



# How is our infrastructure tracking?

Monitoring progress against New Zealand's first Infrastructure Strategy



## New Zealand Infrastructure Commission | Te Waihanga

Te Waihanga seeks to transform infrastructure for all New Zealanders. By doing so our goal is to lift the economic performance of Aotearoa and improve the wellbeing of all New Zealanders.

We are an autonomous Crown entity, listed under the Crown Entities Act 2004, with an independent board. We were established by the New Zealand Infrastructure Commission/Te Waihanga Act 2019 on 25 September 2019.

Information on the Commission is available at [www.tewaihanga.govt.nz/](http://www.tewaihanga.govt.nz/)

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# Foreword

New Zealand's first Infrastructure Strategy, Rautaki Hanganga o Aotearoa, was released in May 2022. The Strategy set a pathway to transform infrastructure for all New Zealanders.

This is the New Zealand Infrastructure Commission's first monitoring report of the Strategy. The aim of our monitoring work is to track progress against the Strategy, as well as to identify areas where more effort is needed.

In several areas, we have seen heartening progress against the Strategy's objectives. For example, we are moving towards a renewable energy future. New consents issued for renewable energy generation have nearly doubled in a year and progress is being made to develop an offshore wind market. But we need to pick up the pace and do more to ensure overall security of supply. We can't just rely on solar and wind to fill the energy generation gap.

Similarly, proposed new fast-track legislation has the potential to be a game changer for infrastructure projects of regional and national significance, provided the right checks and balances are in place. However, reform of the resource management system remains one of the most pressing obstacles to the achievement of the Infrastructure Strategy objectives. The Government has signalled an intention to move quickly to develop a new regime that will deliver fewer resource management plans, shorter consent times and less litigation – this is an area we will be monitoring closely.

We have seen improvements in how demand for infrastructure is managed, which has improved infrastructure outcomes. For example, volumetric charging in New Plymouth has reduced water lost from leaks to such an extent that scheduled new investment has been deferred. Congestion, or time-of-use, charging is proven to reduce demand for road space at peak times. Draft congestion charging legislation is ready to go. Auckland Council and the Government agree that is needed and it is time to get on with it. Legislating for congestion charging remains a critical move in improving transport outcomes and enabling Auckland, and other congested cities, to implement this is a priority action.

While good progress has been made on some of the Strategy's objectives, our monitoring work found there are still areas where we need to make significant changes. For example, New Zealand invests more than the median OECD country in its public infrastructure, as a proportion of GDP, and is near the bottom 10% of countries on the efficiency of that investment.

Since the Strategy was published in May 2022, the infrastructure environment has become more challenging – it is getting more expensive to build at a time when the country is becoming more fiscally constrained. The need for a greater focus on efficiency is paramount not only for our new investments, but also for how we get the most out of our existing investments.

In some sectors, we also need to do much better at infrastructure asset management and maintenance. Te Waihanga research has found that for every \$10 we spend on infrastructure, \$6 needs to be spent on maintenance. While renewal spending equals or exceeds depreciation in some sectors (such as electricity distribution), it is below depreciation in a number of others such as state highways, local roads, water supply, wastewater and stormwater infrastructure, leading to declining asset condition.

There have been bright spots for infrastructure delivery: Watercare's Central Interceptor is being built on time and with a budget increase in line with inflation, despite the challenges of the COVID-19 pandemic. SH25A was rebuilt well ahead of schedule after incurring significant damage due to the North Island weather event in January 2023. These examples show that with the right project disciplines and environment, new infrastructure can be delivered efficiently, but examples like these are often the exception. Cost estimation and forecasting need to improve – ongoing infrastructure delivery cost benchmarking can help this. Knowing what projects should cost to build and maintain, based on both local and international data, can guide us towards better infrastructure decisions.

The Strategy stressed the importance of undertaking robust investment decision-making processes to ensure value for money. More robust decision-making processes must be accompanied by increased project leadership capabilities. In line with the Strategy, Te Waihanga is working with major project leaders and leadership development professionals to create a learning development framework and programme that will support current and aspiring major project leaders.

As we look forward to the next year, our focus is on using the information and expertise Te Waihanga has developed to support and promote the ongoing implementation of the Infrastructure Strategy. We will continue to deliver the actions assigned to us in the Strategy and will support the Government as it lays down its long-term infrastructure investment plan, through the proposed National Infrastructure Agency, and the development of a National Infrastructure Plan.



**Dr Alan Bollard CNZM**

Board Chair

7 May 2024

# Kupu Takamua

I whakaputaina te Rautaki Hanganga o Aotearoa, te rautaki tūāhanga tuatahi a Aotearoa, i te marama o Haratua i te tau 2022. I whakatakotohia e te Rautaki he huarahi hei whakaumu i te tūāhanga mō ngā tāngata katoa o Aotearoa.

Koinei te pūrongo aroturuki tuatahi a Te Waihanga mō te Rautaki. Ko te whāinga o ā mātou mahi aroturuki he whai haere i te koke ki te Rautaki, me te tautohu i ngā wāhi me nui ake te whakapau kaha.

Kua kitea e mātou te koke mārika ki ngā whāinga o te Rautaki i roto i ētahi o ngā wāhanga. Hei tauira, kei te anga whakamua tātou ki tētahi āpōpō pūngao whakahōu. Kua tata huaruatia ngā whakaae hōu mō te whakatupu i ngā pūngao whakahōu i te tau kua taha, ā, e koke whakamua ana te whakawhanaketanga o tētahi māketete hau ki te aumoana. Engari me tere ake tātou, me nui ake te mahi e tutuki ana i a tātou hei whakaū i te whakamaru whānui o te whakarato. E kore e taea e tātou te whakawhirinaki noa ki te rā me te hau ki te whakakī i te āputa whakatupu.

Waihoki, tērā te pitomata o te pire whakahohoro ture ki te whakaumu i te āpōpō o ngā pūtere tūāhanga tāpua ā-rohe, ā-motu anō hoki, engari me whakarite ngā tukanga mō te arowhai me te papanga. Ahakoa ko te whakahōu tikanga o te pūnaha whakahaere rawa tētahi o ngā tino taitapu tonu ki te tutukinga o ngā whāinga o te Rautaki Hanganga. Kua tohua e te Kāwanatanga he koronga ki te tere huri atu ki te whakawhanake i tētahi tikanga whakahaere hōu ko tōna tukunga iho ka iti atu ngā mahere whakahaere rawa, ka poto atu anō hoki ngā wā whakaae, ā, ka iti atu ngā take hei whakawā mā ngā kōti - ka āta aroturukitia e mātou tēnei wāhanga.

Kua kite mātou i te āhua e pai ake ai ngā hua tūāhanga mā ngā whakapakaritanga ake o te whakahaeretanga o te popono mō te tūāhanga. Hei tauira, nā te uta i te utu ine rōrahi i Ngāmotu i nui taioereore ai te heke iho o te ngaronga o ngā wai. Nā te pērā kua whakatārewahia te haumi hōu i whakaritea. Kua hāponotia mā te utu kūkā, arā, te wā whakamahī, e heke iho ai te popono mō te huarahi i ngā wā e mātotoru ana ngā waka. Kua rite te pire mō te utu kūkā. E whakaae ana te Kaunihera o Tāmaki Makaurau me te Kāwanatanga e matea ana tēnei, ā, kua tae ki te wā ki te whakatinana. He mea whaitake te whakature i te utu kūkā ki te whakapai ake i ngā putanga tūnuku. He mahi whakaarotau tēnei te whakaahei i Tāmaki Makaurau me ētahi atu tāone nunui kūkā hei whakatinana i tēnei.

Ahakoa he pai te koke i ētahi o ngā whāinga o te Rautaki, i kitea e ā mātou mahi aroturuki tērā tonu ētahi wāhanga me nui whakaharahara ā mātou panoni. Hei tauira, he nui ake te haumi a Aotearoa i te whenua waenga o Te Rōpū Whakakotahi Ōhanga me te Whanaketanga i ana tūāhanga tūmatanui, hei wāhanga o te tapeke wāriu hokonga, engari ka taka tātou ki te takere 10% o ngā whenua i te whāomo o taua haumi.

Nō i te tānga o te Rautaki i Haratua 2022, kua uua ake te taiao tūāhanga – kei te piki haere te utu mō te hanga i te wā e piki ake ana te aukati i te whakapau pūtea. He mea nui whakaharahara kia nui ake te aro ki te whāomo, kua mō ā tātou haumi hōu anake, engari, mō te āhua e whakanui ake ai i ngā hua i ā tātou haumi o te wā.

I ētahi rāngai, me pai noa ake tā tātou whakahaere rawa tūāhanga, tautiaki anō hoki. Kua kitea e te rangahau a Te Waihanga, mō ia \$10 e whakapaua ana e tātou i te tūāhanga, \$6 me whakapau ki te tautiaki. Ahakoa he ōrite, he nui ake rānei ngā hekenga wāriu i ētahi rāngai (perā i te tohatoha hiko), kei raro iho i te hekenga wāriu o ētahi atu pērā i ngā huarahi matua, me ngā huarahi o te rohe, me te tūāhanga mō te whakarato wai, me te waipara, me ngā wai āwhā, nā reira ka whanatu tēnei ki te hekenga o te āhuatanga o ngā rawa.

Heoi, tērā ngā piki o te tuku tūāhanga: Kei te hangaa te Mīhini Hurihuri Pokapū a Watercare e ū ana ki te wā i whakaritea me tētahi pikinga o te tahua pūtea e rite ana ki te pikiutu tukipū, ahakoa ngā wero o te mate urutā o KOWHEORI-19. I oti tōmua noa atu te hangaia anō o SH25A i mua i te wā i whakaritea i muri i te pakaru nui taioreore nō te tūāhuatanga huarere o Te Ika a Māui i Kohitātea 2023. E whakaatu ana ēnei tauira mā ngā raupapa tika me te taiao, ka taea ngā tūāhanga hōu te whakaoti whāomo, engari, i te nuinga o te wā he okotahi kē ēnei momo tauira. Me pai ake te whakapae utu me te matapae - ka taea te whakapaerewa utu tuku tūāhanga haere tonu te āwhina ki te whakatutuki i tēnei. Mā te mōhio ki te utu e tika ana hei hanga, hei tautiaki anō hoki i ngā pūtere, e takea ana i ngā raraunga ā-motu, ā-huriao anō hoki, tātou e ārahina ai ki ētahi whakataunga tūāhanga pai ake.

I mirimiratia e te Rautaki te hiranga o te whakahaere i ngā tukanga whakatau pakari hei whakarite i te wāriu nui mō te utu pāpaku. E matea ana e ngā tukanga whakatau pakari ake ngā pūkenga ārahi pūtere kaha ake. E rite ana ki tā te Rautaki, kei te mahi tahi a Te Waihanga me ngā kaiārahi pūtere mātuatua me ngā ngaio whakawhanake kaiārahi ki te hanga i tētahi anga whakawhanake ako me tētahi hōtaka hei tautoko i ngā kaiārahi pūtere mātuatua o nāianei, o anamata anō hoki.

I a mātou e titiro whakamua ana ki te tau e haere ake nei, ko tō mātou aronga ko te whakamahi i ngā pārongo me te tohungatanga kua whakawhanakehia e Te Waihanga hei tautoko, whakatairanga hoki i te whakatinana haere tonu o te Rautaki Hanganga. Ka haere tonu mātou ki te whakatutuki i ngā mahi kua whakaritea mai ki a mātou i roto i te Rautaki me te tautoko anō hoki i te Kāwanatanga i a ia e whakatakoto ana i tana mahere haumi tūāhanga wāroa, mā roto i te Pūtahi Tūāhanga ā-Motu, me te whakawhanaketanga o te Mahere Tūāhanga ā-Motu.

Dr Alan Bollard CNZM

Nā te Heamana

7 May 2024

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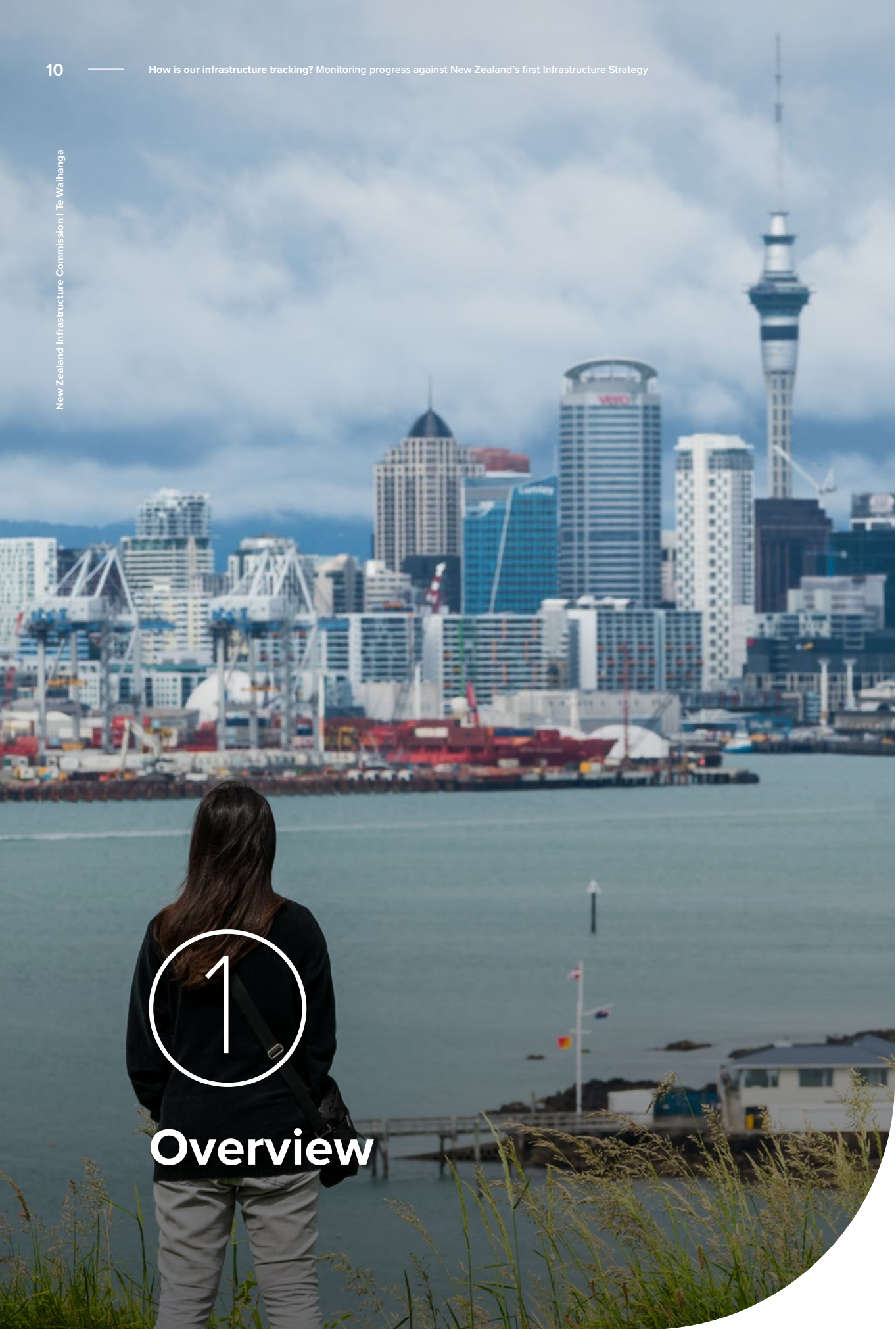
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# Overview



## Our infrastructure lays a foundation for the people, places, and businesses of Aotearoa New Zealand to thrive.

In May 2022 the New Zealand Infrastructure Commission (Te Waihanga) released New Zealand's 30-year Infrastructure Strategy, with a clear call for action: that we must be smarter about how we plan, build, and use our infrastructure. Two years have now passed. In that time, we have experienced catastrophic weather events, a cost-of-living crisis, and supply chain disruption related to geopolitical issues. New Zealand has also had a change of Government. In this report we consider how well the Infrastructure Strategy has fared – what has been achieved and what remains to be done. This report covers the reporting period from May 2022 to December 2023, with updates to 31 March 2024 included where available.

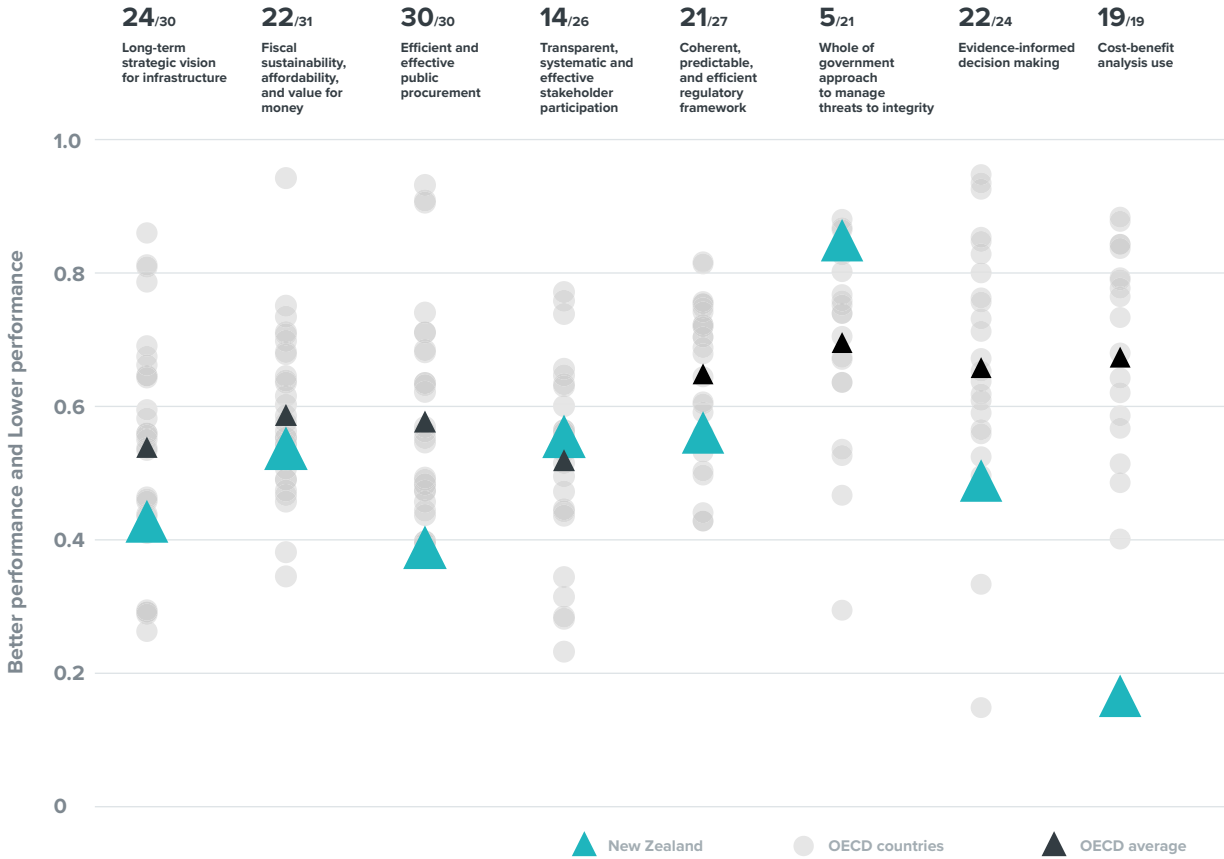
## Efficiency and value for money remain our big infrastructure challenge.

New Zealand currently spends more than Australia and the median OECD country on public infrastructure as a percentage of GDP, but ranks near the bottom 10% of high-income countries for the efficiency of that spend. As a country, we face challenges turning our many resources into infrastructure services. We see this in input costs, where infrastructure prices have risen one-third faster than prices elsewhere in the economy; and in productivity, where infrastructure construction productivity has grown at only one-third of the rate of the overall economy.

The fiscal environment is changing. Government debt levels, while still relatively low, are increasing, and current spending is exceeding current revenues.<sup>1</sup> Looking ahead, we expect tighter fiscal management and greater emphasis on efficiency. On this marker, there is ample room for improvement. A recent OECD benchmarking exercise<sup>2</sup> shows that New Zealand ranks below average for many core elements of infrastructure governance, including the predictability of our regulatory environment, evidence-based decision-making, and value for money (see **Figure 1**). However, New Zealand ranks last in the OECD for the use of social cost-benefit analysis in infrastructure decision-making. This poor standing is in contrast to relative strengths for stakeholder participation and our whole-of-government approach to integrity.

## There are a variety of opportunities for New Zealand to get better at infrastructure

Figure 1: OECD benchmarking of infrastructure governance



Source: OECD

## The cost of maintaining and renewing the existing asset base is our largest infrastructure cost.

Our public infrastructure assets, excluding land, are worth \$287 billion, or \$55,800 per person, and we now have 70% more infrastructure per person than we did a generation ago. <sup>3</sup> Infrastructure assets are long-lived, but they wear out due to use, weather damage, and other factors. For every \$10 we spend on infrastructure, \$6 needs to be spent on maintenance. If we want to maintain our existing infrastructure for future generations, that's roughly how much we need to spend on maintenance and renewal investment. That leaves \$4 out of every \$10 of investment available for new or improved infrastructure.

Information on the condition of many of our existing assets is hard to get, but our research suggests that more renewal investment will be needed in networks like existing state highways, local roads, hospitals, water supply, wastewater and stormwater infrastructure. <sup>4</sup> Improvement of asset management practices will also ensure we get the most value out of our existing infrastructure, since sporadic maintenance can be significantly more expensive than continuous and well planned programmes. <sup>5</sup>

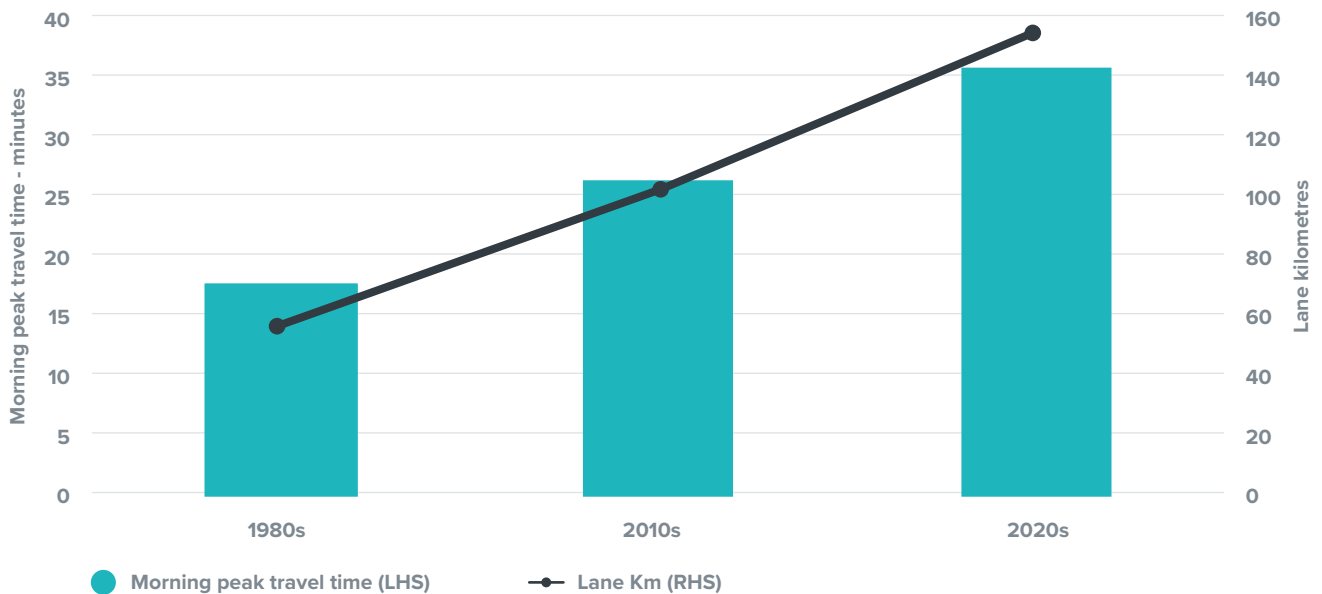


## We must get more out of the assets that we have by better managing demand.

With limited new investment available in this time of financial constraint, the focus must be on getting the most out of the asset base we already have. That includes finding ways of managing peak demand. This should be a focus across all infrastructure sectors but is particularly important for transport networks in urban areas. Motorway development in Auckland demonstrates clearly that building for the peak has not solved congestion. Despite significant investment in transport capacity over the last two decades, travel times have been increasing (see Figure 2). For example, on the Northwestern Motorway (SH16), the lane kilometres of motorway nearly tripled between the 1980s and today. However, over the same time, morning peak travel times doubled from 18 minutes to 35 minutes.

