport investment today. The next 20 years saw rapid declines in investment, until levelling off at between 0.1% and 0.2% of GDP since the 1980s.

Our modelling suggests that there should have been increased investment in social housing over the last several decades to account for population growth and renewals of existing stock. The level of investment forecast is notably higher than it was over the past 20 years to make up for this underinvestment.

International benchmarking of social housing infrastructure

After some initial investigation, we did not complete a comprehensive international benchmarking exercise for public housing. There are numerous ways that the public sector can assist individuals with housing cost burdens. This includes building and owning social housing with subsidised rents, but it could also include providing subsidies or transfers to individuals to use in the private market.

Based upon information from the OECD's Questionnaire on Affordable and Social Housing (QuASH), New Zealand's investment in social housing is the highest as a share of GDP compared to other OECD countries. Spending on rent subsidies is also comparably high.

The share of our housing stock that is public housing (3.8%) is low compared to the OECD (7%). However, it is not necessarily low compared to similar countries like Canada and Australia.

Other Public Capital

Stable investment demand

INA Investment Forecast

Average annual investment requirement, billions in 2023 NZD

Driver of demand	2025–2035	2035–2045	2045–2055
Renewals	$0.51	$0.59	$0.66
Demographics	$0.09	$0.08	$0.07
Income growth	$0.06	$0.07	$0.07
Resilience	$0.04	$0.04	$0.05
Decarbonisation	$0.00	$0.00	$0.00
Technology and other	Not quantified	Not quantified	Not quantified
Shortages/Surpluses	-$0.05	-$0.02	-$0.01
Cost inflation	$0.08	$0.13	$0.19
Total	**$0.73**	**$0.89**	**$1.03**
Average 2010–2022	**$0.55**		

Other public capital is a sector that encompasses a wide range of public assets. These include government-owned digital infrastructure (servers), community and sports facilities, childcare and social assistance facilities, museums, stadiums, and convention centres.

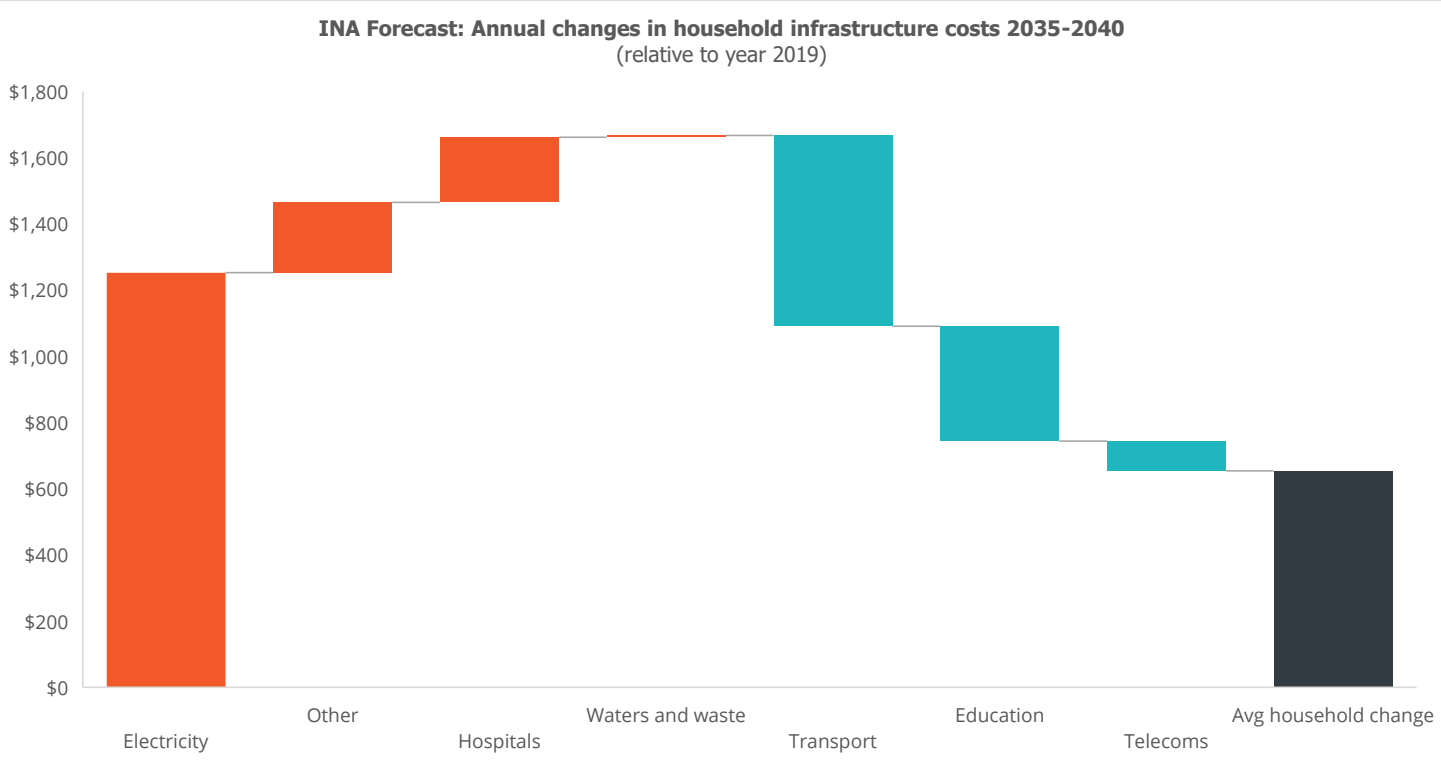
Over the past 20 years, investment as a share of GDP has averaged about 0.2% of GDP, without much volatility. Our forecast continues this trend, with the increased investment in dollar terms largely reflecting growth in the economy.

