He Pou a Rangi
Climate Change Commission

Monitoring report: Emissions reduction

Assessing progress towards meeting Aotearoa New Zealand's emissions budgets and the 2050 target

July 2025

2025 ANNUAL MONITORING REPORT

Haere mai – Welcome

This advice is required under sections 5J, 5ZJ and 5ZK of the Climate Change Response Act 2002.

ISSN: 3021-2650 (Print)
ISSN: 3021-2669 (Online)

Disclaimer: He Pou a Rangi Climate Change Commission (the Commission) has made every effort to ensure the material and analysis underpinning and contained in our report is accurate and correct. However, the Commission makes no warranty, representation or guarantee that the material is error-free. Potential errors that come to our attention will be assessed by the Commission, and any necessary corrections to our information will be notified via an erratum published on our website. If an error is identified that the Commission considers materially affects any part of our report, the Commission will notify the Minister of Climate Change in writing as soon as possible.

Disclosure statement: As anticipated by the appointment criteria, the Climate Change Commissioners come from varying fields such as adaptation, agriculture, economics, te ao Māori and the Māori–Crown relationship. While a number of board members continue to hold roles within these fields, our advice is independent and evidence-based. The Commission operates under its Interests Policy, which is derived from the Crown Entities Act 2004. You can read more about our board members on the Climate Change Commission website. The Commission regularly updates and publishes on its website a register of relevant board interests.

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About He Pou a Rangi Climate Change Commission

He Pou a Rangi Climate Change Commission (the Commission) is an independent Crown entity established by the Climate Change Response Act 2002 (the Act) to:

a. provide independent, evidence-based advice to successive governments on mitigating climate change (including through reducing emissions of greenhouse gases) and adapting to the effects of climate change
b. monitor and review progress towards emissions reduction and adaptation.

In carrying out these roles, the Act requires the Commission to draw from the best available evidence and analysis, and to consider the impacts of climate change and the implications for Aotearoa New Zealand over time. The Act also directs us to consider the Crown–Māori relationship, te ao Māori, and specific effects on iwi/Māori in our work.

The Commission's impartial advice focuses on the outcomes that can result from government action and policy, and the choices that decision-makers have. The aim is to support the Government to fulfil its role under the Act, including achieving emissions budgets and the 2050 target, and allowing the people of Aotearoa New Zealand to prepare for, and adapt to, the effects of climate change.

The scope and timeframes for the Commission's advice and monitoring reports are set out in the Act. More information about the Commission's work programme can be found on our website, www.climatecommission.govt.nz

Titiro mai – Attention

There are a range of summaries of this report available on our website. These have been developed in response to audience feedback, and also reflect evolution of our approach to translation into te reo Māori.

Summaries cover: energy, industry and buildings; transport; agriculture; waste and fluorinated gases; and removals.

There is also a *Whakahekenga rehukino* summary in te reo Māori and English, covering key points for emissions reduction actions centred on iwi/Māori.

The summaries, full report and other supporting documents are available on our website: climatecommission.govt.nz/ERM-2025

About emissions budgets and reduction plans

This covers what the report assesses and how it relates to our 2024 advice about revising emissions budgets.

In November 2024, the Commission provided advice on two key parts of the emissions reduction system: a review of the 2050 target, and advice for a fourth emissions budget (2036–2040) – which included recommending that the first three emissions budgets are revised. Government decisions on those reports are due by the end of 2025.

In December 2024, the Government published its second emissions reduction plan (for 2026–2030) and amended the first emissions reduction plan (for 2022–2025).

This means our 2025 assessment of emissions reduction progress is made across two emissions reduction plans, and at a time when the Government is considering if the country's emissions budgets and 2050 target should be revised.

Our recommended revisions to the first three emissions reduction budgets

The Commission's recommended revisions to the first, second and third budgets is part of the system that allows for response to changed conditions, supporting the country to stay on course for achieving its long-term climate goals. We can only advise revisions to emissions budgets if we find evidence that specific circumstances have changed since the budgets were originally set in 2022.

Our November 2024 recommendation was to adjust the first, second and third emissions budgets, to reflect changes in the country's official calculation of greenhouse gas emissions (New Zealand's Greenhouse Gas Inventory), and the impact of higher rates of forest planting than projected when budgets were set.

Our advice reflected that improvements in the way emissions are measured and reported, and higher rates of forest planting, meant the current budget levels no longer represented the level of reduction of actual emissions that was intended when the budgets were set. Updating the budgets would allow ambition on emissions reductions to be sustained.

How we made this assessment

We have completed our annual monitoring of emissions reduction against the *current* budgets and plans, as required by the Act.