### We keep building motorways, but we can't build our way out of congestion

Figure 2: Morning peak travel time on SH16 Northwestern Motorway



Travel times and lane kilometres on SH16 Northwestern Motorway

Source: New Zealand Infrastructure Commission's analysis of various data sources.

The Strategy recommended congestion or time-of-use charging be introduced in Auckland and other urban areas. It is proven to reduce demand for road space at peak times. Over the last 20 years, there have been at least five major studies of congestion pricing options for Auckland. All have concluded that congestion pricing would help to reduce the city's traffic woes. The latest study found that it could reduce severe congestion by up to 20% and total travel time delay by up to 35%. International experience from places that have put congestion pricing into place confirm that it works in practice.

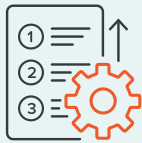
Draft congestion charging legislation has been written, Auckland Council and the Government agree that is needed, yet it has not yet been implemented. There is some expectation building that legislation will be passed this year to enable Auckland and other congested cities to implement this as a priority action.

## Our long-term infrastructure investment planning framework must do more to prioritise value for money.

The OECD recommends that countries guard fiscal sustainability, affordability, and value for money through rigorous project appraisal and selection processes, and independent and impartial expert assessments. Consistent with this advice, Te Waihanga has been asked to develop an Infrastructure Priorities Programme. This will provide a schedule of high-quality infrastructure proposals including non-built solutions that meet a test of national significance, from which long-term infrastructure plans can be developed.

### About the Infrastructure Priorities Programme

The Infrastructure Priorities Programme uses a standardised process to assess infrastructure proposals at set points in the planning process, culminating in a menu of vetted proposals available to decision-makers and the public. The purpose is to assess proposals before a funding commitment is made, determine if they offer long-term strategic value to New Zealand, and promote those projects that are likely to maximise value. Resulting from this process, the intent is to:



**1.** Improve investment assurance during planning



**2.** Ensure strategic alignment and value for money of investments



**3.** Improve early-stage knowledge of infrastructure needs and problems



**4.** Identify opportunities for agency cooperation



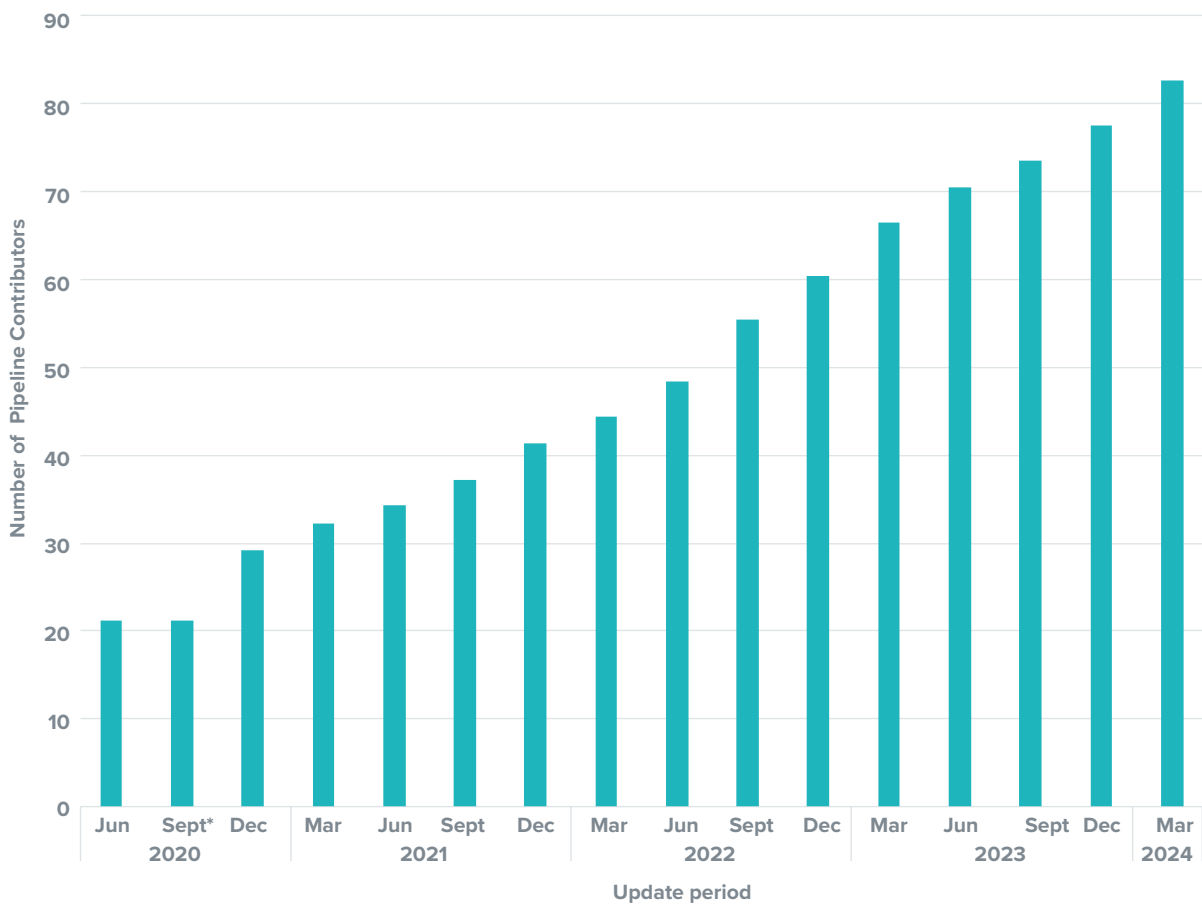
**5.** Create greater consensus on infrastructure priorities



The Infrastructure Priorities Programme supplements the National Infrastructure Pipeline (the Pipeline) – New Zealand’s national data set of infrastructure project information. The Pipeline is an important evidence base for how New Zealand maintains, renews, and improves its infrastructure. In March 2024, the Pipeline received updates from 82 contributing infrastructure providers, compared to 44 contributors in March 2022 – an increase of 86% (see Figure 3). The value of projects included in the Pipeline grew from \$69 billion in March 2022 to \$121.8 billion in March 2024 (an increase of 77%). These project values represent anticipated, planned, and active projects with a mixture of funding certainty. The Pipeline’s forward view of intentions and project activity across New Zealand gives our infrastructure providers and construction markets valuable insights to help coordinate, plan and prioritise, including during times of crisis (see Case Study 1).

## Number of National Infrastructure Pipeline contributors has grown

Figure 3: Number of Pipeline contributors by quarter



Source: New Zealand Infrastructure Commission, March 2024.

Case Study 1:

**National Infrastructure Pipeline**



**National Infrastructure Pipeline – coordination to recover from times of crisis**

Record breaking rainfall occurred in the 2023 Auckland Anniversary flooding event, followed by Cyclone Gabrielle which impacted large parts of North Island in February. These weather events resulted in severe damage to infrastructure, private homes, commercial property, and land used for agriculture.

Rebuilding following disaster events can place significant unplanned demand on the construction and infrastructure sectors, in addition to existing project demand that is already in the Pipeline. With real constraints on funding, workforce capacity, supply chains, and other supporting resources like accommodation, it is critical that careful coordination and prioritisation occurs.

The Pipeline is supporting the ongoing recovery and planning from these severe weather events. Early information was collected about recovery needs and prospective projects from infrastructure providers. Insights were developed and shared securely by Te Waihanga on the potential aggregate scale of the recovery effort

and potential workforce demand based on timing assumptions infrastructure providers had made. These insights highlighted deliverability challenges.

The information provided important context on capacity constraints and reduced silos and projects competing for the same resources at the same time. The process leveraged existing Pipeline capability and sought to reduce duplication of effort, using the same information to inform better decision-making by infrastructure providers, regional recovery agencies, and the Government on infrastructure investments, prioritisation and timing, and workforce supply and development.

The capability developed to support the recovery has enhanced the Pipeline's ability to facilitate strategic coordination between infrastructure providers, while keeping government stakeholders informed. This capability endures beyond the recovery from the 2023 events and will assist agencies to be better prepared to support the next recovery.



## The Government has committed to the development of a National Infrastructure Plan to ensure an efficient and effective response to New Zealand's infrastructure challenges.

This will be developed by Te Waihanga and will combine the following elements to provide a long-term investment framework.

- a **National Infrastructure Pipeline**: a national view of infrastructure project activity, including current projects and projects that are planned or being planned (0–10 years).
- an **Infrastructure Priorities Programme**: a structured independent review of infrastructure proposals and problems in various stages of planning, including initiatives that avoid the need for investment (5–15 years). This also includes non-built solutions, such as policy and system interventions that avoid the need for infrastructure investment.
- an **Infrastructure Needs Assessment**: establishing long-term infrastructure needs and indicative spending bands at a sector and/or regional level (5–30 years).

The plan will ultimately be broken down by city and region and cover all sectors, reflecting an intention to inform city and regional deals. The first plan will be published by the end of 2025.

## A greater supply of housing is needed in high-value land areas where infrastructure costs are likely to be lower.

Dispersed cities make the provision of infrastructure, and therefore housing, more expensive. Recent research by Infrastructure Victoria found that:

*Infrastructure in a dispersed city costs the government about AUS\$41 billion more by 2056, or AUS\$59,000 extra for every new home built, compared to a compact city.<sup>6</sup>*

The National Policy Statement on Urban Development (NPS-UD) and the Medium Density Residential Standards (MDRS) require councils to provide for greater development and intensification in cities. Councils are at different stages in giving effect to these instruments, and different requirements apply to different councils.

The Government has signalled an intent to prioritise measures to increase urban housing supply. This intent includes a commitment to require tier 1 and 2 councils to make 30 years' worth of land for housing available immediately and to make the MDRS optional.<sup>7</sup> Since many of our cities claim to have 30 years of supply available (or will do after implementing the NPS-UD and MDRS) and house prices remain above construction costs, it is unclear whether this requirement will improve housing affordability. Ultimately, to bring down house prices, we need a greater supply of housing in areas that are both attractive to live in and where the provision of infrastructure is more affordable to developers and homeowners.

## Reform of the resource management system remains one of the most pressing obstacles to achieving the Strategy's objectives.

New Zealand does not currently have a planning system that supports the fast-paced, efficient, and sustained infrastructure investment needed to meet the challenges and opportunities ahead. The resource management process has significant implications for both the time and cost to deliver much needed infrastructure (see **Case Study 2**), with consenting costs being around 5.5% of the total cost of an average infrastructure project. For smaller projects – worth less than \$200,000 – consenting averages 16% of a project's costs.<sup>8</sup> These challenges remain an outstanding issue to be addressed and the Government has signalled an intention to develop new legislation that will require fewer resource consents, shorter plans and consent times, and less litigation.

The Government has introduced fast-track legislation to speed up regionally and nationally significant infrastructure projects.<sup>9</sup> These projects will not go through existing consenting processes. The case for this is stronger for infrastructure that is consistent with national goals and provides wider public benefits, such as net-zero carbon 2050, waste reduction, housing affordability and healthy clean waterways. Wider application to general commercial activities, while not without potential benefit, carries risks to social licence and therefore, the durability of fast-track processes.

### Case Study 2:

#### Legal challenges drive budget overruns and delays

##### Mt Messenger Bypass

Mt Messenger Bypass is a new six-kilometre route that avoids the existing steep, narrow and winding route over Mt Messenger on State Highway 3 in North Taranaki. It includes two bridges and a tunnel. When approved in 2017, it had an estimated cost of around \$200 million and construction was expected to start in mid-2018.<sup>10</sup> Legal challenges on the project's Resource Management Act 1991 applications prevented construction from starting until 2022, four years later than planned. However, it has been reported that:



***A little over a year after beginning construction, New Zealand Transport Agency has spent more than 60 percent of its budget for a project in Taranaki without completing a single kilometre of road.<sup>11</sup>***

With construction partially underway, legal challenges under the Public Works Act 1981 have extended the construction timeline and delays in these proceedings have added an estimated \$37 million to the cost of the project from this last construction season alone. The New Zealand Transport Agency Waka Kotahi (NZTA) reported that without the legal challenges under the Resource Management Act and Public Works Act, the bypass would already be completed.<sup>12</sup> Instead, the project continues to suffer delays and increased costs from legal challenges, with an updated budget expected in mid-2024.

As part of the resource management system reform, a mechanism is needed for the long-term protection of land that might be required for future infrastructure. For example, the cost of purchasing the land for the Ōpāheke North-South Arterial Road today is \$78 million, but Auckland Council expects this to rise 13 times, to \$1.0 billion, by the expected time of purchase. The Government has signalled an intention to investigate land protection options to lower infrastructure costs. <sup>13</sup>

## More renewable energy generation is being consented, but we need to keep up the pace.

Fast-track consenting during the COVID-19 pandemic enabled many infrastructure projects to proceed, including a number of renewable energy projects. In the last year, committed generation projects consented almost doubled from the previous year, mostly from geothermal, solar and wind projects (see Case Study 3). <sup>14</sup>

### Case Study 3:

#### Consent to develop New Zealand's largest solar farm

##### Harmony Energy: Tauhei Solar Farm

UK-based Harmony Energy was given fast-tracked approval to develop New Zealand's largest solar farm in the Waikato. The Tauhei Solar Farm is a 200 MW project that will install 330,000 solar modules, which will generate an annual yield of 280,000 MWh, enough renewable electricity to power 35,000 homes. <sup>15</sup>



*The project will support NZ's net-zero ambition, enhance energy security, and help mitigate the negative impact of climate change, but it's about more than clean energy. The project allows for continued farming production and will create opportunities for local businesses and employment. The design includes the planting of 120,000 native trees that will provide screen planting, riparian margins, bio-diversity corridors, and the establishment of a 7-hectare wetland.*

*Pete Grogan, Harmony Energy Director*

Since obtaining fast-track approval, Harmony Energy has secured Overseas Investment Office consent and entered a 50/50 joint venture with First Renewables Power Limited (part of the Clarus Energy Group) to construct the project. Construction is expected to start in quarter 3 of 2024 and conclude in May 2026.



To meet forecast demand, generation needs to more than double over the next 30 years. New Zealand's current installed generation capacity is approximately 10 GW, which is tracking ahead of Transpower's Accelerated Electrification Scenario (AES) 2025 forecast of 9.7 GW.<sup>16</sup> Transpower's current generation pipeline for grid connected generation is 30 GW (mostly solar and wind). If this investment in generation goes ahead, it will meet the AES 2050 target. The fast-track legislation is also likely to assist, by reducing the consenting time and providing greater certainty to investors. However, while increased renewable energy generation is required, security of supply is also an issue as other energy sources, such as gas peakers, are required to provide consistent supply to the market.

Offshore wind farms are expected to play a role in the generation of renewable electricity as technology improves and costs decrease. As recommended in the Infrastructure Strategy, progress is being made in developing a permitting regime for offshore wind generation, with regulatory settings expected to be in place in 2025.<sup>17</sup>

## The severe weather events of 2023 have focused attention on the resilience of our critical infrastructure.

As recommended by the Infrastructure Strategy, the Department of Prime Minister and Cabinet is leading a work programme to enhance the resilience of critical infrastructure to all hazards and threats, both natural (such as earthquakes and floods) and human-induced (such as cyber security incidents and espionage). This work is intended to introduce a new regulatory framework in late-2025, with the aim of increasing investment in risk reduction and resilience in advance of disruptive events. This would reduce the likelihood of disruption to our most critical infrastructure assets which support lives, livelihoods, and the economy. Investments in advance of disruption can be made more strategically, represent better value for money than those made as part of recovery, and can be allocated more fairly between infrastructure providers, investors and consumers.

## Some steps have been taken to strengthen the government's ability to act as a sophisticated client of infrastructure.

These include the introduction of Cabinet Office Circular CO (23) 9,<sup>18</sup> which strengthens the investment management system. Treasury's improvements to their Quarterly Investment Reporting provides more robust data to assess investment and asset performance over time, better enabling Ministers to consider upcoming decisions and associated trade-offs. Rau Paenga (formerly Ōtākaro Limited), was established in 2023 as a specialist infrastructure delivery agent to assist Crown agencies to deliver large, complex infrastructure projects.

The Government is also proposing the establishment of a National Infrastructure Agency, to coordinate government funds, connect investors with New Zealand infrastructure, and improve project funding, procurement and delivery.

The Minister for Infrastructure chairs the recently established Infrastructure and Investment Ministers Group that will oversee the cross-government infrastructure work programme. The key functions of this group will be to oversee the performance of investments throughout their life cycle and to support the development of the National Infrastructure Plan.

## Investment decision-making must be supported by a robust process to ensure value for money.

The Infrastructure Strategy provided clear guidance on the 10 core principles for good decision-making. These principles cover decisions at all points in the life of an infrastructure project. An essential element is the detailed business case, which is used to rigorously analyse the project and assess options. The Watercare Central Interceptor project is an example of how a business case can add value to project delivery (see **Case Study 16 in Section 5.1**). At a time when many other projects experienced significant cost overruns, the Central Interceptor has operated relatively close to initial estimates. The business case was a contributor to this.

In contrast, a 2023 review by the Auditor General into the New Zealand Upgrade Programme (NZUP), found that:

*Ministers made decisions to progress some NZUP projects even though those projects were not fully scoped or planned. Full business cases were not always available or up to date even when the project's planning was more advanced, such as for transport projects that were already part of the National Land Transport Programme.* <sup>19</sup>

A Te Waihanga-commissioned report looking at transparency of large public sector projects found that around half of all the business case and assurance case documents were not accessible, and that reviews were also not accessible for completed projects. Transparency enables New Zealanders to better hold government and delivery agencies to account and as a result, improves project outcomes.

## Overall progress against the objectives of the Infrastructure Strategy is heartening, but there is no room for complacency.

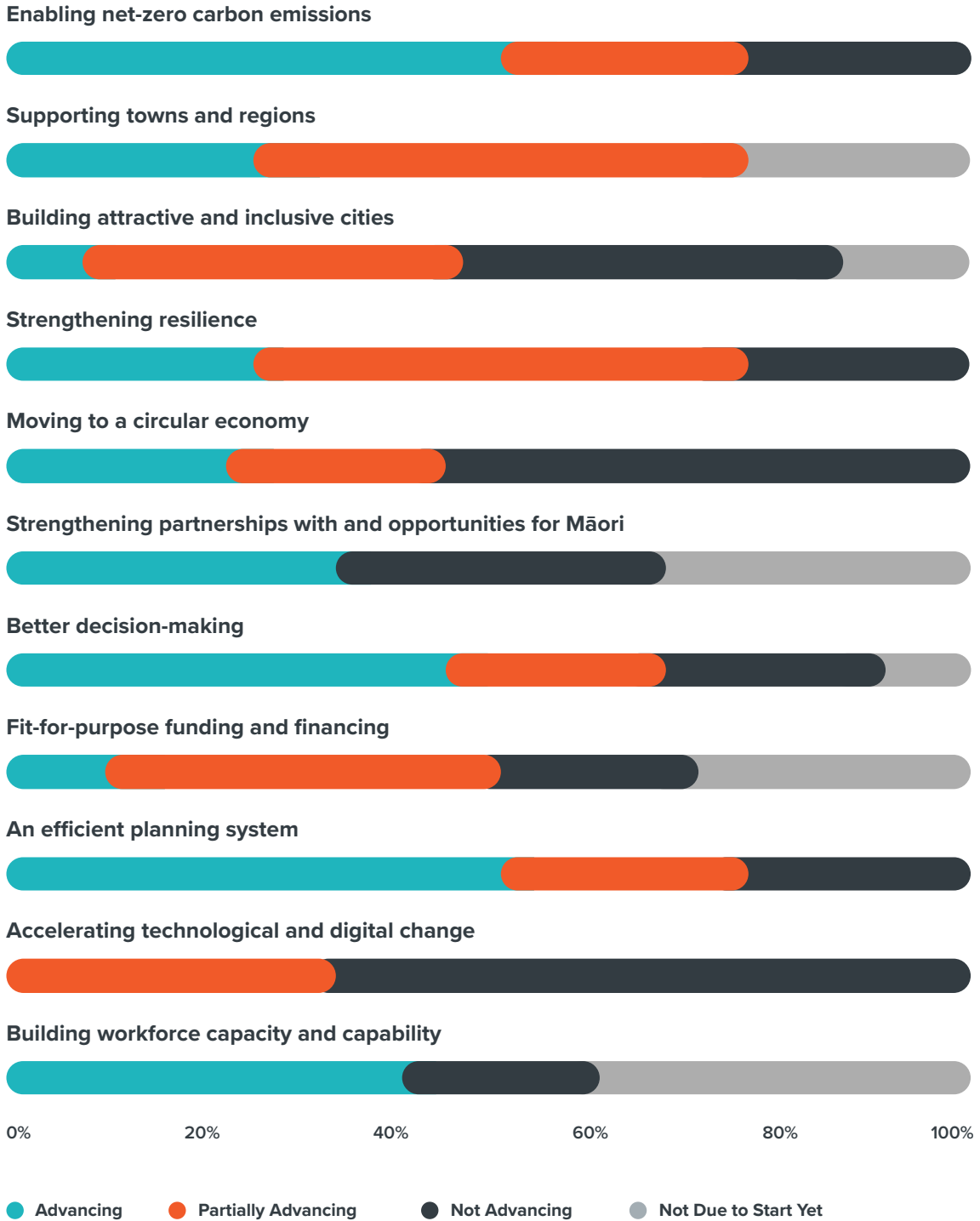
We have undertaken an assessment of progress against each Infrastructure Strategy objective and theme (see **Figure 4**). While we are seeing areas of progress, there is much more that must be done if we are to get the most out of our infrastructure investment. Over the course of the next year, we expect to see a greater focus on better long-term planning, supported by faster consenting processes that better enable the delivery of the infrastructure investment New Zealand needs.

Specifically, with the introduction of streamlined consenting, it is even more important to follow the core principles of good investment decision-making to ensure value for money. This requires good problem definition, all options to be fully scoped, including non-built solutions, and the development of a detailed business case with a rigorous social cost benefit analysis, before commitments are made to proceed with specific projects. These processes must be transparent and subject to independent assurance.

Finally, implementation of congestion charging is a proven intervention to reduce demand for road space at peak times. The building blocks for the implementation are in place, making this a priority action for the coming year.