International benchmarking of other capital networks.

We did not complete international benchmarking of this network. This is due to the wide range in the types of assets in the sector.

What does this mean for households?

Higher electricity charges, less transport costs



There are choices about how we fund and finance our forecast investment path. But regardless, New Zealanders will have to pay, by households, through taxes, rates, or user charges. To understand whether our investment forecasts are likely to be affordable for New Zealanders, the Commission has modelled household budget impacts based on scenarios for the mix of user charges and taxes typically used to pay for investment.

Our modelling indicates that meeting investment needs will require higher charges or taxes in the short and medium terms (relative to 2019 levels). This is largely due to the increased investment need in electricity, which is primarily funded by user charges. Central government can help mitigate this increase by adjusting charges and taxes in response to moderating demand for transport and education infrastructure (figure left).

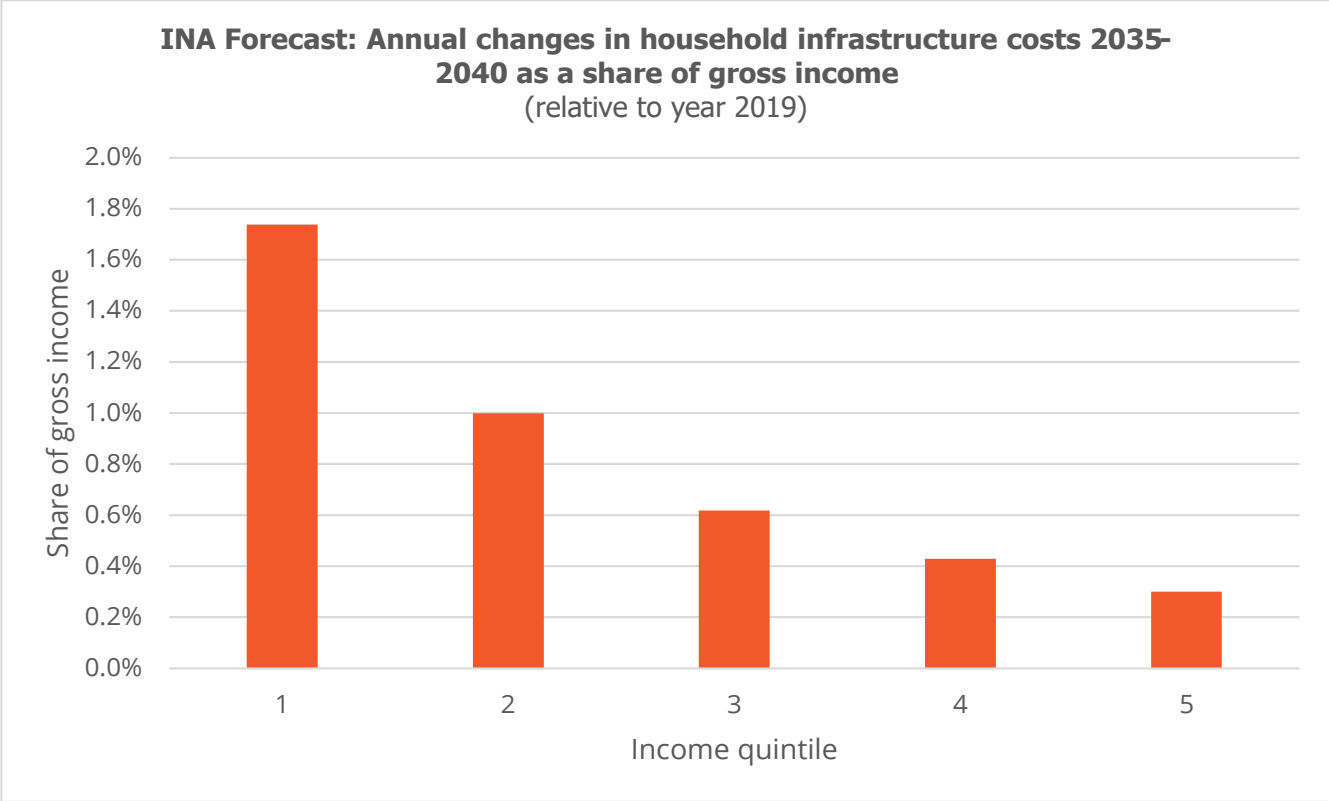
Notes: Modelling is based upon household expenditure on infrastructure services from the 2015 and 2019 Household Expenditure Surveys. This modelling builds upon work completed for our 2023 Research Insights report ('How much do we pay for infrastructure?'). In effect, it takes a fixed amount of additional spending (over and above baseline levels) and allocates it over all households based on data or estimates of their propensity to use or access infrastructure networks.