Our 2024 recommendation to revise the first, second and third budgets is important context. The Commission's advice on the fourth emissions budget also contributes to this report, as it underlies some of the opportunities identified as options for Government action, based on the EB4 demonstration path.

Adequacy of plans and their implementation: Our assessment of the adequacy of the Government's emissions reduction plans covers the first and second plans. This is reported as the risk of not achieving the current budgets for the first, second and third periods, and the 2050 target.

Tracking progress: We track progress in reducing emissions, using the latest available data and the projections in the Government's second emissions reduction plan. We have included, where possible, a view of current progress compared to both the current and the revised budgets we recommended. Providing that comparison allows decision-makers to see how much further action would be required to achieve the emissions reductions as originally intended.

At a glance: monitoring emissions reduction

Summary for decision-makers

The country is making progress on reducing greenhouse gas emissions.

- Total net emissions continued to fall over the last year measured.

Emissions are on track for the first budget but will need more work – urgently – to set up for future reductions.

- The country is likely to achieve the first emissions budget (for 2022–2025) due to a combination of emissions reductions and changes to accounting methods.[i]
- The second emissions budget (for 2026–2030) can be met but there are some areas of significant risk.
- Current plans are insufficient to meet the third emissions budget (for 2031–2035) and further action is required *before* the third emissions reduction plan. The Government needs to act ahead of the next emissions reduction plan (due in 2029) as many options that would make a difference will take time to take effect.
- There are also significant risks for meeting the 2050 target without further action.

Action across a wide range of sectors can strengthen the country's resilience to changing global conditions.

- Our analysis shows there are many viable opportunities for further emissions reduction that could reduce risk for the economy and return other benefits to the country.

Recommendation

We recommend the Government acts ahead of the third emissions reduction plan, to reduce risk for the second emissions budget and get on track for the third budget *and* 2050 target, by:

- **strengthening the New Zealand Emissions Trading Scheme (NZ ETS) to ensure it can be effective as a key policy tool for reducing emissions *and***
- **implementing additional targeted policies to complement the NZ ETS, focused on renewable energy, transport and agriculture.**

This recommendation reflects that while the third emissions reduction plan is not due until 2029, early action will reduce investment uncertainty, avoid more disruptive measures later, and help put the country on track to meet the third emissions budget (for 2031–2035) and the 2050 target.

i Methodological changes in New Zealand's Greenhouse Gas Inventory (to improve how emissions are measured and reported) have resulted in a lower level of real-world reductions needed to meet the current first emissions budget. The Commission has separately recommended the first three budgets are revised to bring them in line with the intent when they were set.

What we assessed

He Pou a Rangi Climate Change Commission (the Commission) is tasked under the Climate Change Response Act 2002 (the Act) with independently monitoring Aotearoa New Zealand's progress on reducing greenhouse gas emissions.

This 2025 report is the second annual monitoring report on reductions in the country's greenhouse gas emissions. These objective assessments will form a picture over time, showing how the country is tracking towards its climate change goals.

They present our assessment of:

- the adequacy of the Government's emissions reduction plans and their implementation
- how the country is tracking against the 'emissions budgets' that serve as stepping stones to the long-term emissions reduction target
- progress towards that 2050 target.

This monitoring covers reductions in gross emissions, and removals of greenhouse gases from the atmosphere (carbon dioxide absorbed by forests as trees grow), to report against the country's net emissions target. See 'Precis of key findings' following.

Benefits of monitoring

The emissions budgets set up under the Act turn Aotearoa New Zealand's long-term 2050 target into achievable steps, and provide predictability and stability for government, business and community action.

Independent monitoring of progress against those budgets supports governments to stay on track with climate action, and to continually improve the country's plans.

Monitoring reports provide transparent evidence and information for people to hold governments accountable, which builds trust in the system.

Box A1: Approach and information for this report

This 2025 emissions reduction monitoring report tracks progress towards achievement of the first emissions budget (2022–2025), the second budget (2026–2030), the third budget (2031–2035), and the 2050 target. It assesses the adequacy of both the first and second emissions reduction plans, and progress in their implementation.

Since our last report the Government has published its second emissions reduction plan. We have updated the benchmark that we use to assess adequacy, to reflect the modelling used for the second emissions reduction plan.

Our review covers government policy and action in the 12 months up to 1 April 2025.

As required in section 5ZK of the Act, our analysis is based on the latest available data from New Zealand's Greenhouse Gas Inventory (GHG Inventory), combined with "the latest projections for current and future emissions and removals".[ii]

The information and approach used is outlined in *Chapter 1: Introduction*, with detail in the Technical Annex on our website. See also the report preface *About emissions budgets and reduction plans*.

ii Climate Change Response Act 2002, s 5ZK(2)(a).