## Tracking progress against the Infrastructure Strategy's objectives and themes

Figure 4: Overview of progress made since the Infrastructure Strategy was published in May 2022











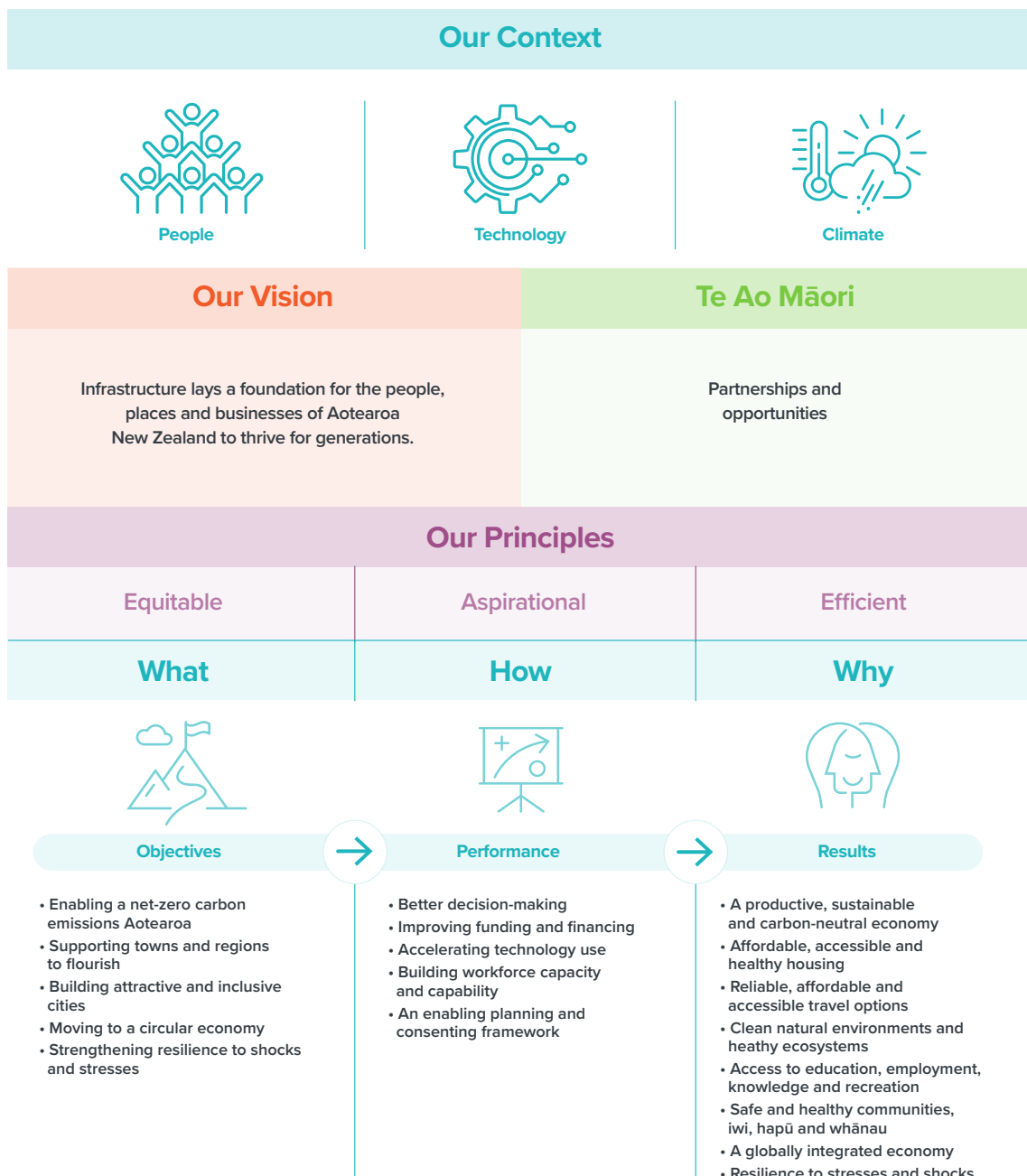
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# Monitoring the Infrastructure Strategy

## The Infrastructure Strategy sets a course for significant transformation across New Zealand.

To achieve our ambition for New Zealand to thrive, the Strategy's blueprint envisions a New Zealand that's responding to the challenge of net-zero carbon emissions, where our cities and regions are attractive, inclusive and flourishing, our infrastructure is resilient to shocks and stresses and we're moving towards a circular economy. To achieve these ambitions, we need a step-change in the performance of our infrastructure system, including the way we make decisions and the capital, labour and technologies we use (see Figure 5).

**Figure 5: Infrastructure Strategy blueprint for action**



Source: 'Rautaki Hanganga o Aotearoa 2022–2052 New Zealand Infrastructure Strategy', New Zealand Infrastructure Commission, 2022.



## The Infrastructure Strategy has now been in place for two years.

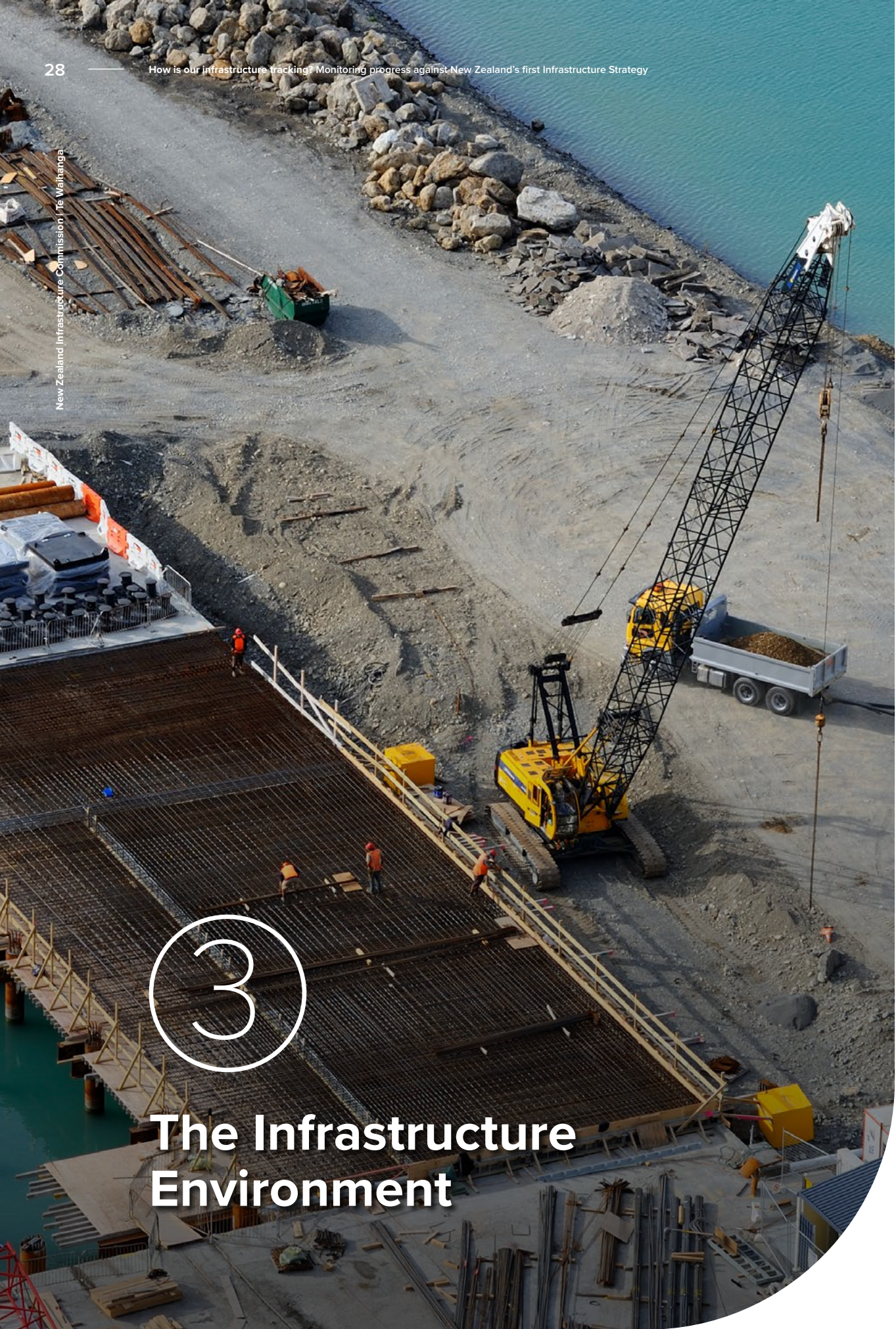
During this time, we have seen progress against a number of its objectives. This report tracks that progress from May 2022 to December 2023, while noting subsequent updates, where appropriate, through to the end of March 2024. This includes changes that have been made since the 2023 central government elections, where this information is available.

Over the past two years, Te Waihanga has gathered evidence from a wide range of sources to understand how the objectives and recommendations in the Infrastructure Strategy are tracking. As part of our monitoring work, we have held meetings with both internal and external subject-matter experts, reviewed statistical releases, conducted desk research, and carried out a survey of government agencies to gather updates. Drawing on our evidence base, we have scored the Infrastructure Strategy recommendations as either 'advancing', 'partially advancing', 'not advancing', or 'not due to start yet'. These scores reflect our best judgement of the available evidence.

This report draws on a wide range of data sources and research to provide an update on the current infrastructure environment. It then discusses each Infrastructure Strategy objective and theme, providing an assessment of the areas that are progressing well and those where further focus and action is needed.







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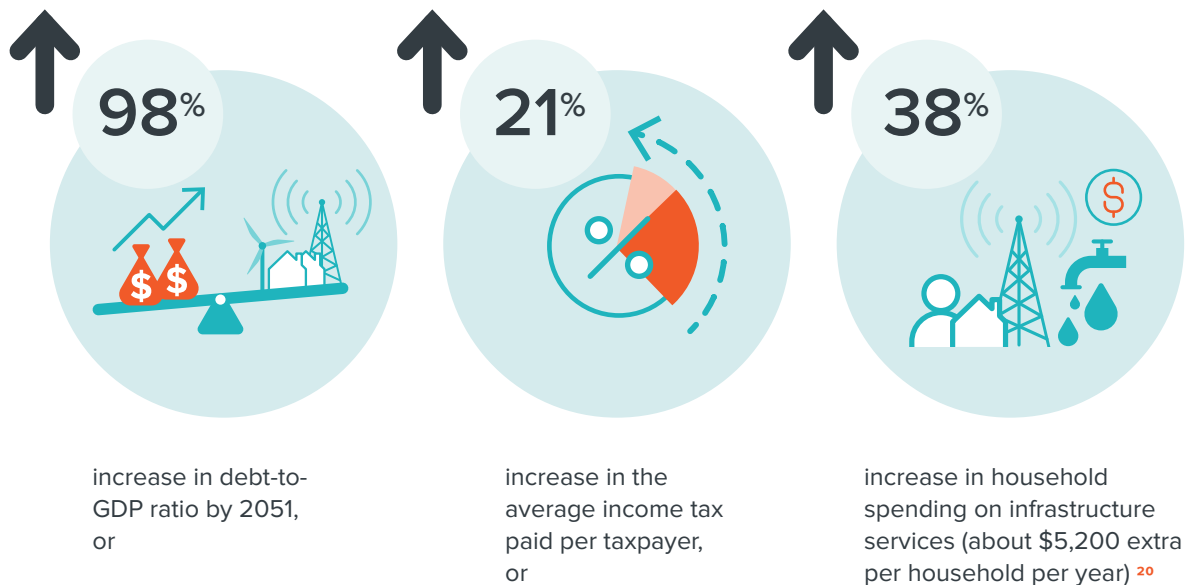
# The Infrastructure Environment



## New Zealand faces some difficult choices.

The Infrastructure Strategy assessed that to build our way out of current and future infrastructure challenges, like climate and demographic change and the cost of renewing and replacing infrastructure, would cost around 9.6% of GDP. This is almost double what we currently spend.

We estimate that attempting to fund or finance this level of investment would require:



This level of investment is unaffordable, and as recognised in the Infrastructure Strategy, we cannot build our way out of every infrastructure challenge we face. We must not only improve the way we plan, fund, and deliver our infrastructure; we must also make better use of the infrastructure we already have.

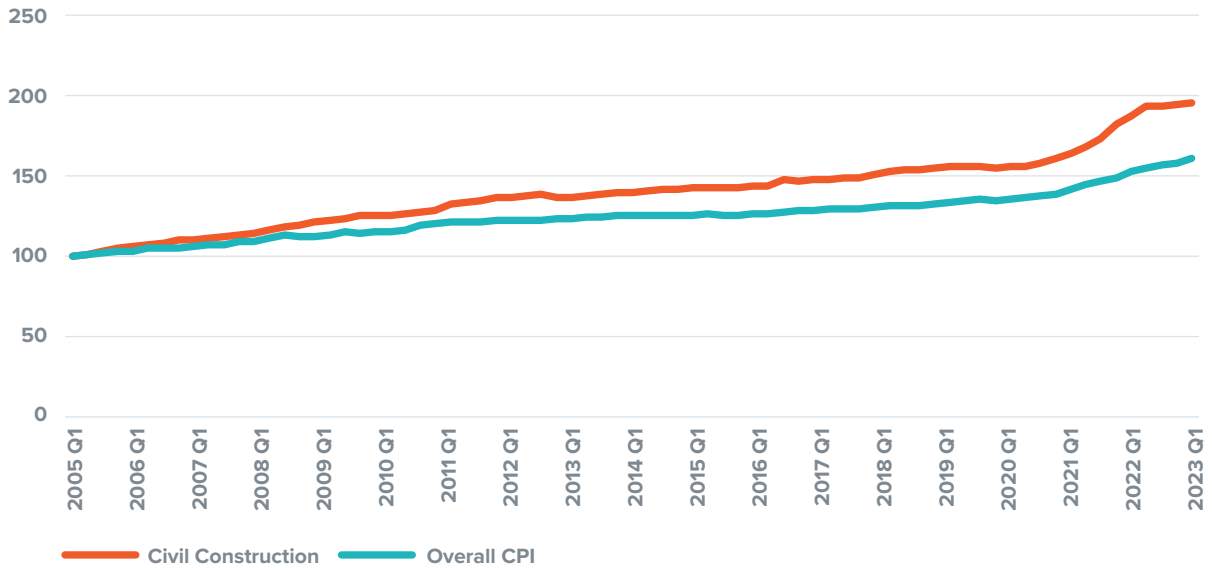
## New Zealand is experiencing affordability and fiscal constraints.

The Government's fiscal capacity to build infrastructure is likely to be constrained over the coming years. Treasury, in its advice to the incoming Government, emphasised the need to bring revenues and spending more in line, while keeping debt levels low. Tighter monetary policy and slower global economic growth will further tighten budgets in the short term, while an ageing population and ongoing geopolitical uncertainty will put pressures on government finances over the longer term.<sup>21</sup>

This need for fiscal constraint is happening within a context of rising construction costs, which have risen faster than expected since 2021 (see Figure 6). While this has coincided with a surge in overall inflation, construction costs have risen faster than prices elsewhere in the economy.

## Infrastructure prices are rising faster than overall economy prices

Figure 6: Infrastructure prices compared to overall economy prices, index 2005=100



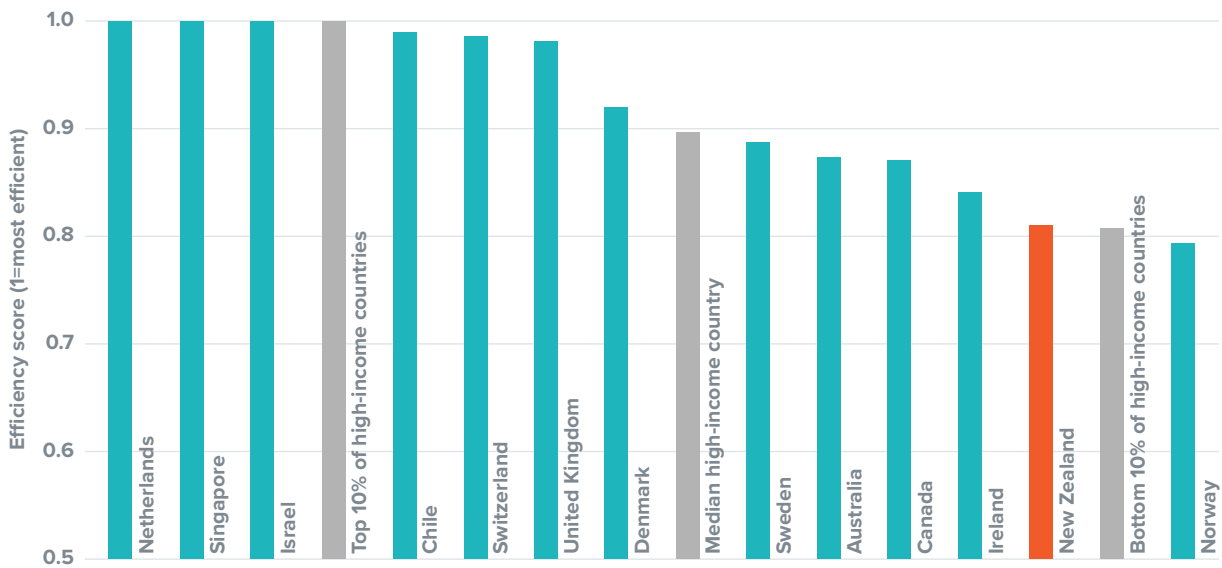
Source: Te Waihanga analysis of Statistics New Zealand Producer Price Index and Consumer Price Index data

## Efficiency remains one of New Zealand's biggest infrastructure challenges.

New Zealand's average spend on public infrastructure between 2003 and 2022 was 5.8% of GDP. <sup>22</sup> Our investment levels are higher than both Australia, as a percentage of GDP, and the median OECD country, but New Zealand ranks near the bottom 10% of high-income countries for the efficiency of that spend (see Figure 7).

## New Zealand ranks near the bottom 10% of high-income countries for efficiency of infrastructure spend

Figure 7: Efficiency of public infrastructure spend



Source: Research Insights: 'Investment gap or efficiency gap? Benchmarking New Zealand's investment in infrastructure', New Zealand Infrastructure Commission, December 2021.

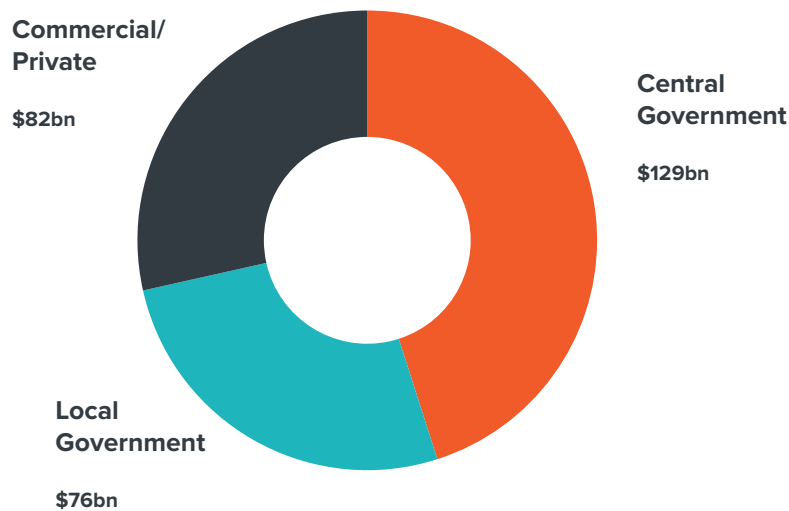
While our infrastructure is becoming more expensive to build and maintain, infrastructure construction productivity has grown at only one-third of the rate of the overall economy.<sup>23</sup> The combination of demand for new infrastructure, increasing costs, and declining productivity risks creating either a growing financial burden, requiring further debt, taxation, or user charges, or lower levels of service. Improving the efficiency of our capital investment and the operation of our existing assets requires greater focus.

## We must get a balance between maintenance and new investment.

In 2022, New Zealand's infrastructure assets, excluding land, were worth \$287 billion (see Figure 8). This is \$55,800 per person, an increase of \$32,900 per person from 1990. This suggests that we have 70% more infrastructure per person than we did a generation ago.<sup>24</sup>

### New Zealand's infrastructure assets, excluding land, are worth \$287 billion

Figure 8: Infrastructure net capital stock by sector of ownership, 2022



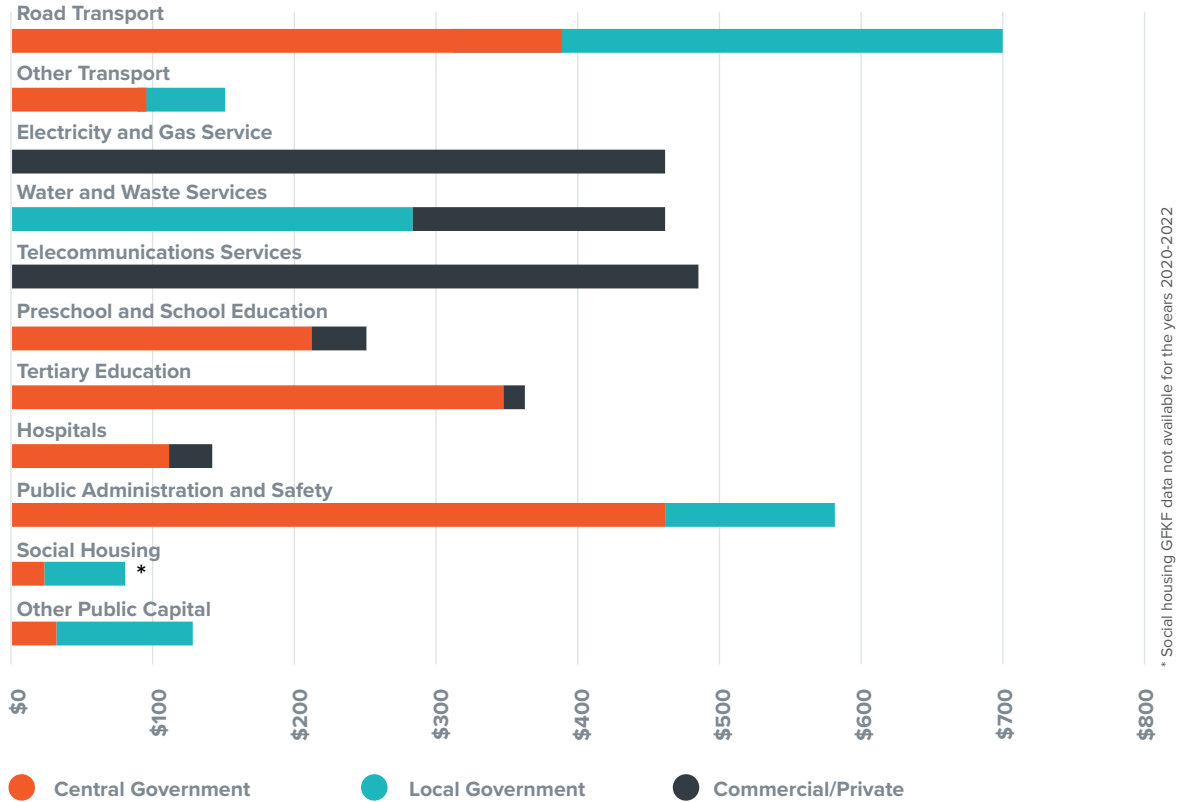
Source: Research Insights: 'Build or maintain? New Zealand's infrastructure asset value, investment and depreciation, 1990–2022', New Zealand Infrastructure Commission, February 2024.