The modelling allows us to make different assumptions around how future infrastructure is funded (user charges vs taxes), how it is financed, and the share of costs passed through to businesses and consumers. The figure above are the results if network infrastructure requirements are funded by user charges and other infrastructure are funded by income taxes, with 90% passed through to consumers.

These results are indicative and will vary depending around these parameters. We plan on building upon this model to include different scenarios prior to the publication of the Final National Infrastructure Plan.

What does this mean for households?

Higher electricity charges, less transport costs



Lower-income households are expected to pay larger shares of their income towards meeting future infrastructure needs (figure left). More generally, lower-income households tend to spend a greater share of their incomes on infrastructure services. This is particularly the case for public transport.

Electricity investment, which is the sector that will require the greatest uplift in our forecasts, is largely variable funded by user charges (i.e., usage-based rates). This means that higher income households pay more in dollar terms because they use more electricity. However, user charges (as opposed to general taxation) tend to affect lower-income households more as a share of their income.

This increase could be partially offset a lower-investment requirement for transport infrastructure. These user charges (FED, RUC, and registrations) will benefit lower-income households disproportionately, as private transport costs are the highest category of infrastructure expenditure for low-income households.

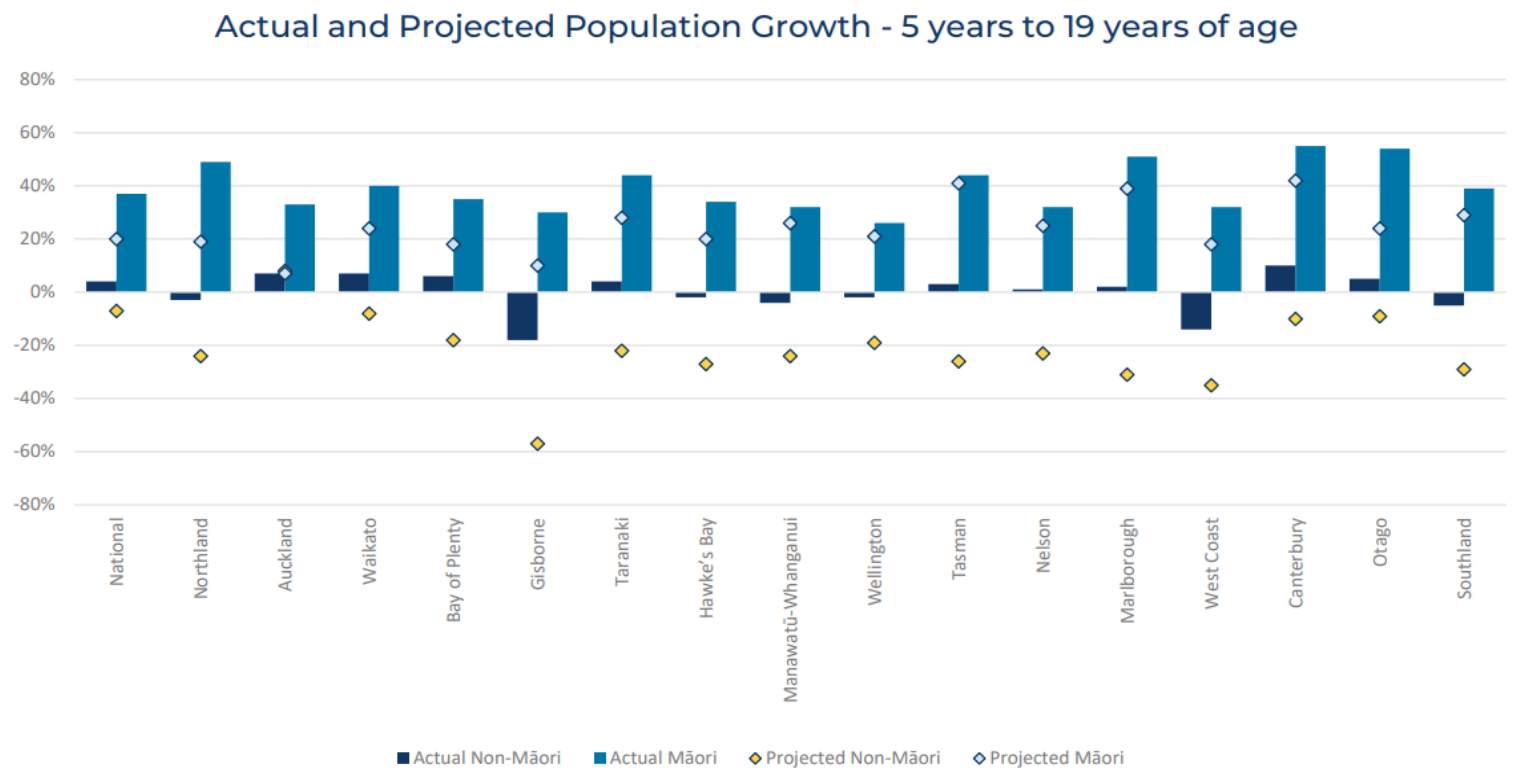
Moreover, as noted earlier, our modelling does not examine the overall impacts of operating expense. Electrification may further reduce private transport costs reduced less petrol and vehicle maintenance costs.

Infrastructure needs for Māori

Māori communities have different investment needs

Māori will have greater primary school needs than the overall population

Māori are a much younger population



Note: Actual population growth reflects growth between 2013 and 2023 Censuses. Projected growth is from Stats NZ 2018–2043 population projections.
Source: 'Analysing the Impact of Long-term Investment Drivers on Māori', Nicholson Consulting. Commissioned by the New Zealand Infrastructure Commission, March 2025.

The drivers of demand we identify for future investment need may affect Māori populations differently. Certain infrastructure decisions may prevent the ability of Māori to exercise kaitiakitanga (guardianship) over te taiao, or disrupt connections to their whenua (land), which are central to maintaining and enhancing Māori wellbeing.

While our forecasts present the overall picture of investment needs across sectors, we recognise that the story could be quite different for Māori populations.

An example of this is the need for new or improved schools. Overall, the growth in the student-age population in New Zealand is expected to fall, which is reflected in our investment forecast as subdued need for increases in investment beyond renewing existing schools.

However, this demographic dynamic is the opposite for Māori populations, which are expected to have significant growth in school age populations (figure left). In addition to increased investment to meet expanding student rolls, this dynamic may also increase the availability of schools with Māori immersion settings.

Infrastructure investment to lift fiscal constraints on infrastructure needs

Investing with an eye on the future

Can investments now help us meet needs in the future?

Base

The source of money for infrastructure funding.