Figure 9 shows average annual investment, per person, in different infrastructure sectors over the 2013–2022 period. During this time, we invested an average of \$3,780 per capita, per year. Road transport was the largest single investment category, averaging around \$700 per capita. We invested around \$450–\$480 per person in electricity and gas infrastructure, water and waste infrastructure, and telecommunications infrastructure. Investment in school infrastructure (\$250 per capita) and university infrastructure (\$360 per capita) exceeded hospital investment (\$140 per capita), despite a trend towards an ageing population.<sup>25</sup>



## What's our annual investment, per person, across different infrastructure sectors?

Figure 9: Average annual real per-capita value of gross fixed capital formation, 2013–2022



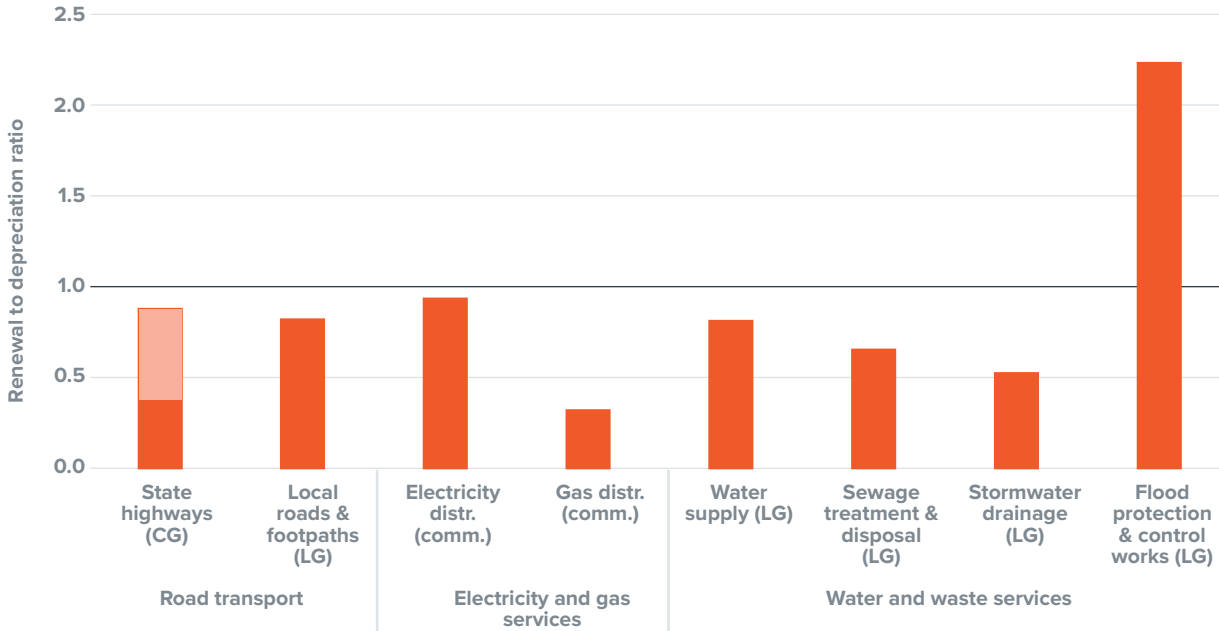
Source: Research Insights: 'Build or maintain? New Zealand's infrastructure asset value, investment and depreciation, 1990–2022', New Zealand Infrastructure Commission, February 2024.

## If we want to maintain our existing infrastructure for future generations, around 60% of all investment needs to go to renewing existing assets.

This means that only \$4 out of every \$10 of investment will be available for new or improved infrastructure. While we are spending enough on renewals in some areas, like electricity distribution and flood protection, a rebalancing is needed in others, such as existing state highways, local roads, water supply, wastewater and stormwater infrastructure (see Figure 10).

## We have under-invested in maintaining some of our existing infrastructure

Figure 10: Asset renewals by sector



**Note:** Te Waihanga analysis of data from NZTA, the Department of Internal Affairs, and the Commerce Commission. state highways data is actuals for the 2012–2022 period, with a range that reflects different assumptions about the classification of renewal vs maintenance spending; local government infrastructure data is forecasts for the 2019–2028 period; electricity distribution data is actuals for the 2014–2021 period; and gas distribution data is actuals for the 2017–2021 period. **Source:** Research Insights: 'Build or maintain? New Zealand's infrastructure asset value, investment and depreciation, 1990–2022', New Zealand Infrastructure Commission, February 2024.

### Replacing and renewing our ageing hospitals will be very costly.

Half of our hospitals are over 40 years old. It is estimated that over the next 30 years, replacing and renewing existing assets could cost over \$60 billion, a figure which will test levels of affordability. However, due to the unreliable information available about the current condition of health assets, future investment requirements are uncertain. <sup>26</sup> Better information on asset condition and renewal requirements is essential, and significant improvements to asset management practices and service delivery methods are needed.

An important step in preparing public hospital infrastructure for the future will be having an integrated, national plan. Health New Zealand, Te Whatu Ora, is currently working to deliver a National Infrastructure Investment Plan and Asset Management Strategy which is expected this year.

## Climate change remains the defining challenge of this century and is a risk to our infrastructure.

The Government has set New Zealand's first three emissions budgets, covering the period from 2022 to 2035, under the Climate Change Response Act 2022. The Climate Change Commission has advised that meeting the emissions budgets requires concerted action to reduce greenhouse gas emissions across all sectors of the economy. New Zealand's First Nationally Determined Contribution under the Paris Agreement sets a more stringent emissions target for the period 2021–2030 that will require purchasing offshore emissions in addition to domestic action to meet the emissions budgets. The cost to the government to purchase offshore emissions credits by 2030 could range from around 1% of annual GDP to around 5% of GDP, or up to \$23.7 billion. There are, therefore, significant fiscal benefits in taking faster action to reduce our domestic emissions, rather than purchase offshore emissions credits.

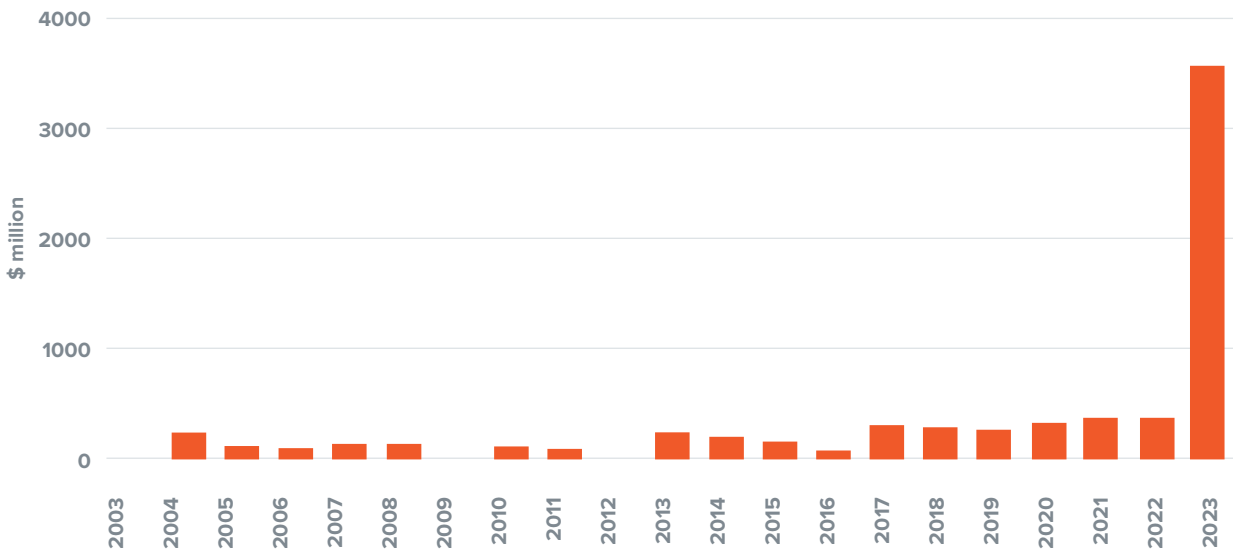
*Adapting to climate change and reducing emissions are interlinked – one cannot be addressed without considering the other.* –Dr Rod Carr, Chair, Climate Change Commission <sup>27</sup>

## Extreme weather events are putting our infrastructure under pressure.

The severe weather events of the Auckland Anniversary floods and Cyclone Gabrielle in 2023 led to significant flooding, landslides, and damage to housing and infrastructure. The cost of asset damage from these two events has been estimated at between \$9 billion and \$14.5 billion, <sup>28</sup> and insurance claims were around \$3.5 billion <sup>29</sup> (see Figure 11). Combined, these two events overtook the 2016 Kaikōura earthquake as New Zealand's second-most-costly natural disaster. The Canterbury earthquakes (2010 to 2011) remain New Zealand's most damaging and costliest natural disaster. <sup>30</sup>

### Changing weather patterns have the potential to be very costly

**Figure 11: Insurance claims 2003–2023, values in 2023 dollars excluding non-weather events such as earthquakes**



Source: Insurance Council of New Zealand. <sup>31</sup>



Treasury scenario modelling shows that net core Crown debt could be higher by 3.8% of GDP in 2061 due to increased storms and droughts. <sup>32</sup>

These potential costs heighten the importance of understanding how best to adapt to and mitigate climate change in a manner consistent with a sustainable fiscal trajectory and future economic growth and resilience. <sup>33</sup>

The extreme weather events highlight the vulnerability of New Zealand's infrastructure networks to natural hazards and the interconnection between these networks – when one network fails it can have a cascading effect on other infrastructure networks, with devastating impacts for the communities affected.

## Infrastructure providers need to adapt to the changing needs of a growing and ageing population.

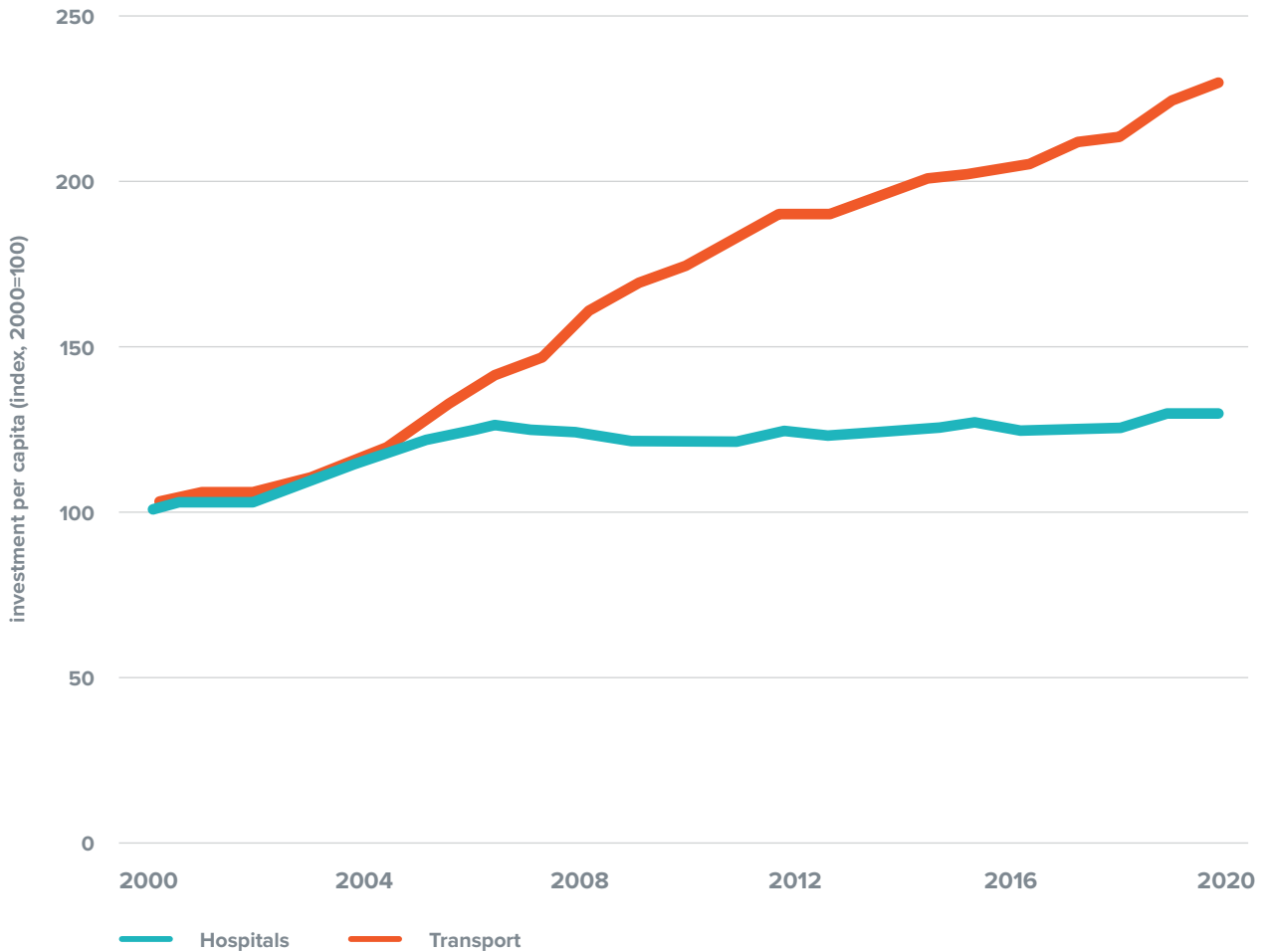
The population of New Zealand is growing. As at December 2023, New Zealand's population grew by 145,100 (2.8%) year on year. <sup>34</sup> The annual net migration gain was 126,000 in the December 2023 year, similar to the population of the Taranaki region. A near-record migration gain of '173,000 non-New Zealand citizens more than offset a record net migration loss of New Zealand citizens'. <sup>35</sup> However, while managing the impacts of population growth remains an issue, the Infrastructure Strategy also recognised that an ageing population will have an increasing impact on the types of infrastructure services we need. The median age is now 38 and 16.5% of the population is aged 65 or over.

## As our population ages, the type of infrastructure needed and its location will need to change.

For example, hospital visits are considerably higher for people aged 65 and over. <sup>36</sup> However, the level of investment in hospitals relative to the number of New Zealanders aged over 65 has decreased since the early 2000s. This is in comparison to the investment in transport, which has significantly increased (see **Figure 12**). This comparative level of investment will likely need to change as our population continues to age.

## Investment in hospitals is not keeping pace with an ageing population

Figure 12: Comparison of investment per capita for transport and hospitals



**Note:** This chart shows the amount of investment in hospital infrastructure for each person aged over 65 and the amount of investment in transport infrastructure per person. Each has been indexed to be equal to 100 in the year 2000. What this chart shows is that the amount of investment in hospital infrastructure for each person over 65 initially rose in the early 2000s but has steadily declined since then. In 2018 we invested 55 cents in hospital infrastructure for people aged over 65 for every dollar we invested in 2000. Our investment in transport infrastructure in contrast has risen rapidly. For each dollar we invested in transport infrastructure per person in 2000, we invested \$3.17 in 2022, indicating a 317% increase in the amount of investment in transport infrastructure per capita. **Source:** New Zealand Infrastructure Commission.



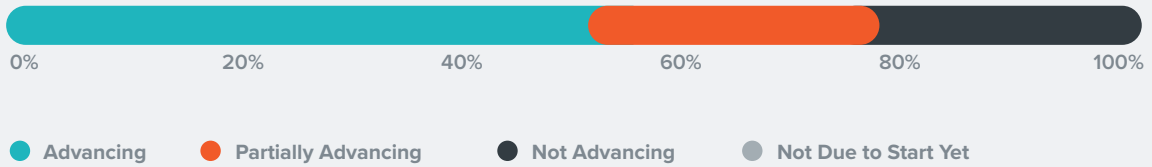
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**New Zealand's  
ambitions for a  
clean, affordable,  
wealthy, and  
healthy economy**



## 4.1. Enabling a net-zero carbon emissions New Zealand

### Status of the 'enabling a net-zero carbon emissions Aotearoa' recommendations in the Infrastructure Strategy



### More renewable electricity generation is being developed, but we need to keep up the pace.

We have seen an increase in the pace at which renewable energy generation is being consented, particularly through the COVID-19 fast-track consenting process. As at April 2024, 659 MW of new generation had been approved under the fast-track process and 970 MW was lodged and in progress (see Figure 13).<sup>37</sup> Put in perspective, this amount of generation is the equivalent of over three and a half Clyde Dams.

### Renewable energy generation consenting accelerated under COVID-19 fast-track legislation

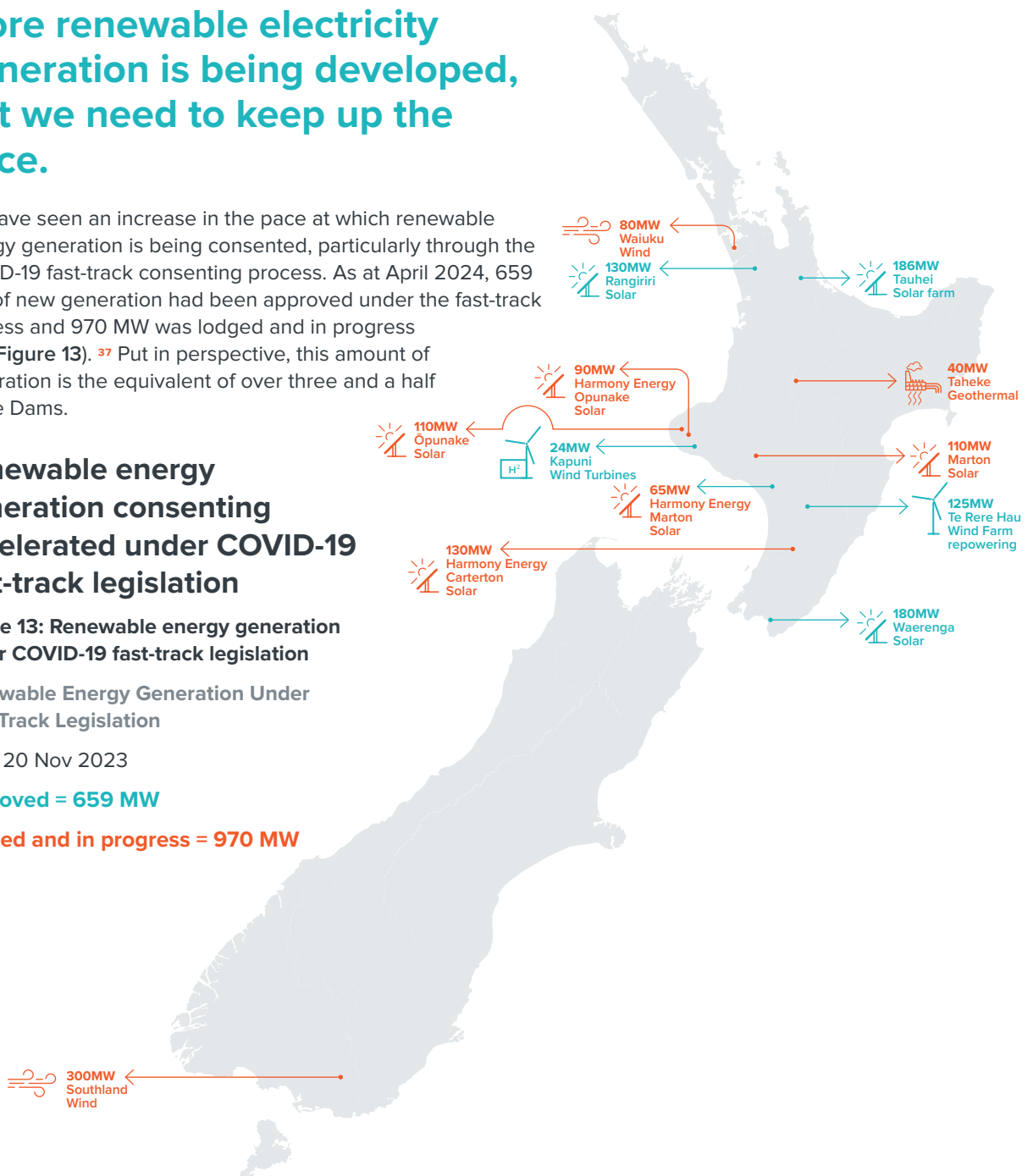
Figure 13: Renewable energy generation under COVID-19 fast-track legislation

#### Renewable Energy Generation Under Fast-Track Legislation

As of 20 Nov 2023

**Approved = 659 MW**

**Lodged and in progress = 970 MW**

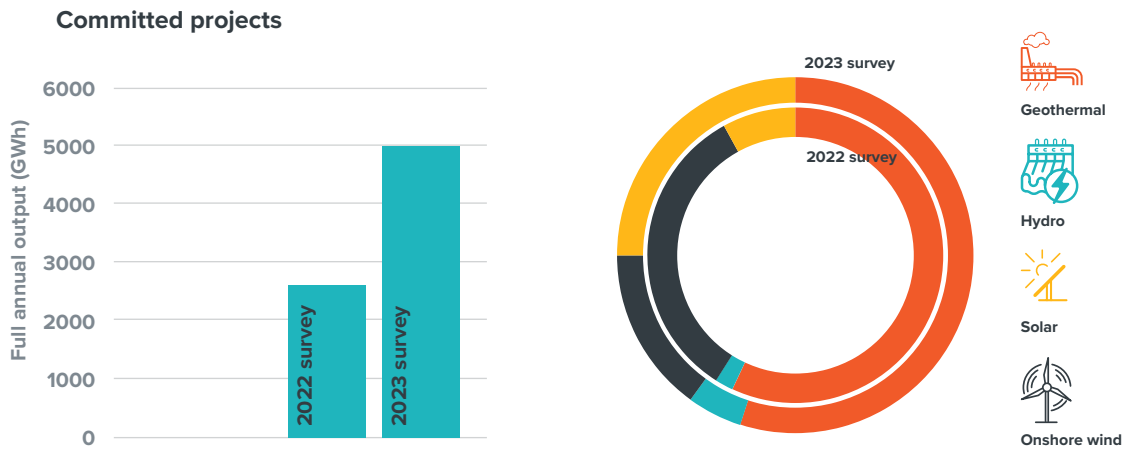


Source: Environmental Protection Authority.

In 2023, committed generation projects almost doubled from the previous year (see Figure 14). Most of this new generation comes from geothermal, solar and wind projects. <sup>38</sup>

## Committed renewable electricity projects doubled between 2022 and 2023

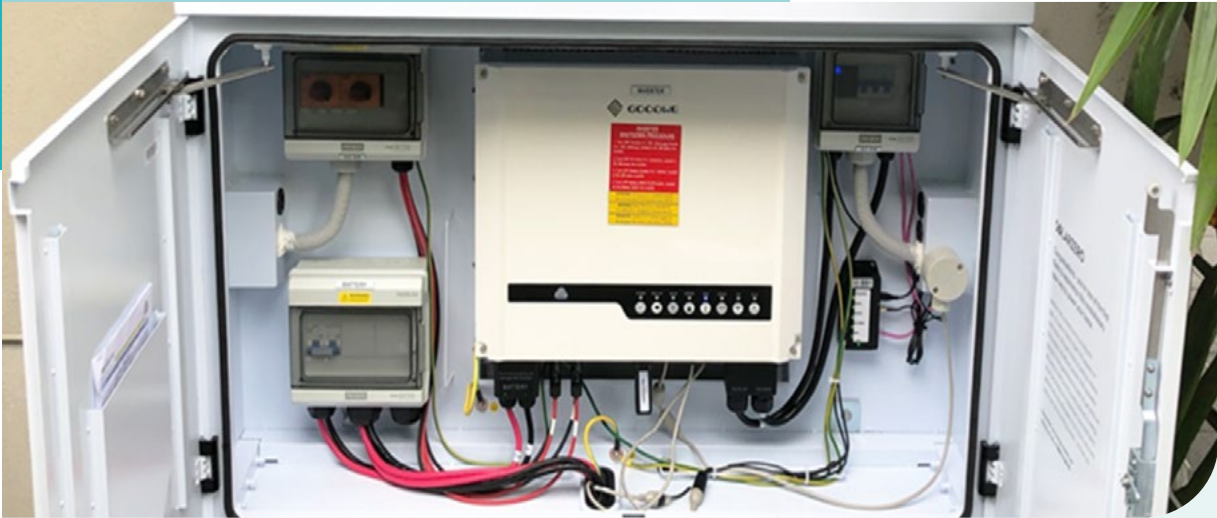
Figure 14: Committed renewable electricity projects based on 2022 and 2023 Electricity Authority surveys



Offshore wind may well become a significant low-cost electricity resource over the next 20 years. Consultation was undertaken in 2023 on a proposed permitting regime for feasibility activities and development of renewable offshore energy. Regulatory settings for offshore energy are expected to be in place by 2025. This is consistent with the recommendations made in the Infrastructure Strategy.

We have also seen some movement towards the uptake of low-emission distributed energy resources (DERs), particularly solar. DERs are one way to provide cost savings while also reducing reliance on transmission lines and improving reliability and resilience especially during peak demand periods (see Case Study 4). Issues around contract length are a potential concern for consumers, however. In October 2023 the Electricity Authority published a work programme, <sup>39</sup> which included regulatory changes to better support DERs. These changes may include improved access to meter data and visibility of DERs through registry updates. Regulatory and registry amendments are anticipated by the end of 2024.

### Distributed Energy Resources: SolarZero Virtual Power Plant



#### SolarZero, consumer electricity resources and more efficient infrastructure

SolarZero has installed over 13,000 residential solar and battery systems across Aotearoa New Zealand. The batteries are run as a virtual power plant and can:

- help reduce peaks in electricity consumption
- provide power system stability services
- provide emergency peak power
- keep the lights on in houses when the power system goes down.

Last winter, SolarZero, together with Ara Ake, Transpower, and the Electricity Authority, ran a pilot using its residential fleet to provide power during high-demand peak periods. In this pilot, SolarZero's capacity was visible to the market and electricity from the SolarZero Virtual Power Plant was able to be dispatched by Transpower. The pilot tested a new 'lite' method for dispatching electricity from small power stations, which will enable SolarZero and other small players to participate in the market without the full set of regulatory requirements that are only necessary for large power stations.

Coordinating consumer energy resources (CER) could substantially improve the utilisation of electricity infrastructure. Peaks in demand can be shaved and troughs filled, resulting in a much more efficient use of the capital deployed in electricity infrastructure. With forecast increases in electricity demand due to the electrification of the economy, these kinds of new solutions will contribute to enabling the capital deployed in the electricity industry to be used as efficiently as possible.

Transpower estimates that the country will need an additional 12.6 GW of grid-connected generation by 2050, <sup>40</sup> more than double our current generation of close to 10 GW. <sup>41</sup> We are on track to meet this as Transpower's generation pipeline for grid connected generation sits at 30 GW (mostly solar and wind). This growth will require the ongoing support of a streamlined consenting regime and enabling regulatory settings that support the levels of investment required. The Government has made a commitment to doubling New Zealand's supply of clean, renewable electricity by requiring decisions on renewable energy project consents to be issued within one year. Fast-track legislation is being progressed to enable this to happen (see section 5.3).

While increased renewable energy generation is required, security of supply is also an issue as other energy sources, such as gas peakers, are required to provide consistent supply to the market. Security of supply came front of mind in 2023 following equipment failures at the Huntly Power Station <sup>42</sup> and Stratford. <sup>43</sup> Reliance on overseas suppliers and long lead times for replacement parts has highlighted the importance of ensuring incentives to maintain flexible generation options during the energy transition.

## The electricity sector is a leader in managing demand.

While increased generation is undoubtedly needed, the electricity sector is taking steps to better manage demand. This includes agreements with major users like Tiwai Point Aluminium Smelter and New Zealand Steel (Glenbrook Steel Mill), <sup>44</sup> to cut demand during times when the electricity system is under stress (see **Case Study 5**). The Electricity Authority has also introduced real-time pricing, which changes the way spot prices are calculated to better reflect real-time market conditions. It delivers 'accurate and reliable spot prices to be published at the end of each half hour trading period, removing any guess work and encouraging more participants to take part in the market with certainty around costs and benefits'. <sup>45</sup> This provides greater price certainty, which means consumers can act confidently to avoid high prices. Previously, indicative spot prices for energy and instantaneous reserves were not finalised until at least two days after the trading period. While these indicative prices were generally a sound guide to final prices, large differences could arise, especially when the electricity system is under stress. <sup>46</sup>

### Case Study 5:

#### Creative ways to manage peak electricity demand



#### Meridian-Tiwai Point deal provides a creative solution to managing demand <sup>47</sup>

Under the agreement, Meridian can require the Tiwai Point smelter to cut demand by up to 50 MW, which is likely to be valuable when the electricity system is under stress, such as winter peak periods or during power generation or transmission issues. This is roughly equivalent to the power consumed by 50,000 average homes. In return, Meridian pays a monthly premium and an additional amount for every megawatt of electricity by which the smelter has reduced consumption.

*The net result is likely to be a reduction in carbon emissions from burning less coal and, just as importantly, a reduction in the overall cost of the electricity system, which ultimately reduces costs to customers.* – Neal Barclay, Meridian Energy Chief Executive



## There have been some steps to consider carbon emissions in infrastructure investment decisions.

Cabinet Office Circular CO (20)3 requires an analysis of greenhouse gas emissions (a Climate Implications Policy Assessment or CIPA) for certain policy proposals presented to Cabinet. <sup>48</sup> The NZTA has also developed its Climate Assessment of Transport Investment model (see **Case Study 6**), which rates activities and work categories based on their potential to reduce or increase emissions. <sup>49</sup> However, it does not apply to all central government infrastructure investments. Treasury is planning a comprehensive review of the business case process, including carbon considerations.

### Case Study 6:

#### Climate Assessment of Transport Investment (CATI) model



#### Enabling early decisions for transport investment

NZTA has pioneered an approach to support investment decision-makers: the Climate Assessment of Transport Investment (CATI) model. CATI can be applied at the early stages of investment programmes to assess potential benefits for people and the planet, and to achieve good outcomes.

CATI is a flexible, nationally consistent and simple to use methodology that informs programme-level investment decision-making at multiple stages of programme development.

It is important to understand the impact that investment will have early in the planning phase, before projects and programmes are locked in, as the ability to reduce emissions through investment decreases as programme delivery progresses.

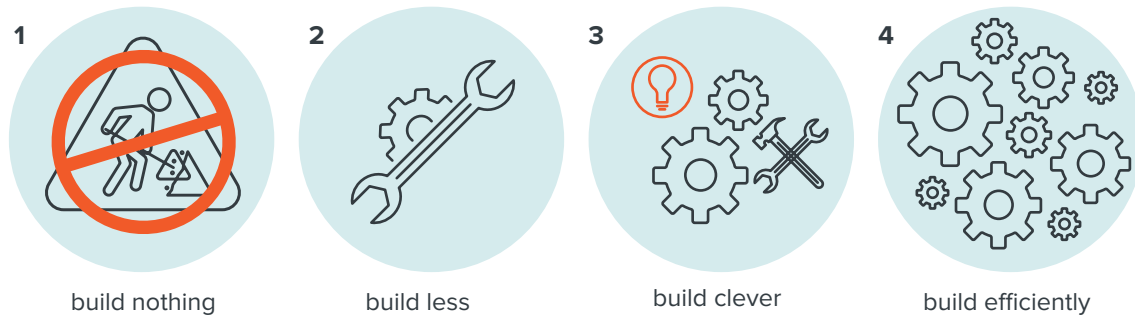
The CATI model rates the positive or negative potential of activities and work categories of the National Land Transport Programme (NLTP) investment profile based on best science. CATI is interactive and offers the ability to consider differing options in shaping programmes through national, regional and local views.

This climate rating captures the combined benefits gained from interventions in addressing greenhouse gases and air quality, offering energy and cost savings. It also assesses access and mobility improvements, contributing to increased safety and health through active travel and public transport use.

Together with other models and tools, when embedded into transport decision-making, CATI could help NZTA transition to a low-emissions and climate-resilient transport system.

CATI has been integrated into the development of the 2024–27 NLTP.

Watercare provides an example of an organisation seeking to reduce embodied carbon when making infrastructure decisions. It has a strategic vision of reducing its embodied carbon by 40%. Every project, starting at feasibility, is required to report on the volume and percentage of embodied carbon reduction achieved. It utilises the World Green Building Council Four Ways to reduce embodied emissions:



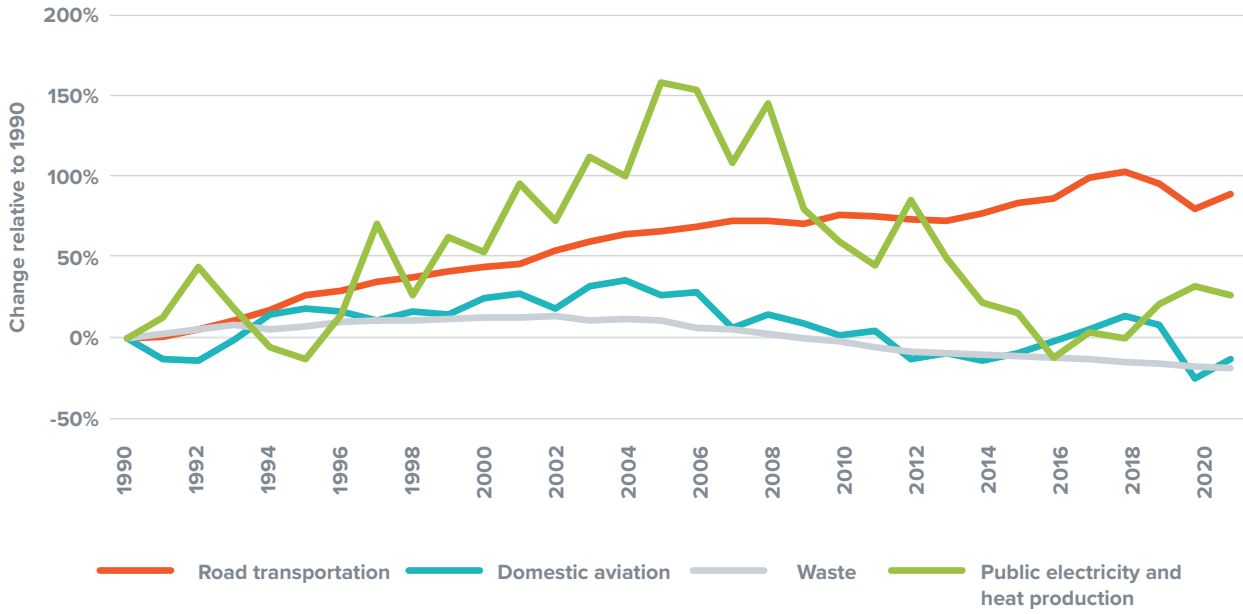
To date, Watercare advises that it has found several examples in each area, with 'build nothing' and 'build less' delivering substantial savings. It is now moving to a whole-of-life carbon accounting methodology, which accounts for and looks to substantially reduce whole-of-life carbon emissions of its new infrastructure.

## More action is needed to reduce carbon emissions from infrastructure.

Addressing infrastructure emissions is one component of a much broader climate change policy environment. Progress has been made in some infrastructure sectors, such as defence, where the New Zealand Defence Force has worked with the Energy Efficiency & Conservation Authority (EECA) to decommission coal-fired boilers in favour of more sustainable energy sources. However, emissions from road transportation continue to grow (see **Figure 15**). Considerable effort will be needed to achieve meaningful reductions of carbon emissions across the infrastructure sector.

## Comparison of greenhouse gas emissions in road transportation, waste, domestic aviation, and public electricity and heat production

Figure 15: Greenhouse gas emissions from selected infrastructure sectors

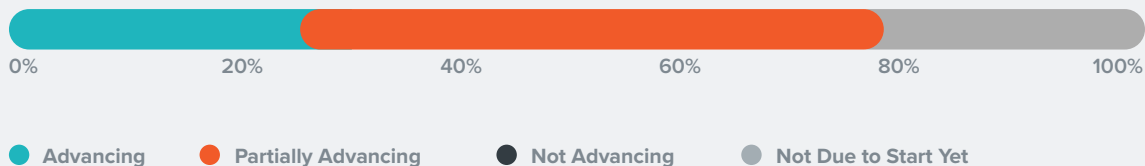


Source: Ministry for the Environment, Greenhouse Gas Inventory. <sup>50</sup>



## 4.2. Supporting towns and regions to flourish

### Status of the 'supporting towns and regions to flourish' recommendations in the Infrastructure Strategy



## We need cost effective solutions to service regional New Zealanders.

New Zealand households spend an average of around 16% of their after-tax income – about \$13,500 per year – on infrastructure services such as drinking water, transport, broadband, and home heating. Households in large urban areas tend to spend a lower share of their after-tax income on infrastructure services compared to households in rural areas and regional centres. There are differences, however, when we start to look more closely. For example, while the average rural household spends around 20% of its income on infrastructure services, one in four rural households spends more than 35%.<sup>51</sup> Affordability, therefore, remains a real issue for many people who live in rural New Zealand and a greater focus is needed on lower-cost infrastructure solutions (see **Case Study 7**).

### Case Study 7:

#### Effectively managing health risks with affordable water solutions for smaller supplies

##### Getting to acceptable drinking water solutions for smaller water supplies – right-sizing regulation avoids the need for costly infrastructure

Most households in New Zealand have access to water through municipal networks, but access to networked water is not universal due to the economics of water supply. The provision of water is expensive and typically involves high fixed costs. Smaller water suppliers (more prevalent in rural areas) are less likely to meet safety requirements and are more prone to supply interruptions.



The Water Services Act 2021 places a duty on water suppliers to ensure that the drinking water they supply is safe. The Water Services Act allows Taumata Arowai to create Acceptable Solutions to establish a method of compliance with legislative requirements that is proportional to the scale, complexity and risk profile of smaller water supplies.

Acceptable Solutions are intended to provide a practical and cost-effective pathway to compliance for smaller water suppliers serving fewer than 500 people. Taumata Arowai has developed three Acceptable Solutions – for roof water supplies, for spring and bore water, and for mixed-use rural supplies.

Measuring the success of the Acceptable Solutions approach is not only about whether they effectively manage the health risks, but whether the requirements are simple, low maintenance, and low cost for suppliers.

## The rural-urban divide continues to exist in digital connectivity.

Despite significant investments in mobile and digital connectivity infrastructure, rural New Zealanders can experience connectivity services that are slower, less reliable, and more expensive than urban New Zealanders.<sup>52</sup> The Ministry of Business, Innovation, and Employment (MBIE) has advised that 'there is no sustainable funding pathway to address this "urban-rural divide", and the scale of the divide could increase once existing rural broadband initiative contracts expire between 2026 and 2034'.<sup>53</sup> Emerging technologies such as satellite-based internet provider Starlink, appear to be reducing the barriers to high-speed connectivity in rural areas, although cost may remain an issue.

## There are early signs that New Zealand is preparing for net-zero carbon emissions aviation.

Regional New Zealand relies on a well-functioning aviation network for passenger and freight connectivity. However, air services to our regions can be infrequent and expensive. The Infrastructure Strategy recognised that new technologies, like electric aviation, may improve the economic viability of commercial regional air services and recommended measures to prepare for these opportunities. While it is early days, there are encouraging signs in the aviation sector, as demonstrated by Air New Zealand's purchase of its first battery-powered electric aircraft (see **Case Study 8**). Progress is also being made to advance the uptake of other low emissions fuels for aviation, such as sustainable aviation fuel and hydrogen.<sup>54</sup>

### Case Study 8:

#### Air New Zealand is progressing sustainable aviation



Source: Air New Zealand

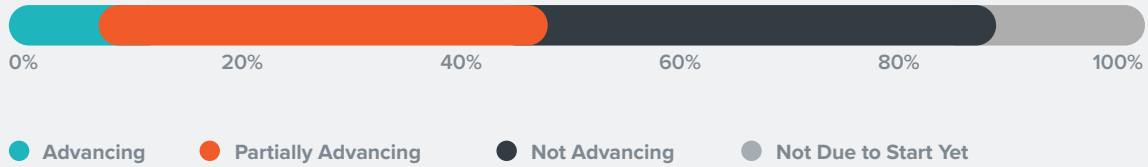
#### Air New Zealand's battery-powered electric aircraft

Air New Zealand is taking steps towards sustainable aviation through its Mission Next Gen Aircraft programme.<sup>55</sup> This aims to fly the first commercial demonstrator flight from 2026 and begin replacing its Q300 domestic fleet with a more sustainable aircraft from 2030 (likely green hydrogen or battery hybrid systems).

As part of this programme, Air New Zealand has purchased its first battery-powered electric aircraft, the ALIA CTOL from BETA technologies. This plane is expected to operate as a cargo service, in partnership with New Zealand Post from 2026, after testing and certification by New Zealand's Civil Aviation Authority. It's estimated it will carry up to 560kg of cargo and will run mail between New Zealand airports. Initially, the aircraft will only operate between two airports.<sup>56</sup>

### 4.3. Building attractive and inclusive cities

#### Status of the 'building attractive and inclusive cities' recommendations in the Infrastructure Strategy



#### Longer-term spatial planning for growth is becoming an established practice.

Spatial planning provides the opportunity to integrate long-term planning for infrastructure and housing, and to align investment and regulatory decisions as cities grow. Spatial planning has become established across New Zealand, with spatial plans in place that cover nearly 85% of the country's population. Urban Growth Partnerships between central and local government and mana whenua in six high-growth areas have been a driver, with joint spatial plans a key output. The National Policy Statement on Urban Development also requires every tier 1 and 2 urban environment to prepare spatial plans in the form of a Future Development Strategy. While these existing spatial plans have provided a method to integrate land use and infrastructure planning for urban areas and growth corridors, they lack statutory weight in investment and resource management decisions. <sup>57</sup>

#### Greater focus is needed on lowering the land value ratio (land value/capital value) in urban centres.

This can be most usefully achieved by enabling greater supply in high land value areas where infrastructure costs, particularly for transport, are often lower. Greater upzoning in the Auckland Unitary Plan provides a useful example (see **Case Study 9**). Upzoning in existing high-value areas can be complementary with releasing more land on the urban fringe, although higher infrastructure costs are expected to be a natural constraint in these types of locations when the costs of network expansion exceed those of increasing existing capacity.



Case Study 9:

**Greater upzoning in the Auckland Unitary Plan increased housing supply**

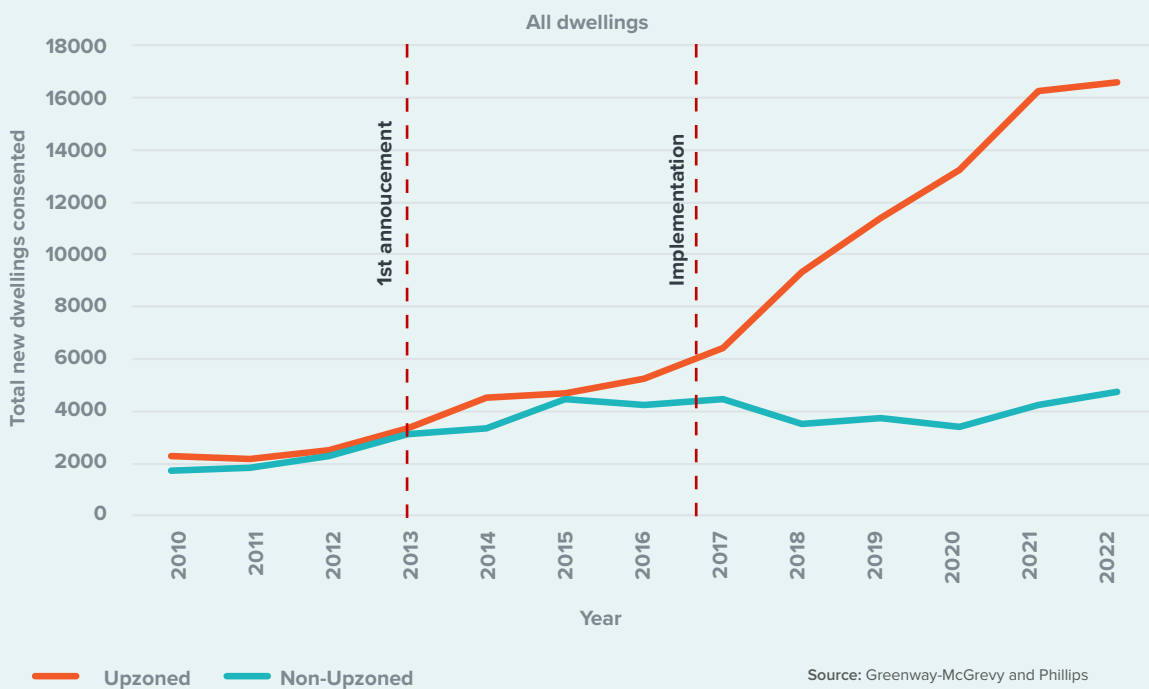


**Greater upzoning increases housing supply**

The Auckland Unitary Plan relaxed land use regulations to enable greater residential intensification and population density, including terrace housing and apartments. There was a dramatic increase in the number of building consents issued in upzoned areas after the Auckland Unitary Plan became operational at the end of 2016 (see Figure 16).<sup>58</sup>

**Number of new dwellings significantly increased after upzoning in Auckland's Unitary Plan**

**Figure 16: Comparison of new dwellings in Auckland by year, 2010–2022**



Source: Greenway-McGrevy and Phillips

The National Policy Statement on Urban Development (NPS-UD) and the Medium Density Residential Standards (MDRS) have required councils to provide for greater development and intensification in cities. Councils are at different stages in giving effect to these instruments, and different requirements apply to different councils. In addition, the changes being made by some councils will be more impactful than others, as demonstrated by the proposed changes to the Queenstown District Plan (see **Case Study 10**).

The Government signalled an intent to prioritise measures to increase urban housing supply. This includes a commitment to require tier 1 and 2 councils to make 30 years' worth of land for housing available immediately and to make the MDRS optional.<sup>59</sup> Since many of our cities already claim to have 30 years of supply available (either now, or once their plan changes to give effect to the NPS-UD and MDRS are complete) and there is evidence that councils are unlikely to significantly upzone, it is unclear what impact this will have on housing affordability.

### Case Study 10:

## Proposed changes to Queenstown Lakes District Plan are unlikely to significantly increase housing supply

### Intensification in Queenstown – Proposed changes to the District Plan

Queenstown faces a housing crisis. With homes costing about 17 times the median wage,<sup>60</sup> this makes it the least affordable city in New Zealand. The town's population is also booming, experiencing the highest annual growth rate (5.3%) in the country between 1996 and 2020.

Queenstown Lakes District Council (QLDC) is proposing changes to its District Plan to help address housing affordability challenges. These changes would allow for taller buildings and denser development in residential and business areas near town centres in Queenstown, Arrowtown, Frankton, and Wānaka.



Te Waihanga made a submission on the proposed Plan Change.<sup>61</sup> While we recognised that well-designed intensification policies can improve affordability along with numerous other amenity and environmental benefits, our analysis suggested that the proposed policy changes won't significantly increase housing supply as intended. The proposed upzoned areas are unattractive for development as they consist of small lots, are already highly capitalised, and only allow for a very modest increase in height. These factors make them less desirable for redevelopment. We estimated that the policy would yield only 31 to 149 additional houses over 10 years.

To effectively address housing affordability, climate goals and efficient infrastructure use, Te Waihanga recommended:

- enabling increased housing supply to accommodate 2-3 times the current population
- implementing the National Policy Statement on Urban Development (NPS-UD) fully, like a tier 1 city
- avoiding incremental intensification – large-scale, targeted upzoning in brownfield areas is needed to achieve meaningful results.<sup>62</sup>

## Protecting land for future infrastructure networks will cut infrastructure costs.

The need for infrastructure projects can be foreseen years, if not decades, in advance, but infrastructure providers are generally unable to take steps to secure the land required beforehand. Te Waihanga research found that our current 'wait and see' approach to protecting land for infrastructure often means that valuable infrastructure doesn't get built. By the time we need a new school or a better transport route, the right sites for that infrastructure are gone – they've got houses built on them. If the land isn't purchased early, then it can drastically increase project costs. <sup>63</sup> For example, the cost of purchasing the land for the Ōpāheke North-South Arterial Road would cost \$78 million if purchased today, but Auckland Council expects this to rise 13 times, to \$1.0 billion by the expected time of purchase. This is only one of many transport corridors that are likely to be needed within existing urban areas. The Government has indicated that it intends to investigate land protection options to lower infrastructure costs. <sup>64</sup>

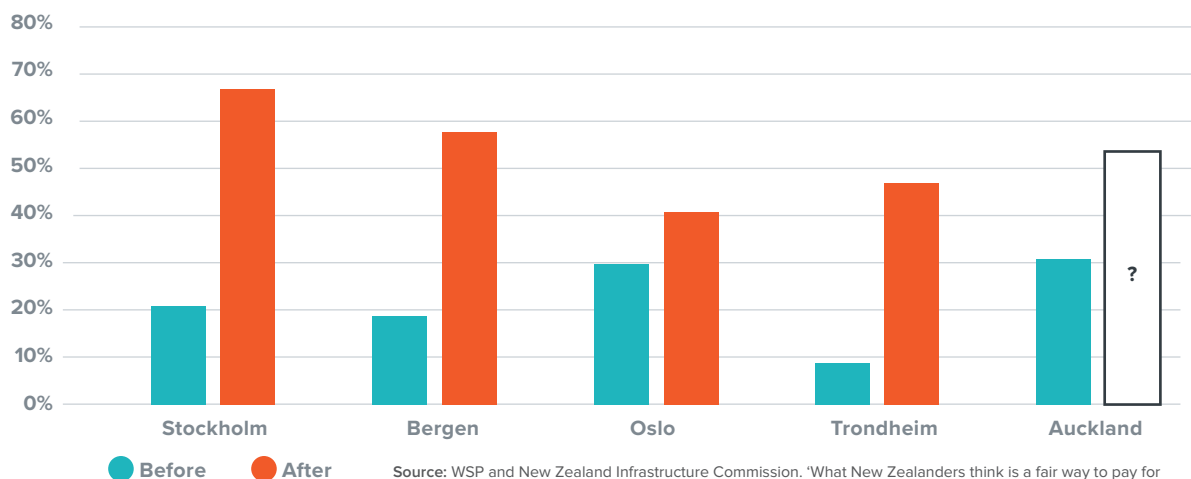
## It is time to implement congestion charging.