Examples: Number of rating units in a city

Charge

The rate or portion each person or dollar pays

Examples: Water and sewerage connection charge

Revenue

Base multiplied by the charge

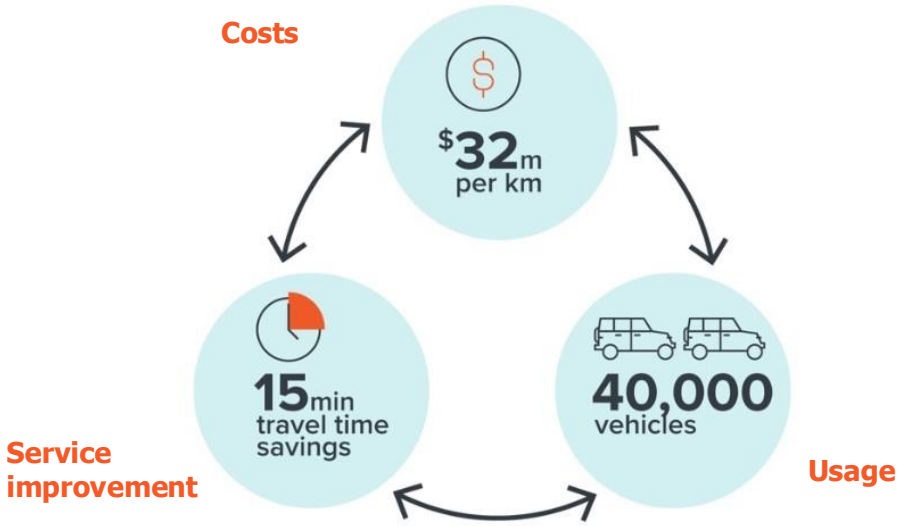
We generate money to pay for sustainable infrastructure investment needs either by raising charges, or by growing the revenue base. We can grow our base by enabling significant economic or amenity benefits that people will pay for, or by growing our population.

The question is, **can public infrastructure investment expand our revenue base so we don't have to raise charges to meet future infrastructure needs?**

Project quality matters

We can lift fiscal constraints by building good projects

When can tolling lead to cost recovery for a new road?



Source: New Zealand Infrastructure Commission Te Waihanga. *Buying time: Toll roads, congestion charges, and transport investment. 2024*

When can land value capture lead to cost recovery for transport projects?

Source: New Zealand Infrastructure Commission Te Waihanga. *Paying it back: an examination of the fiscal returns to public infrastructure investment. 2024*

Our research has found that high-quality, cost-effective projects will generate benefits people are willing to pay for, thereby lifting fiscal constraints on meeting future needs. Projects that serve many users, have lots of beneficiaries, at an affordable and certain cost, are more likely to be able to pay for themselves, rather than rely on consolidated funding sources which have numerous investment pressures.

Conclusions

Summary of findings

Two key takeaways from our work

1

Despite our challenges, our infrastructure networks measure up reasonably well

Our forecast and international benchmarking results do not point to across-the-board quality and quantity issues in our infrastructure networks.

Rather, it is a nuanced story. Some networks, such as roads and water, we appear to have an efficiency issue, where we spend a lot but have average infrastructure quality. Other networks, like hospitals, our low levels of spending have led to below-average infrastructure quality and the need to invest more to address maintenance and renewal backlogs.

2

Meeting future infrastructure needs will face headwinds, so we must prioritise

New Zealand has spent over 150 years building a sizeable infrastructure network that serves us reasonably well. Renewing or replacing, let alone adding to, these networks requires financial resources.

Population and income dynamics over the next 30 years will present challenges for us to maintain and improve our networks. Prioritisation of our resources to areas of highest value is critical. Continually raising charges to fund everything is not affordable or sustainable.

Our forecast has identified key areas where more investment will be demanded (health, electricity). But to keep the overall level of infrastructure investment affordable to New Zealanders, this will also require redirecting resources away from other areas that are seeing declining investment demand. It will also require a rigorous appraisal of projects to determine the best use of our infrastructure dollars.

Future work for the Needs Analysis

Potential extensions for future versions

- This work represents our first attempt at taking a system-level view of infrastructure needs. But we recognise that more can be done.

- Areas for future work include:
  - Considering complementary or substitutability between types of infrastructure types (i.e., is it more efficient to meet freight needs with road, rail, or shipping?)
  - Examining infrastructure needs at a regional council level or a rural/urban level
  - A physical asset view on investment needs (i.e., how many hospitals will we need?), rather than investment spending
  - Forecasting maintenance and operation costs in addition to capital investment costs