Charging by time-of-use (congestion charging) is a proven intervention to reduce demand for road space at peak times. The building blocks for the implementation of congestion charging in New Zealand are already in place. In November 2023, Auckland Council's Transport and Infrastructure Committee instructed Auckland Council and Auckland Transport to identify an appropriate time-of-use charging scheme. There is broad Parliamentary support and legislation has been drafted that could be introduced quickly with suitable amendments to reflect Government priorities.

One of the biggest challenges to congestion charging is public approval prior to implementation. We are unaware of any city that has enjoyed majority support prior to implementation. However, following implementation, perceptions of fairness and acceptability commonly change. Te Waihanga recently published results from a survey of public views on the fairness of congestion charging and compared this to congestion charging schemes in different Scandinavian cities (see Figure 17). <sup>65</sup> While the percentages are based on different data and therefore cannot be directly compared, the survey found support for time-of-use pricing as a fair way of dealing with congestion was similar to levels of public acceptance of time-of-use charging in other cities before a congestion charge was put in place. In particular, 31% of respondents living in the Auckland region think time-of-use charging is fair, higher than levels of public acceptance of congestion charging in cities overseas before it was introduced. In the cities that went on to introduce congestion charging, levels of public acceptance increased significantly.

## Public acceptance of congestion charging increases after implementation

Figure 17: Public acceptance of congestion charging in Auckland and several Scandinavian cities





## Volumetric charging for water has a high level of support.

Similar to congestion charging, volumetric charging for water use reduces demand, conserves resources, defers new investment and lowers production costs over the long term, and is generally cheaper for water consumers (see **Case Study 11**). Nearly three-quarters of respondents surveyed by Te Waihanga (72%) think it's fair that what households pay for water should be based on what a household uses. <sup>66</sup> Decision-makers have the opportunity to harness this broad support for use-based charging as a fair means of paying for water and to adopt volumetric charging where it is not already in place. This could be done by incorporating a low fixed charge (or an increasing block tariff) for basic needs and the discretion to have lower charges for some households.

### Case Study 11:

#### Water meters defer requirement for new investment in New Plymouth

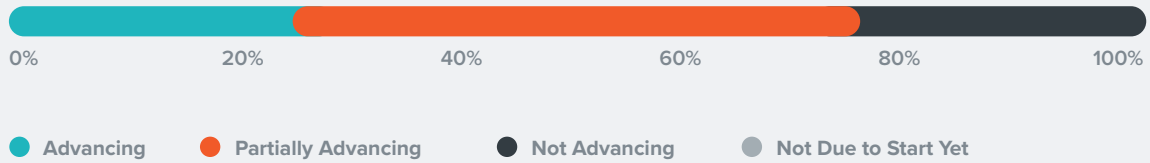


#### Water Meters In New Plymouth

To date, 14,206 water meters have been installed in New Plymouth, with up to 25,500 forecast to be installed. This has enabled the asset owner to identify many leaks in the area, that once fixed, will drop demand to a level where a new \$4 million pump station upgrade will no longer be needed. In February 2024, the water meters helped identify and stop leaks totalling 557m<sup>3</sup> per day, equivalent to about 81 Olympic swimming pools a year. <sup>67</sup>

## 4.4. Strengthening resilience to shocks and stresses

### Status of the 'strengthening resilience to shocks and stresses' recommendations in the Infrastructure Strategy



### The North Island severe weather events have provided impetus for critical infrastructure resilience planning.

The North Island severe weather events caused widespread damage across the North Island in early 2023, particularly in Northland, Auckland, Gisborne and the Hawke's Bay regions. Cyclone Gabrielle brought winds exceeding 120-km per hour, heavy rainfall, and storm surges, overwhelming river management systems and leading to widespread flooding. Eleven people lost their lives and there were an estimated 1,720 injuries. Over 240,000 homes lost power and outages impacted telecommunications, hampering emergency response and information access. Prolonged payment system failures also made it almost impossible for those most in need to acquire essential medicines, fuel and food. The solid waste management and resource recovery system was also significantly disrupted. The event exposed the fragility of New Zealand's infrastructure and the interconnectedness of its various systems (see **Figure 18**). Disruptions in one system had cascading effects on others, hindering response and recovery efforts. This underscores the need for building resilience across interconnected infrastructure networks.





## The Infrastructure Strategy recommended a series of actions to increase the resilience of critical infrastructure.

These included defining critical infrastructure, identifying minimum service levels, and developing a coordinated approach to managing risk. The Department of Prime Minister and Cabinet is leading a work programme to enhance the resilience of critical infrastructure systems to all hazards and threats, both natural (such as earthquakes and floods) and human-induced (such as cyber security incidents and espionage).

Public consultation has been undertaken to seek views on:

- the need to reform New Zealand's existing regulatory approach to delivering a resilient critical infrastructure system
- the barriers that need to be addressed to enhance resilience, including improving information flows between critical infrastructure asset owners and the government, and setting enforceable minimum resilience requirements
- creating appropriate accountabilities for critical infrastructure resilience. <sup>68</sup>

The work is intended to introduce a new regulatory framework in late-2025. Over time, the new regulatory regime will help to improve critical infrastructure asset owners' understanding of hazards and threats that may impact infrastructure service delivery, and act to reduce risks, increase resilience and build adaptive capacity. This would reduce the likelihood of disruption of our most critical infrastructure assets which support lives, livelihoods, and the economy. Investments in advance of disruption can be made more strategically, represent better value for money than those made as part of recovery, and can be allocated more fairly between infrastructure providers, investors and consumers.

It is important, however, that any regulation is right-sized and well designed. The overall approach should also take account of cost trade-offs and other mechanisms available to manage resilience risks, including ex-post measures (for example, speed to recovery, availability of temporary communications options, and number of Bailey bridges available) and ex-ante tools (for example, insurance, planning, and design for resilience).

## The availability of better information will improve resilience planning.

Since the publication of the Infrastructure Strategy, more risk management information has become available. For example, Hamilton City Council has an ongoing programme to understand the effects of rare and very large rain events across the city. It has an online tool that enables people to search flood risks by property address. <sup>69</sup> Auckland Council also has a flood viewer. <sup>70</sup> Improved resilience planning is being incorporated into the design of large-scale developments. **Case Study 12** demonstrates how new stormwater solutions protected Kāinga Ora developments from flooding during the Auckland Anniversary floods.

## Kāinga Ora improves flooding resilience



Greenslade Reserve at around 6pm on Friday 27th January, doing what it is designed to.



Greenslade Reserve late Saturday morning with people playing on the grass.

### Kāinga Ora improves resilience to flooding in new developments

New stormwater solutions in Northcote, Mt Roskill, and Ōwairaka large-scale developments functioned as planned during the Auckland Anniversary floods in January 2023. They diverted huge amounts of water away from homes that would otherwise have been flooded and badly damaged, draining it away in a safe and controlled way.

*A good example is Greenslade Reserve in our Northcote Development. This reserve is not only a sports ground and park for the community, but also a stormwater retention basin. During the floods it filled up, containing the vast majority of the floodwaters, and by the next morning, all the surface water had drained so families could return to playing on the grass.* <sup>71</sup>

Source: Kāinga Ora – Homes and Communities. <sup>72</sup>

The New Zealand Lifelines Council updated Aotearoa New Zealand's Critical Infrastructure National Vulnerability Assessment in 2023. <sup>73</sup> This report provides a unique strategic perspective of all infrastructure services as they act in combination to support the wellbeing of New Zealanders. It is intended to stimulate awareness, particularly about interdependencies, and drive a change in approach to prioritising resilience investment in infrastructure. The report includes increased focus on the needs of customers and communities and their ability to contribute to overall resilience improvements.

## While the national adaptation plan is intended to provide a coordinated approach, it is unclear whether substantive progress is being made.

In its second six-monthly report on the National Adaptation Plan (NAP) and Emissions Reduction Plan (ERP), the Climate Change Chief Executive's Board stated that: <sup>74</sup>

*There are no formal indicators to assess whether we are making enough progress to achieve our climate adaptation goals and what a 'sufficient' level of resilience or an acceptable level of risk is. However, there is a clear sense from agencies that we are not moving fast enough. This has been underscored by Cyclone Gabrielle and other extreme weather events experienced in New Zealand over this reporting period, and the likelihood that events like these will occur at a faster rate than previously expected.*

In 2022 the Ministry for the Environment published guidance to explain how local government must 'have regard to' the NAP and ERP including:

- using the best available data for the middle-of-the-road scenario and the fossil-fuel intensive development scenario
- screening hazard and risk assessments for longer-term coastal impacts. <sup>75</sup>

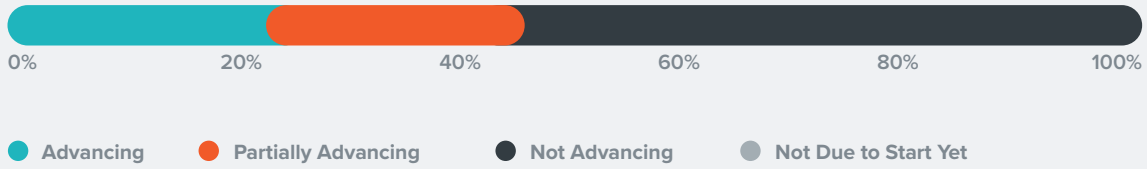
This aims to strengthen the integration of coastal hazards and climate change considerations into land-use planning.

Earlier this year, the Ministry for the Environment updated its 'Coastal hazards and climate change guidance'. <sup>76</sup> The technical document provides national guidance to local and central government, and other users outside government. It is designed to help users plan for, manage and adapt to increasing coastal hazards and risks from climate change. The guidance is structured around understanding risks and what matters most (criticality), developing and implementing risk reduction and adaptation measures, and monitoring and evaluation.

Dynamic Adaptive Pathways Planning (DAPP) is one of the tools available to support entities moving through this process and is featured in the guidance. A number of councils continue to leverage DAPP to support their decision-making and agree with communities' options and triggers for adaptation actions.

## 4.5. Moving to a circular economy

### Status of the 'moving to a circular economy' recommendations in the Infrastructure Strategy

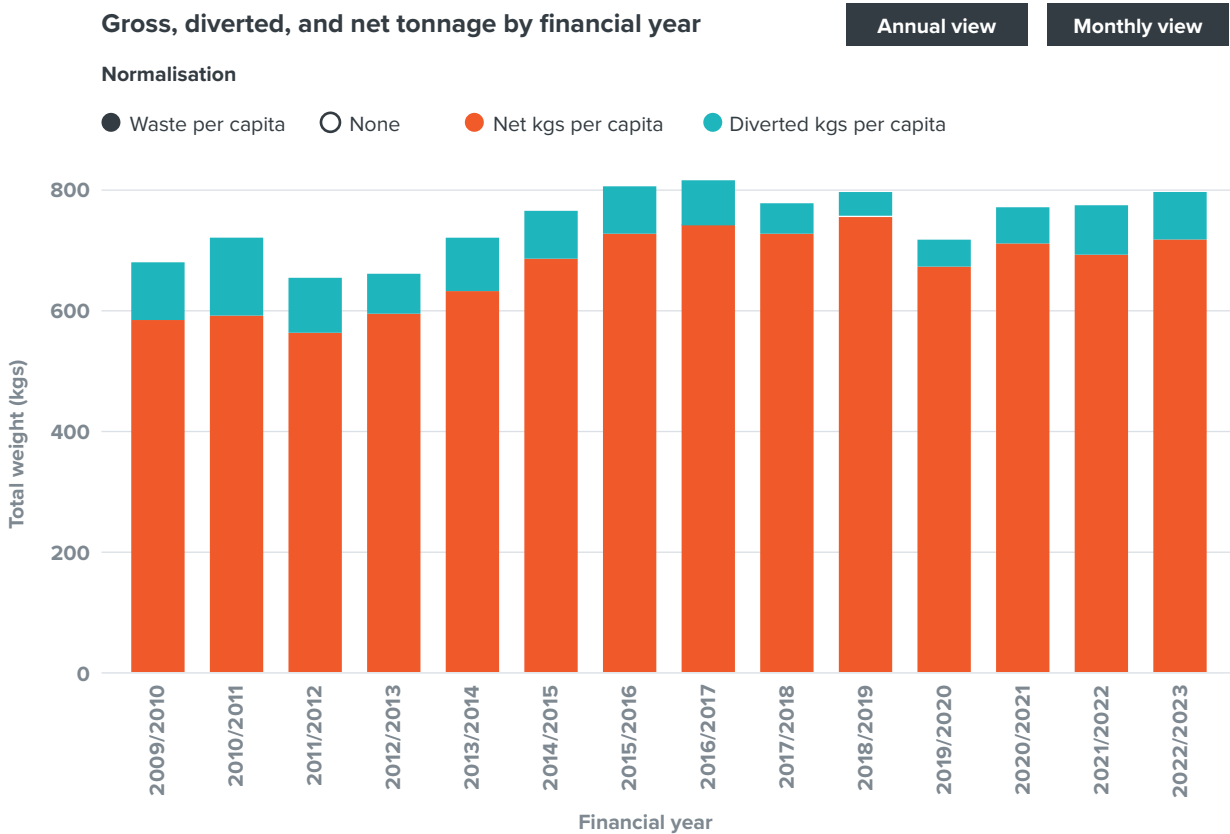


## New Zealand ranks close to last in the OECD for our poor recycling efforts. <sup>77</sup>

In 2020, waste caused around 4% of New Zealand's total greenhouse gas emissions and around 9% of its biogenic methane emissions. <sup>78</sup> In 2022/23, New Zealand generated around 780 kilograms of waste per person, almost 70% higher than the United Kingdom. <sup>79</sup> The amount of waste we produce annually remains persistently high (see Figure 19).

### Annual waste per capita has increased since 2009/10

Figure 19: Annual waste per capita (kgs) in Class 1 landfills, 2009/10 to 2022/23



Note: This is waste to class 1 landfills. Source: Ministry for the Environment. <sup>80</sup>



While a proportion of waste is diverted from landfill, no consistent data exists on what waste is recycled. A 2021 stocktake, for example is reported to have found that '21% of the 336,000 tonnes of material estimated to be processed through recycling centres each year ends up in landfill due to contamination'.<sup>81</sup>

The waste levy has been increased and expanded to cover additional landfill types, including construction and demolition fill.<sup>82</sup> However, the levy remains lower than other countries<sup>83</sup> and has not reacted to large increases in inflation that have occurred over the last three years. Much of the increase will offset rising prices across the economy, which demonstrates the need for greater flexibility in pricing. The Infrastructure Strategy recommended that prices keep pace with inflation. We have been advised that the increase in the waste levy is starting to incentivise the sorting of waste, resulting in a small decrease in waste to landfill.

The Chief Economist for the Parliamentary Commissioner for the Environment's Office reflected in November 2023:

*The previous Government decided to progressively increase the levy over four years from \$10 per tonne – set in 2009 – to \$60 per tonne as of July 2024.... By comparison the United Kingdom landfill tax is currently around £100 [NZD\$210] per tonne. This has been progressively raised over time, leading to 80% less waste going to landfill. Obviously, they have been using the price to reduce waste rather than raise revenue.*<sup>84</sup>

– Geoff Simmons, Chief Economist, Parliamentary Commissioner for the Environment

## Measures are being taken to divert organic waste from landfill.

In March 2023, the Government announced changes to household food scraps, consistent with the Infrastructure Strategy. Under this policy setting, households in urban areas would need to have kerbside food scrap collections in place by 1 January 2030. Regulations have not yet been passed to implement this policy.<sup>85</sup> Food scrap collections are already in place in several local authority areas (such as Auckland).

We have been advised that the Waste Minimisation Fund has been used to incentivise kerbside organics collections. The Government has also provided funding to support organics processing infrastructure in New Zealand, such as the Ecogas Reporoa Organics Processing Facility, which received a loan from the Provincial Growth Fund.<sup>86</sup> Since October 2022, the Waste Minimisation Fund has allocated \$24.3 million to 33 projects to support organic kerbside collections. This funding will divert an estimated 64,000 tonnes of organics from landfill per annum.

## Case Study 13:

**Expansion of organic waste collection in Tauranga****Tauranga City Council – kerbside collection of organic waste**

In 2021, Tauranga City Council was awarded \$8 million from the COVID-19 Response and Recovery Fund to introduce new kerbside collection services, which included rubbish, recycling and food scraps bins for over 56,000 households. This service also included an optional garden waste collection service that households could opt in to for an additional cost. The new kerbside collection services were in addition to the existing glass bottle and jar kerbside collection service. Since introducing the new services, Tauranga has nearly halved the amount of household waste going to landfill. Plus, turned over 5 million kilograms of food scraps into compost that has been used to grow new food in the Bay of Plenty and Waikato.



Other measures to reduce waste include:

- Waste Minimisation (Public and Related Products) Regulations 2022 to decrease single-use plastics entering the market. <sup>87</sup>
- Waste Minimisation (Tyres) Regulations 2023, which contain regulations for the recycling and reuse of tyres. <sup>88</sup>

## Action is underway to improve waste sector data.

As discussed in the Infrastructure Strategy, there is a lack of good data about waste and recycling infrastructure and services. The Ministry for the Environment has a work programme to build and maintain a waste data evidence base, providing comprehensive and internationally comparable waste data. A waste statistics dashboard was delivered in December 2023. <sup>89</sup>

New regulations, which will come into force on 1 July 2024, will require facility operators to report on the materials 'activity source', such as construction, household or business waste. For facility operators, there will also be changes for volume-to-weight conversion factors. For sites that do not have a weighbridge, the categories for types of waste or diverted materials will be expanded. Territorial authorities will need to report on their levy spending, as well as their waste minimisation activities. <sup>90</sup>

## More action is required to reduce waste from construction and demolition, which is the largest source of waste in New Zealand.

This accounts for up to 50% of all waste generated and is expected to be a growing problem, unless action to minimise waste is taken. <sup>91</sup> Reducing the volumes of construction and demolition waste going to landfill has environmental and economic benefits. An Environment Select Committee report in August 2023 examined the current status of construction and demolition waste and noted, amongst other matters that 'the building regulatory system does not incentivise action to minimise construction and demolition waste'. Some councils have updated their waste bylaws to require site-specific waste management and minimisation plans for construction and demolition projects. However, the enforcement provisions that can be applied under a bylaw do not carry the same consequence as under primary legislation.

Some initiatives are underway to reduce construction waste. Since 2021, there have been 18 construction and demolition projects active across the Waste Management Fund and the Plastics Innovation Fund, which aims to divert 125,000+ tonnes of construction and demolition waste per annum from landfill (mainly wood and plastics). These projects have received co-investment of \$21.8 million (with a total project value of \$53.8 million). **Case Study 14** provides an example of a current recycling initiative.

## Case Study 14:

### Recycling waste concrete into other infrastructure projects

#### Transpower recycling concrete foundations in Auckland

In 2024, Transpower commenced recycling of concrete foundations from transmission towers removed as part of the line dismantling project in Auckland. Northpower is Transpower's service provider on this project.

So far, Northpower has sent almost 347 tonnes of reinforced concrete to be recycled. This includes concrete from the foundations of 16 towers. This recycled concrete can be used in construction projects, for example, the base of footpaths. This may be just the beginning of their concrete recycling journey as Transpower look to identify other concrete recycling facilities around the country and share their learnings with the business and wider sector.



The recycling cost of the concrete is lower than landfill disposal costs and so they are achieving both environmental and cost savings. There are also some significant emission reduction costs associated with the recycling and re-use of their assets.

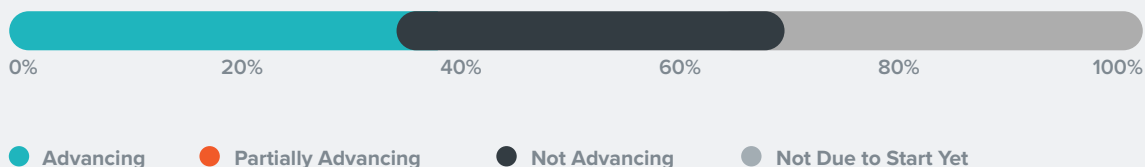
From the work that they have done to date on recycling and re-use trials, it is clear that selective targeting of waste reduction initiatives, coupled with further waste infrastructure development can enable the organisation to achieve significant waste reductions at minimal cost.

## The Infrastructure Strategy noted that a clear Government position on the role of waste-to-energy would provide greater certainty.

This remains an outstanding action. Some waste-to-energy initiatives are underway, such as the First Renewables Reporoa plant, which is close to completing work on a renewable gas project that will upgrade biogas from the Ecogas Organics Processing Facility into biomethane. <sup>92</sup>

## 4.6. Strengthening partnerships with and opportunities for Māori

### Status of the 'strengthening partnerships with and opportunities for Māori' recommendations in the Infrastructure Strategy



## Building strong, meaningful, and enduring relationships between Māori and infrastructure sector participants is foundational for infrastructure that works for everyone.

The Infrastructure Strategy prioritised three areas for action: creating stronger partnerships with Māori across infrastructure planning and delivery, unlocking opportunities for Māori across the infrastructure system, and incorporating mātauranga Māori into infrastructure design, planning, and delivery.

Te Waihanga has been undertaking research on current Māori engagement activity for infrastructure. This research is relevant to all three prioritised areas for action in the Strategy. It looks at two aspects of 'engagement':

- Māori engagement on infrastructure proposals initiated by others
- wider Māori involvement in infrastructure, such as ownership of or investment in infrastructure and direct participation by individuals and businesses in the infrastructure workforce.

Partnerships within the sector are developing. For example, **Case Study 15** provides an example of by Māori, for Māori, in-house leadership programmes being run by Downer. Watercare is another organisation seeking to enhance and uplift Māori business participation in its delivery of services and has:

- a target of 5% of its total spend to be delivered by Māori-owned businesses.
- introduced a Māori business network – Ngā Kakau Paraha. This network of 16 companies has been introduced, via networking sessions, to Watercare's main contractors to foster relationships and to provide opportunities for the companies in the network to increase participation in its capital programme.



## Leadership programme for Māori, led by Māori



### Downer New Zealand Limited offers several leadership development programmes for Māori

These programmes include:

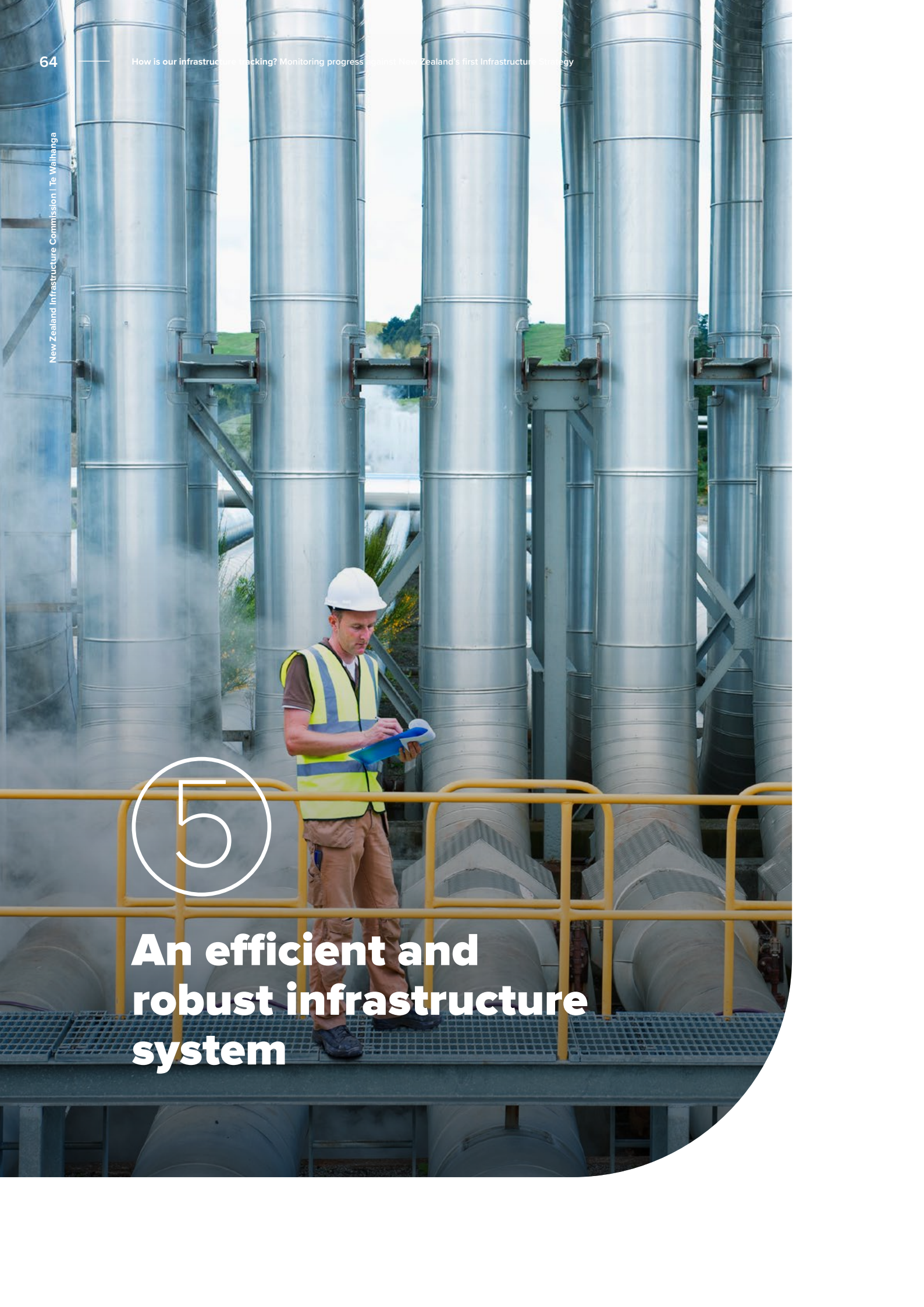
- a Māori Leadership programme (which approximately 450 people have completed)
- a senior leadership programme developed by Ngāti Toa Rangatira and supported by Te Puni Kōkiri
- Te Hā, a wāhine leadership development programme.

In 2023 the Māori Leadership programme and Te Hā were extended to Downer's supply chain. They included their alliance partner, City Rail Link, and subcontractors (for example, Hynds Pipes). They are now extending this to other large organisations in Aotearoa New Zealand. All the course facilitators of these programmes have another job at Downer and have been trained to be facilitators and mentors for both the leadership and rangatahi programmes. The programmes are designed by Māori, for Māori, and are all delivered in-house.

Downer also has an internal cultural competency programme, Te Ara Māramatanga, a noho marae experience, which is for non-Māori staff.

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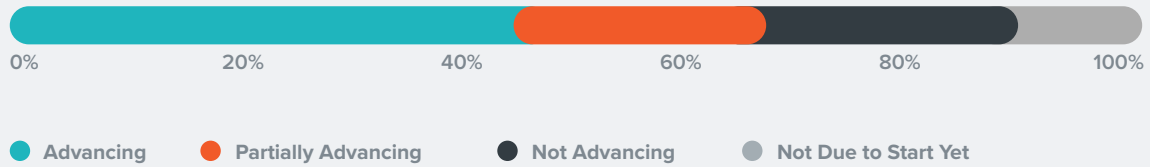
# An efficient and robust infrastructure system





## 5.1. Better infrastructure decision-making

### Status of the 'better infrastructure decision-making' recommendations in the Infrastructure Strategy



## There have been some improvements in long-term infrastructure planning.

The Infrastructure Strategy stressed the importance of a long-term view of infrastructure investments to enable infrastructure agencies, as well as construction firms, to better plan for the future. Some steps have been taken to improve visibility and confidence in future central government investment decisions.

- The Government has requested that Te Waihanga develop a long-term infrastructure plan covering all infrastructure sectors to deliver longer-term certainty, enable more effective planning, and reduce project costs (see the Overview for further details). This will help inform city and regional deals.
- Te Waihanga has undertaken the foundational work of building the National Infrastructure Pipeline, which gives visibility to a funded pipeline of work from over 5,300 projects valued at \$121.8 billion as at March 2024.
- Te Waihanga will also carry out an assessment of Infrastructure Priorities. This will be a structured independent review of infrastructure proposals and problems in various stages of planning, including initiatives that avoid the need for investment. This will improve the quality of business cases and collate a menu of high-quality infrastructure projects from which long-term infrastructure plans can be developed.

## Better public investment practices will improve efficiency and infrastructure outcomes.

Some steps have been taken to strengthen the government's ability to act as a sophisticated client of infrastructure. These include:

- Cabinet Office Circular CO (23) 9, <sup>93</sup> which requires a Risk Profile Assessment to be completed earlier for infrastructure investments and the completion of a Strategic Assessment. This may mean that fewer initiatives progress to business case development.
- Treasury's measures to strengthen Quarterly Investment Reporting, which provide more robust data to assess investment and asset performance over time, and better enable Ministers to consider upcoming decisions/trade-offs.

As discussed earlier in this report, Rau Paenga Limited has been tasked with serving as a specialist infrastructure delivery agent to support Crown organisations to deliver large infrastructure projects. The Government is also proposing to establish a National Infrastructure Agency to coordinate funding, connect investors with New Zealand infrastructure, and improve project funding, procurement and delivery.

The release of Cabinet Office Circular CO (23) 9 formalised the Cabinet decision in August 2023 to cease the requirement for investment intensive agencies to be assessed for an Investor Confidence Rating (ICR). The Investor Confidence Rating (ICR) was a three-yearly assessment of the performance of investment-intensive agencies in managing investments and assets that are critical to the delivery of government services. However, it was agreed the design and execution of the ICR was not meeting the government's needs for an accurate assessment of agency capability. It was resulting in significant compliance and consultancy costs for agencies and was not delivering on its value proposition.

The Minister for Infrastructure chairs the recently established Infrastructure and Investment Ministers Group that will oversee the cross-government infrastructure work programme. The key functions of this group will be to oversee the performance of investments throughout their life cycle and to support the development of the National Infrastructure Plan.

## Better governance practices are needed for large infrastructure projects.

The governance of infrastructure is the policies, frameworks, norms, processes and tools, used by public bodies to plan, make decisions on, implement and monitor the entire life cycle of public infrastructure. New Zealand ranks poorly against other OECD countries on many of the measures used to assess governance practices (see Figure 20).

### Benchmarking infrastructure governance in New Zealand shows we perform poorly against other OECD countries on many measures

Figure 20: Benchmarking infrastructure governance in New Zealand





Te Waihanga commissioned research to assess the transparency of large public sector projects. This research looked at the accessibility of key documents for 27 large projects across central and local government. These ranged in cost from \$50 million to more than \$1 billion, and have a collective value of over \$70 billion. This research showed that around half of all the business case and assurance case documents in these big, public projects were not accessible, and that reviews were not accessible for completed projects. Transparency enables New Zealanders to better hold government and delivery agencies to account and as a result, improves project outcomes.

Treasury's Gateway reviews provide 'an independent peer-review process that examines investments at key points in their life cycle to assess their progress and to rate the likelihood of successful delivery of their outcomes'.<sup>94</sup> This process has been updated so that each Gateway review is also shared with Ministers and Cabinet as part of business case approvals and will be provided to Treasury and the relevant system leader, to support them in their role. Previously they were only shared with the project SRO (senior responsible owner).

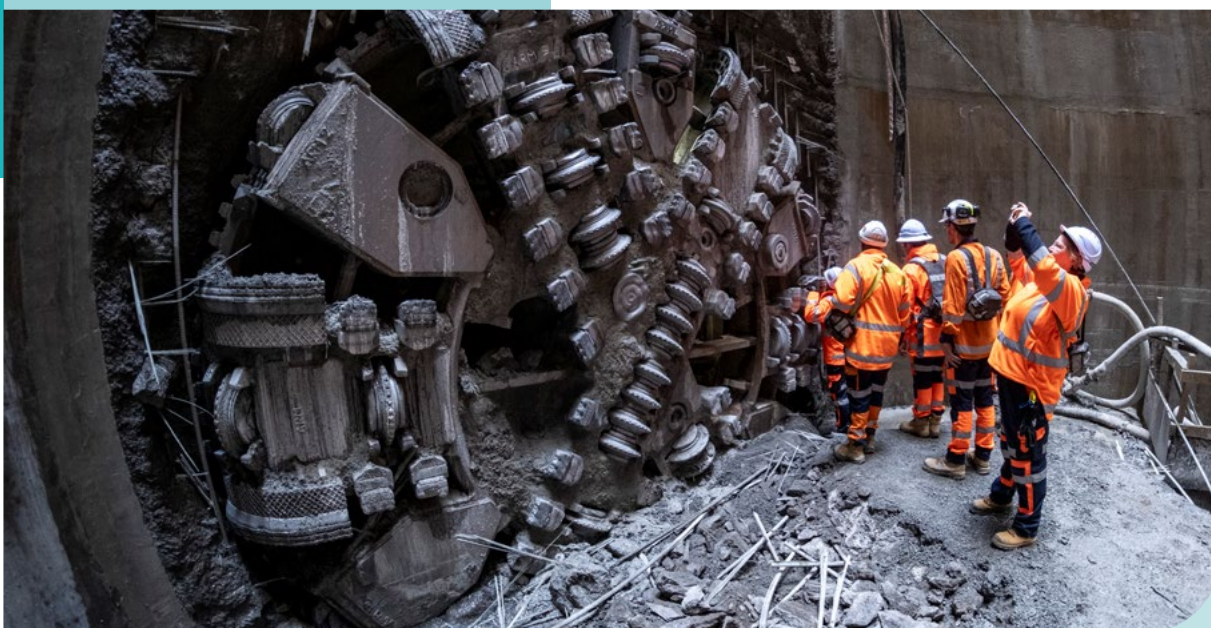
## International experience shows that big projects often cost more and take longer than expected.

Internationally, it's not unusual for large infrastructure projects to significantly exceed budget estimates, with only one in ten projects being completed within budget.<sup>95</sup> A New Zealand example can be found in the cost estimate for the City Rail Link (CRL), which has risen from an initial \$3.4 billion in 2019 to \$5.5 billion in 2023 (although a portion of this increase is likely to be the result of delays caused by COVID-19).<sup>96</sup> Similarly, only one in ten projects worldwide are completed on time. In total, only around 0.5% of large projects are delivered on time, within budget, and realise the expected benefits.<sup>97</sup>

Watercare's Central Interceptor has been a relatively well-performing project when compared to other major infrastructure projects. It has remained on-time and incurred more moderate cost increases, despite three years of lockdowns, resource shortages, global supply chain issues and high inflation caused by the COVID-19 pandemic. It is notable that this project did not have a budget announcement until after the construction contract had been awarded. The project team appears to have provided relatively accurate cost estimates from the outset and avoided optimism bias in time and cost budgets (see **Case Study 16**).

Another example is the Clutha Upper Waitaki Lines Project which has successfully enhanced the capacity of existing power lines between Clutha and the Upper Waitaki Valley.<sup>98</sup> It was completed well under budget at a final cost of \$83 million (the approved budget was \$197 million) and 18 months ahead of schedule. This was achieved through a mixture of upfront investment from Meridian and Contact, fast-tracking of the project, efficient planning where early design work minimised unnecessary construction time, and early material procurement and tight supply chain management prevented price hikes.

## Watercare's Central Interceptor Project



### Central Interceptor Project – an example of management of cost escalations and delays

The Central Interceptor is New Zealand's largest bored wastewater tunnel. It is 4.5 metres in diameter and when completed, will run for 16.2 kilometres from Pt Erin, Herne Bay under central Auckland and the Manukau Harbour to Māngere Wastewater Treatment Plant. The tunnel will lie between 15 and 110 metres below the surface. Two smaller link sewer tunnels intersect the main tunnel. Together, they will collect stormwater and wastewater from the existing combined network and take it to the Māngere Wastewater Treatment Plant for processing. This will see a reduction in more than 80% of wet weather overflows into streams and beaches. Section one of the tunnel (May Road to Mt Roskill South) will go live before the end of 2024. <sup>99</sup>

In the first quarter of 2019, Watercare Services Limited (Watercare) concluded a comprehensive procurement process and awarded Ghella Abergeldie Joint Venture (GAJV) the construction contract to build the Central Interceptor with a completion date in quarter 1 of 2026. The budget was revised by August 2023 to \$1.319 billion to accommodate additional work added to the project scope. A further \$204 million was added in November 2023 to complete the works, bringing the total budget to \$1.523 billion. <sup>100</sup> This included \$109 million to address the impacts of ongoing/future inflation to the end of the project. This equates to approximately 15% cost escalations (not relating to additional works), which compares favourably against the Capital Goods Price Index, which has increased by 28% over the same period since contract award.

Te Waihangā identified three reasons why the project has managed to control its cost escalations and programme delays so well:

- **Pricing autonomy:** The project is paid for by water users, so that overruns would require higher user charges. This is an important incentive for tight budget management. In addition, there was no budget announcement until after the construction contract had been awarded, which means the project team was able to accommodate an appropriate contingency and maintain control over scope.
- **High-trust relationship:** A high-trust relationship was developed and fostered in spite of the contract being a 'Lump Sum' schedule, which is typically associated with lower trust between parties.
- **Incident management response:** When COVID-19 hit, the response between the parties was one of incident management, not contract frustration. Instead of progress slowing or stopping while parties tried to figure out contractual entitlements or liabilities in the face of an unprecedented event, the parties looked after and supported each other to continue delivering through uncertainty and adverse conditions.

## Good project planning requires robust cost estimation.

A rigorous investment planning process is needed, which focuses on problem definition and option identification before consideration of solutions. The use of reference class forecasting for example, helps to reduce optimism bias, and ensure the costs and trade-offs are fully understood.

### About reference class forecasting

Reference class forecasting (RCF) seeks to achieve accuracy in project estimates by basing them on the actual performance of past projects. For a specific project it involves the following three steps:

1. identify a reference class of past, similar projects
2. establish a probability distribution for the selected reference class for the parameter being forecast
3. compare the specific project with the reference class distribution, in order to establish the most likely outcome for the specific project.

RCF then presents 'top-down' project estimates free of optimism bias and strategic misrepresentations, while accounting for risks including the forever debated 'unknown unknowns'.<sup>101</sup> RCF is designed to complement bottom-up estimates to identify potential mismatch.

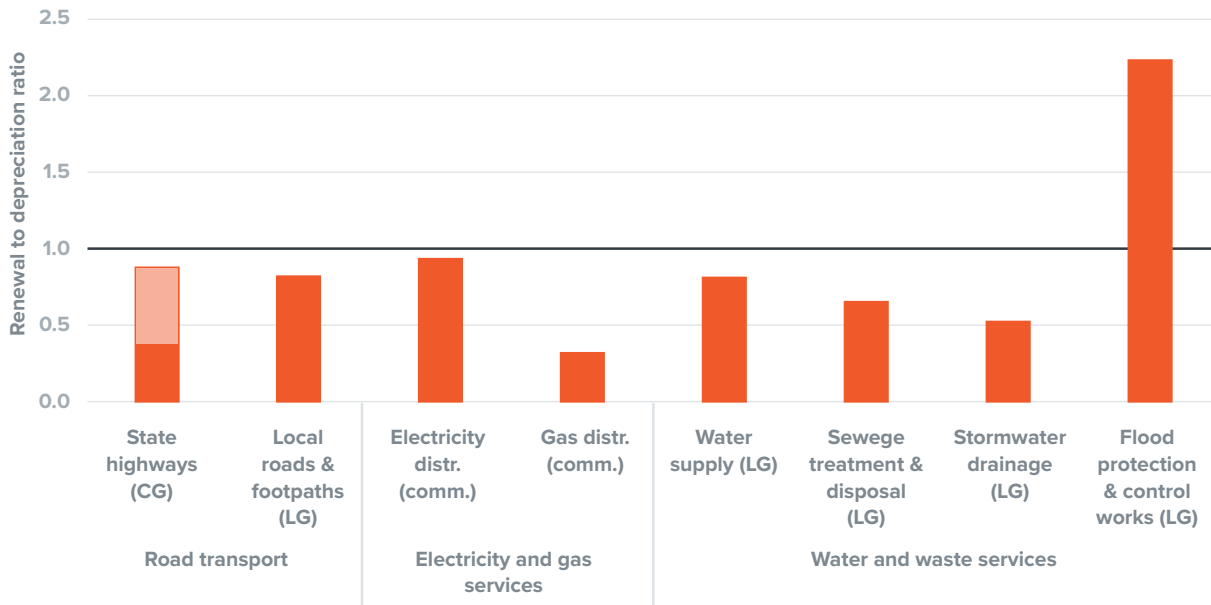
A key advantage of RCF is it better incorporates 'black swan events', such as the COVID-19 pandemic. Project teams do not always know the unforeseen events they will encounter, making it difficult to incorporate into bottom-up, ex-ante cost estimates. But we know that projects with long completion periods will very likely encounter something unforeseen that is external to the project. RCF solves this by including the probability of some unexpected events, based on what has been experienced by completed projects.

## The public sector needs to get much better at asset management.

Repairing or replacing infrastructure that's wearing out is a significant challenge for the sector. Much of the infrastructure we need over the next 30 years is already in existence. We have a duty to look after this legacy and squeeze the most value out of this infrastructure for future New Zealanders. The available data suggests that renewal spending for electricity distribution infrastructure and existing flood protection infrastructure equals or exceeds depreciation. However, renewal spending is below depreciation for state highways; local roads; water supply, wastewater and stormwater infrastructure; and gas distribution infrastructure. In the case of state highways and local roads, the level of renewal spending has led to declining asset condition (see **Figure 21**). Comparable data on vertical infrastructure was not available, as central government, which owns most of these assets, does not compile and publicly report this data.

## Renewal spending is below depreciation for state highways; local roads; water supply, wastewater and stormwater infrastructure; and gas distribution infrastructure

Figure 21: Asset renewal to depreciation ratio by sector



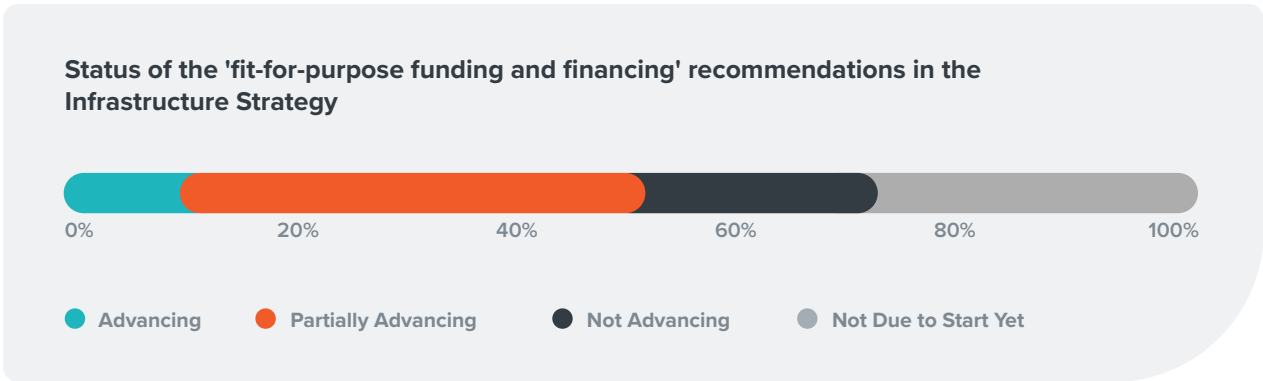
Note: New Zealand Infrastructure Commission's analysis of data from NZTA, the Department of Internal Affairs, and the Commerce Commission. State highways data is actuals for the 2012–2022 period, with a range that reflects different assumptions about the classification of renewal vs maintenance spending; local government infrastructure data is forecasts for the 2019–2028 period; electricity distribution data is actuals for the 2014–2021 period; and gas distribution data is actuals for the 2017–2021 period. Source: Research Insights: 'Build or maintain? New Zealand's infrastructure asset value, investment and depreciation, 1990–2022', New Zealand Infrastructure Commission, February 2024.

Asset management practices must be improved if we are to get the most value out of our existing assets. This could include, for example, establishing a system lead within government for all major infrastructure providers, requiring 10-year asset management plans, improving the transparency of performance, planning and reporting, and investment in professional development pathways for asset managers. Greater confidence could be gained by raising the adequacy of asset management standards before investing in significant new capital investments.

An area of progress has been the introduction of Cabinet Office Circular CO (23) 9, which strengthens the focus on asset management, and in particular, critical service assets. It requires demonstration of asset management planning, practice and performance appropriate to the scale of assets under management, including reporting on relevant asset performance indicators for service critical assets. <sup>102</sup>



## 5.2. Fit-for-purpose funding and financing

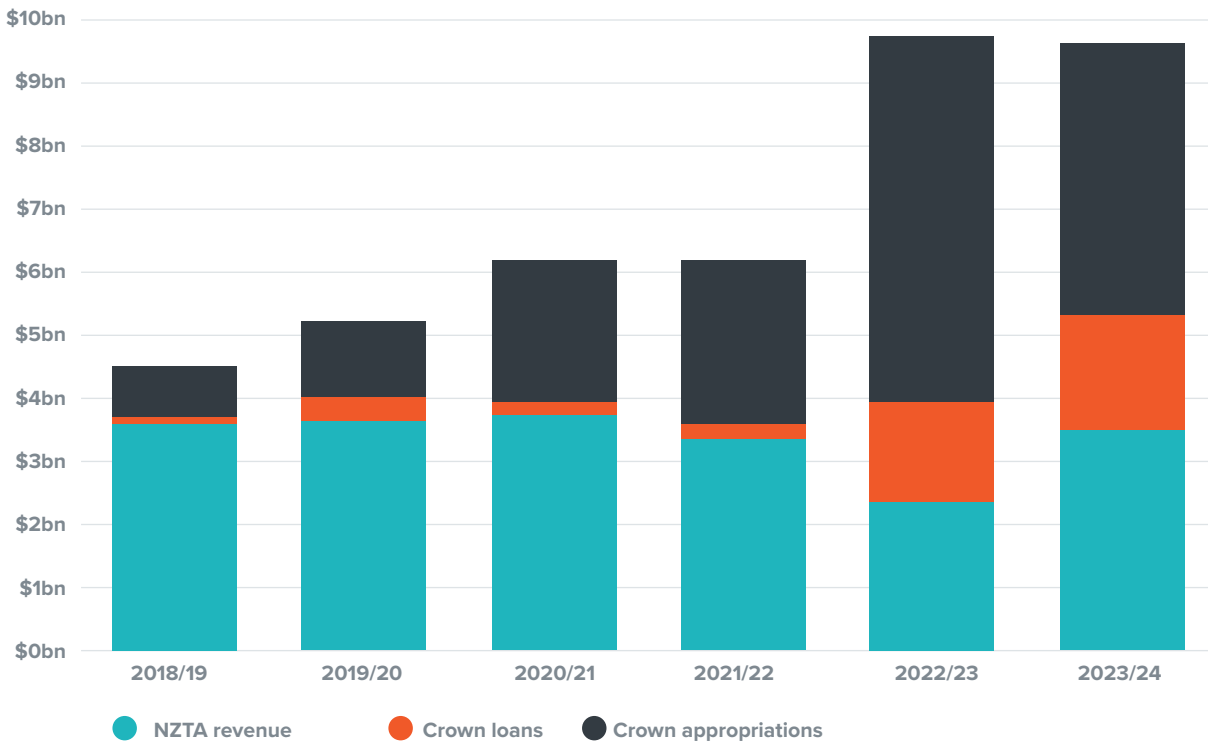


### More sustainable funding sources are needed.

Infrastructure providers in some sectors are increasingly relying on the national balance sheet for funding. For example, Figure 22 shows that an increasing proportion of transport funding has come from outside the National Land Transport Fund (which is funded through user charges).

### Since 2018/19 an increasing proportion of transport funding has come from outside the National Land Transport Fund

Figure 22: National land transport funding by source, 2018/19 to 2023/24



Source: New Zealand Infrastructure Commission

New Zealand has a significant demand for new and improved infrastructure. But this cannot reasonably be funded entirely off national and local balance sheets. Fiscal constraints mean we risk delaying or deferring good capital investments. To avoid a further build-up of infrastructure needs, sustainable and stable sources of revenue are required. One way of doing this is to establish revenue sources with new infrastructure provision.

Some shifts in transport funding along these lines are starting to occur. For example, light electric vehicles will now contribute to the costs of the transport system in the same way as other vehicles and will be required to pay road user charges (RUC) from 1 April 2024. The option of tolling new roads has come into greater focus and the Government has announced future increases to motor vehicle licencing fees, fuel excise duty and road user charges.<sup>103</sup> In Auckland, the Drury development introduced cost-reflective development contributions that more adequately cover the costs of provision, following the lead of Hamilton City Council. In Wellington, the Wellington Sludge facility was funded through a project-specific levy under the Infrastructure Funding and Finance Act 2020 (IFF). In Hawkes' Bay, electricity distributor, Unison, undertook a willingness to pay survey to determine whether customers were prepared to pay more to relocate a substation to higher ground.

## We can make greater use of existing funding and financing tools that connect assets to revenue streams.

The IFF has increased opportunities for these types of tools. The Tauranga City Council used IFF financing and targeted levies to fund its \$175 million Transport System Plan, which included many road upgrades.<sup>104</sup> While tools like this may carry higher financing and administration costs, it links assets with a distinct, transparent and separate revenue stream to ensure sufficient funding is available for capital costs. However, even with an IFF project, getting the cost estimates right is critical since this risk continues to sit with local government rather than the special-purpose vehicle (SPV).

As well as the IFF, there is the opportunity for greater adoption of volumetric water charges, waste levies, development contributions, and targeted rates. However, existing user charges which are set by legislation, such as parking fines, must be indexed for inflation and other cost pressures to be effective as recommended in the Infrastructure Strategy (see **Case Study 17**).

## Parking fines have not been reviewed for 15 years



### On-street parking fines

While local councils can make bylaws to set on-street parking controls under the Land Transport Act, the amount for parking fines is set at a national level in legislation. These fines have not been reviewed for 15 years and a legislative amendment would be required to change them. The maximum parking fine is \$57 for a period in excess of six hours. In Auckland, where parking is at a premium, it can be cheaper to park on the road and pay the fine, than to pay parking fees. The fines are not set at a level that acts as a deterrent to illegal parking. Mayor of Auckland Council, Wayne Brown, has suggested fines should start around \$100, comparable to what Australian states charge overstaying parkers. <sup>105</sup>

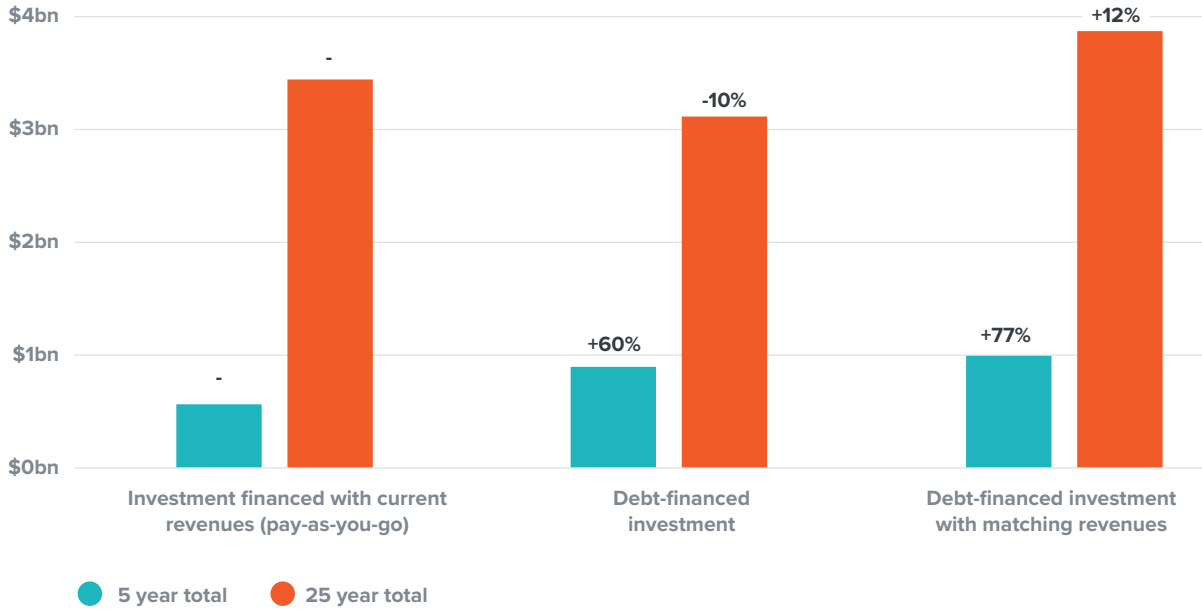
## Improving revenue streams from existing assets means we can finance infrastructure more easily and bring capital investments forward.

Without these revenue streams, efforts to finance infrastructure will result in more infrastructure now, but less in future time periods, and less overall. To demonstrate this, Te Waihanga modelled a hypothetical example government that opts to finance infrastructure in three ways. It could use current revenues (pay-as-you-go), or it could borrow money. If it borrows, it can either pay it off using revenues from future ratepayers or match its borrowing with revenue from current and future ratepayers. This comparison is shown in **Figure 23**.

Debt financing infrastructure in the absence of new revenue streams means less infrastructure overall. <sup>106</sup> In contrast, debt financing investment with matching revenues is a pathway toward closing our infrastructure needs. However, it brings funding constraints into sharper focus.

## How we finance infrastructure can affect how much infrastructure we're able to afford today and tomorrow

Figure 23: Future capital investment of a hypothetical government using different financing methods

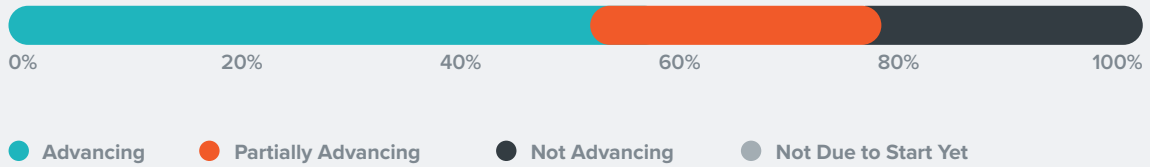


Source: Research Insights: 'Is local government debt constrained? A review of local government financing tools', New Zealand Infrastructure Commission, March 2024.



### 5.3. An efficient planning system

#### Status of the 'efficient planning system' recommendations in the Infrastructure Strategy



### Streamlined consenting for infrastructure can reduce delivery time and cost.

The Infrastructure Strategy recommended faster consenting and project delivery pathways to improve certainty and efficiency. However, New Zealand does not yet have a planning system that supports the fast-paced and sustained infrastructure investment needed to meet the challenges and opportunities ahead. This remains an outstanding issue to be addressed. The Government has signalled an intention to move quickly to develop a new regime that will deliver fewer resource consents, shorter plans and consent times, and less litigation.<sup>107</sup>

The Government has introduced the Fast-track Approvals Bill,<sup>108</sup> which aims to provide a 'one-stop-shop' for fast-track consenting of regional and national projects of significance.<sup>109</sup> Fast-tracking projects involves circumventing existing consenting processes which, given the increased cost and delays in consenting, is arguably necessary until wider reforms are implemented. The COVID-19 fast-track regime provides a precedent – it saved an average of 18 months per project. The new approach also has the benefit of including other non-RMA approvals which may improve efficiencies for infrastructure provision.

The case for bypassing existing consenting processes is stronger for infrastructure that is consistent with national goals and provides wider public benefits, such as Net-Zero Carbon 2050, waste reduction, housing affordability and healthy clean waterways. Wider application to general commercial activities, while not without potential benefit, risks jeopardising public support and therefore, the durability of these processes.

The reconstruction of SH25A after catastrophic damage during the January 2023 storms demonstrates how quickly infrastructure can be built when an expedited approach is taken to all aspects of project delivery, including consenting. This project, which would normally take 18 to 24 months, was able to be completed within less than a year using the emergency provisions in the RMA, good project management, design, and procurement disciplines. Land purchase also was not required, which was an important element in the expedited delivery (see **Case Study 18**).

## Accelerated delivery of State Highway 25A Taparahi Bridge



### New Taparahi Bridge allows SH25A to be opened in less than a year

A 110-metre wide slip during the January 2023 storms completely destroyed a section of SH25A, cutting off the connection between Kōpū and Hikuai. In less than a year, NZTA had completed the construction of the new 124-metre Taparahi Bridge. This was three months earlier than expected, enabling it to be open in time for Christmas 2023 holiday period. The new bridge was not only the fastest option, but also the most resilient.

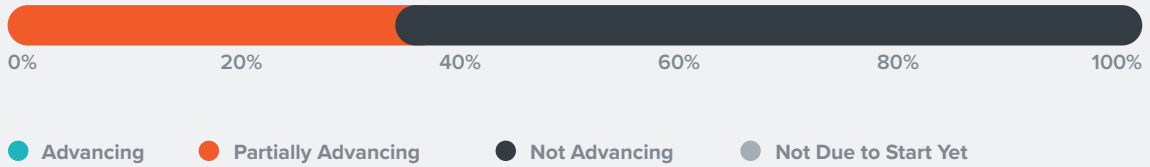
A bridge of this nature would normally take two years to consent and between 18 and 24 months to construct. A number of factors contributed to accelerated delivery, including an accelerated procurement process, no requirement to purchase land, the use of the emergency provisions of the RMA, which enabled construction of the bridge to proceed without resource consent, and an exemption from the Building Act 2004, with the agreement from the Waikato Regional Council and Thames-Coromandel District Council. <sup>110</sup>

*The need to deliver as quickly as possible provided the driver to think creatively about design and construction delivery.* <sup>111</sup>

While the road was closed, the opportunity was also taken to 'invest an additional \$30 million to clear slips, replace 23 culverts, repair or replace 7 kilometres of side drains, and complete the strengthening of 7 bridges as well as complete slope stabilisation and resealing along the rest of SH25A to ensure the entire corridor is safe and more resilient'. <sup>112</sup>

## 5.4. Accelerating technological and digital change

### Status of the 'accelerating technological and digital change' recommendations in the Infrastructure Strategy



## An open data environment with common standards is needed to improve infrastructure outcomes.

The development in 2022 of a Digital Strategy for Aotearoa provided a step in the right direction towards a more coordinated approach to digital technology. However, little has occurred to further develop an open data environment or one with common national infrastructure meta standards. This is an area requiring central government leadership and coordination.

Improvements have been made in Building Information Management (BIM) systems. In 2023, the Construction Sector Accord, BIMinNZ Steering Group, and New Zealand Institute of Building undertook the Digital BIM Guidance Project which included an update to the NZ BIM Handbook – the standard guidance used by BIM practitioners in New Zealand.<sup>113</sup> The updated handbook reflects lessons learned since the 2019 version, as well as numerous technical updates, reflecting steady advances in client, contractor and sub-contractor maturity.<sup>114</sup> Some examples of good practice in BIM have emerged (see **Case Study 19**), including the National Archives building project in Wellington, where BIM is being used extensively. While there is some evidence that BIM use is steadily rising, there remains a case for mandating BIM on infrastructure projects above a certain threshold.

## Using Building Information Management (BIM) systems

### City Rail Link

BIM has been used extensively in the CRL project in Auckland to improve the performance of the project for all stakeholders. BIM has optimised all aspects of the project, which includes challenges such as working underground and in constrained spaces, complex services requirements, a tightly bounded urban environment, and the continued occupation and use of connected and surrounding facilities.



CRL uses a whole-of-life process that considers the total expenditure (capital and operational expenditures) over a 30-year period post-contract, including the ongoing maintenance programme. This process adds considerable value to the safety in design and maintainability, as well as equipment selection. One of the challenges for asset owners in adopting BIM is the continual operating costs for updating models over time.

Visualisations based on the BIM model are used to simulate day-to-day operation and use, as well as respond to emergency situations. It allows potential hazards and conflicts to be identified and mitigated before they occur in the construction process and during the operation of the facilities. It also provides the basis for material to assist train drivers and other key stakeholders to become familiar with the environment.

A critical learning is that BIM has streamlined the development of design reviews, public consultations, and wider communications, improving the quality and efficiency of problem-solving and decision-making on the project. <sup>115</sup>

### Watercare

Watercare has created a partnership environment called Enterprise Model that empowers the implementation of effective Digital Engineering and BIM solutions. Watercare has already developed and established their BIM and Digital Engineering standards and mandated the implementation of these data-driven requirements across a \$13 billion programme of work. A key step for the Watercare digital transformation journey was the creation of a stable and practical backbone of standards, templates, and processes mandated to be implemented during the asset life cycle of all projects above \$15 million. This stable backbone, aligned with Watercare's objectives and the capability and capacity of the New Zealand design and construction supply chain, includes the development of:

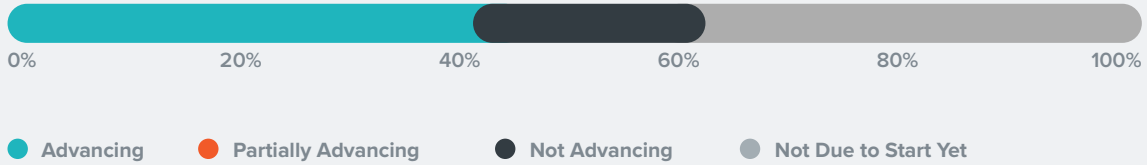
- a master digital engineering execution plan – this document sets out the approach to digital engineering implementation across the programme of work, and covers multiple asset typologies, including pump stations, treatment plants, reservoirs, pipelines, and buildings
- a master model geometry specification to define how model elements are developed
- an as-built model specification defining as-built requirements
- a project specific digital engineering information template documenting every project's digital information flows, processes and deliverables.

This implementation is aligned with national guidelines such as the NZ BIM Handbook, as well as global frameworks such as ISO 19650, (a series of international standards providing guidelines and requirements for managing information over the entire life cycle of built assets using BIM and Digital Engineering).



## 5.5. Building workforce capacity and capability

### Status of the 'building workforce capacity and capability' recommendations in the Infrastructure Strategy

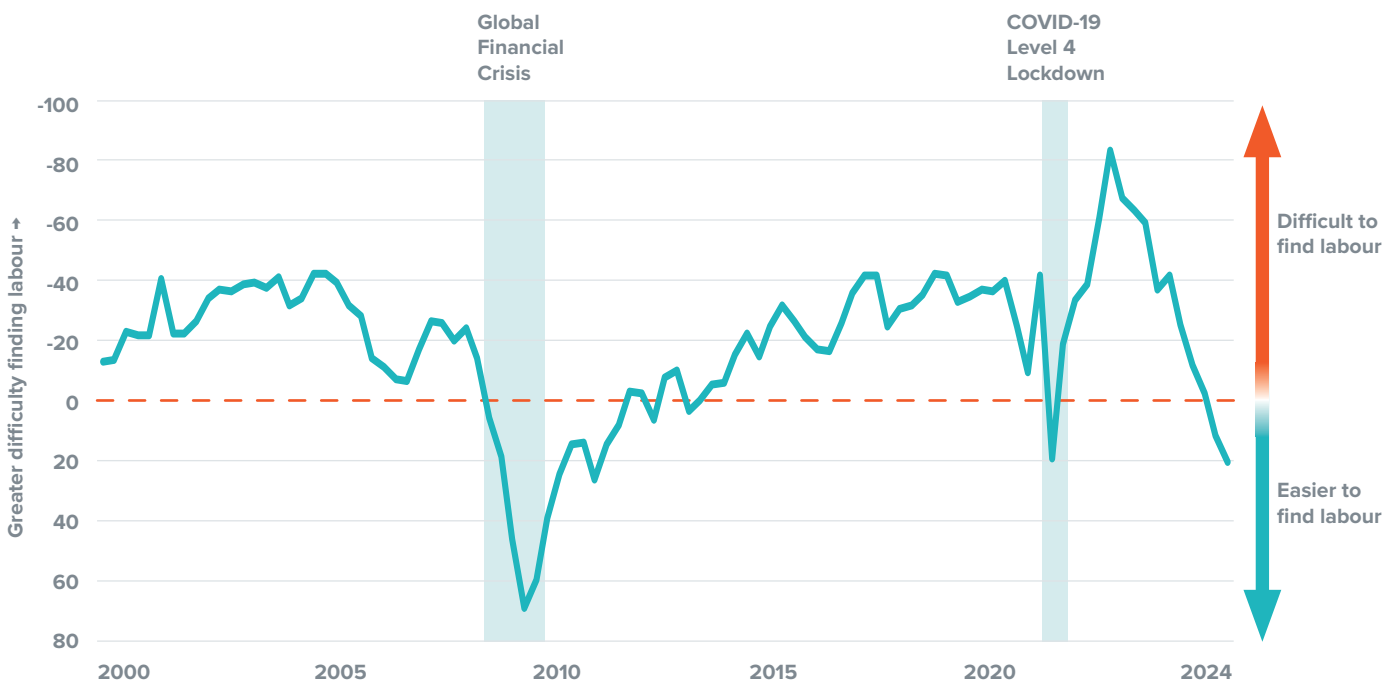


## Workforce capacity pressures appear to be easing

The industry has recently been operating at or near capacity, with total observed project demand roughly equal to the total size of infrastructure workforce capacity (before accounting for renewal and maintenance programmes). However, market soundings with both vertical and horizontal construction firms suggest that there is rising uncertainty about future work, driven in part by changing signals about central government investment as well as softening demand for commercial and residential development. As a result of these pressures, workforce pressures appear to be easing (see Figure 24).

## The construction sector is reporting less difficulty finding skilled and unskilled labour

Figure 24: Ability to find workforce as reported by the construction sector by quarter, 2007–2023



Source: Research Insights: 'Who's working in infrastructure? A baseline report', New Zealand Infrastructure Commission, December 2023.

Te Waihanga market soundings also suggest that civil contracting firms are perceiving increased uncertainty. High levels of uncertainty could have an impact on capacity in the sector with less investment in new staff, skills and technologies. Construction business closures are also a risk.

## Making project announcements too early can reduce long-term project certainty.

However, risks related to low levels of certainty should not be construed as a reason to circumvent best practice planning, governance and decision-making. This is because premature project announcements are associated with a reduction in long-term project certainty in many instances.<sup>116</sup> Therefore, stabilising the forward pipeline will require planning improvements that prevent public commitments prior to fully understanding value-for-money and deliverability risks.

## Continued investment is needed to improve project leadership capability.

Major infrastructure projects are highly complex, and their leaders require diverse skills and competencies. It's a demanding role that requires technical expertise and emotional intelligence mixed with a focus on productivity to get the best from their people. At present, the leaders of our major public sector projects have no formal development pathway.

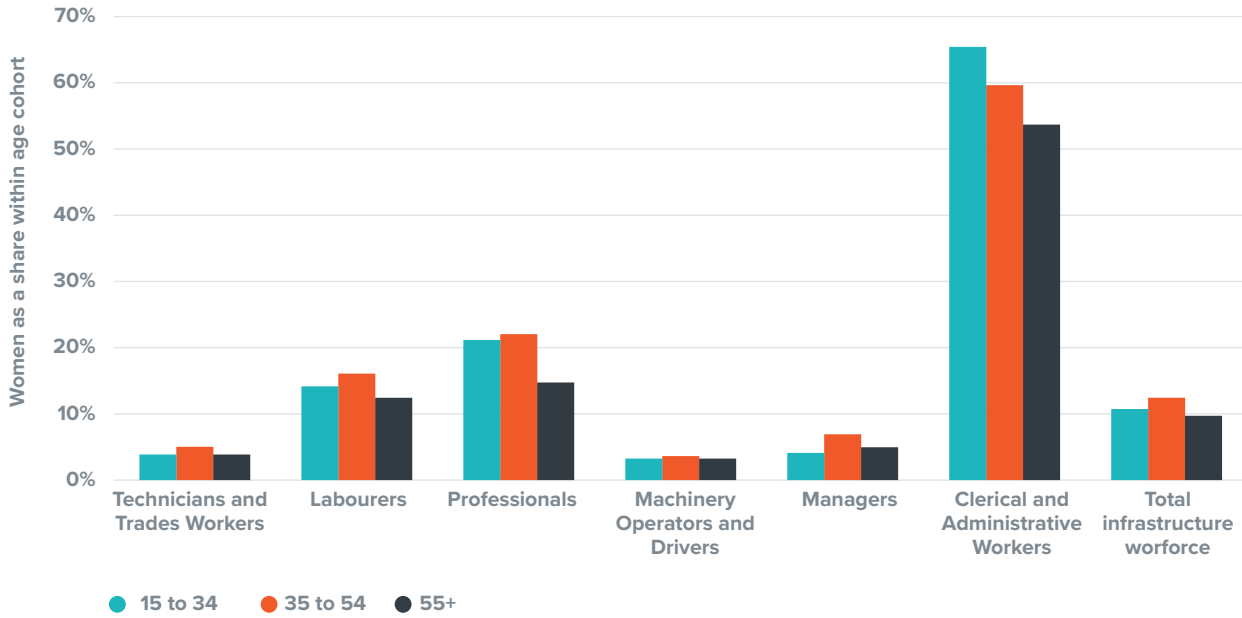
The Government has asked Te Waihanga to create a programme that builds capability to lead major public service infrastructure projects. Work is underway to develop the requirements for a major project leadership programme. Te Waihanga is working with major project leaders and leadership development professionals to create a learning development framework and programme that will support current and aspiring major project leaders. Te Waihanga is also developing a major project leaders' network to support current major project leaders and leadership mentoring.

## Diversity remains an ongoing issue for the construction sector.

The infrastructure workforce is large and complex. It comprises more than 100,000 full-time equivalent workers spread across more than 100 distinct occupations. Different workers are engaged at different stages of the infrastructure life cycle, and capacity or capability gaps at one stage can cause problems at later stages. The overall infrastructure workforce has a similar ethnic makeup to the New Zealand population, but ethnic mix is uneven across occupational categories. Also, only 11% of infrastructure workers are women, clustered predominantly in clerical and administrative positions (see Figure 25). The participation of women in the workforce is only marginally higher among younger age cohorts, meaning that without targeted interventions, this pattern is unlikely to change as the workforce ages.<sup>117</sup>

## Only 11% of infrastructure workers are women, clustered predominantly in clerical and administrative positions

Figure 25: Women as a share of the infrastructure workforce, by occupation and age cohort, 2018



Note: New Zealand Infrastructure Commission's analysis of Scarlatti/Alta workforce estimates.

Source: Research Insights: 'Who's working in infrastructure? A baseline report', New Zealand Infrastructure Commission, December 2023.

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