Precis of key findings

This is set out under the four questions asked in our assessment, as in the 2024 report.

All references to budgets in our findings are to the set emissions budgets, unless specified otherwise.

Question 1: What progress have we seen in emissions reductions to date?

This focuses on shifts since our last report in July 2024.

The numbers

- From 2019 to 2023, the country's total gross greenhouse gas emissions have declined steadily across the economy. This is before we account for removals of carbon dioxide (CO_2) through forests.
- There was a 2% reduction (1.6 $MtCO_2e$) between 2022 and 2023. 2023 was the lowest level of gross emissions since 1999.
- Net emissions, when removals through forests are included, also fell by 2% (under target accounting rules).
- Stats NZ figures – which provide another year of provisional data – indicate that gross emissions declined in all sectors between 2023 and 2024, except in energy. This increase was from a rise in emissions from electricity generation.

The technology

- New technology to reduce emissions continues to improve in availability and cost.
- Agricultural technologies to reduce methane emissions advanced in the last year and are closer to commercialisation – including ruminant bolus and farm effluent systems. These add to the growing toolkit of technologies and on-farm practices farmers can choose from.
- Prices have dropped for resources, such as solar panels and batteries, that support low-emissions options for flexible and distributed electricity generation.

The policy

- Government policy action taken or signalled in the 12 months up to 1 April 2025 that could support reducing emissions includes: updating NZ ETS settings, confirming rail capability for new Cook Strait ferries, and streamlining consenting for new electricity generation from renewable sources. There are also proposals to increase tree planting on Crown-owned land to remove more CO_2, and to develop options for other carbon capture systems.
- Policy action taken or signalled in the last year that may increase emissions includes: introduction of electric vehicle (EV) road user charges, re-opening oil and gas offshore exploration, and winding down the New Zealand Green Investment Finance (NZGIF) portfolio.

The issues

For a view of options available to address these issues, see 'Question 4'.

- Recent high energy prices emphasise the importance of managing energy affordability and reliability of supply. Long-standing energy supply and competition issues, including insufficient investment in new generation and steadily declining gas supply, contributed to industrial closures in the last year. Action by the Government to address this would improve household and business access to affordable, reliable energy, while also reducing the country's emissions. This can be achieved through action to boost renewable electricity supply, deploy new technologies to enhance system flexibility, and improve housing quality to lift energy efficiency, while continuing to transition away from fossil fuels.
- Primary sector producers and rural communities are navigating diverse pressures including climate impacts, and changes in land use and in environmental requirements. There is need for more clarity and stronger policy coordination around emissions reduction and land-use change (particularly around forestry), to mitigate impacts on the groups affected. This would support the delivery of economic, social and environmental benefits, and provide a strong base for climate action by business and communities (see *Chapter 6: Impacts and benefits*).
- Global shifts create increasingly uncertain conditions in the physical and political environment. International climate action continues, and exporters face increasing requirements from global supply chains and international markets, to demonstrate they have reduced emissions.

Question 2: How is the country tracking towards meeting the first emissions budget for 2022–2025?

- The first emissions budget is likely to be met, due to a combination of emissions reductions and changes to accounting methods.
  - The Commission's emissions budget advice in November 2024 noted that methodological improvements to the GHG Inventory meant the first emissions budget effectively requires 7 $MtCO_2e$ less reductions than was originally intended.[iii]
- The remaining risks are external factors that are now outside the Government's control.
  - There could be higher-than-expected emissions from electricity generation, if low rainfall levels for hydro-electric generation combine with declining gas reserves.
  - Loss of forest area (e.g. from deforestation, storm or wildfire) could result in lower-than-expected levels of CO_2 removal.
- These risks show the importance of allowing a significant buffer when creating emissions reduction plans to ensure budgets can be delivered despite changes outside government control.

iii The Commission has recommended the first three budgets are revised to bring them in line with the intent when they were set, see *About emissions budgets and reduction plans*.

The Government's projections

- The Government's projections in its second emissions reduction plan show net emissions within budget for the first budget period. The central projection (i.e. the figure the Government modelling indicates is what will happen) is for 284.1 $MtCO_2e$, which is 6 $MtCO_2e$ below the first emissions budget.
  - In the plan's higher-than-expected emissions scenario, there would be a 1.4 $MtCO_2e$ over-run of the first emissions budget, meaning it would not be met.

Question 3: How is the country tracking towards meeting the second emissions budget (2026–2030), the third emissions budget (2031–2035) and the 2050 target, under current emissions reduction policies and plans?

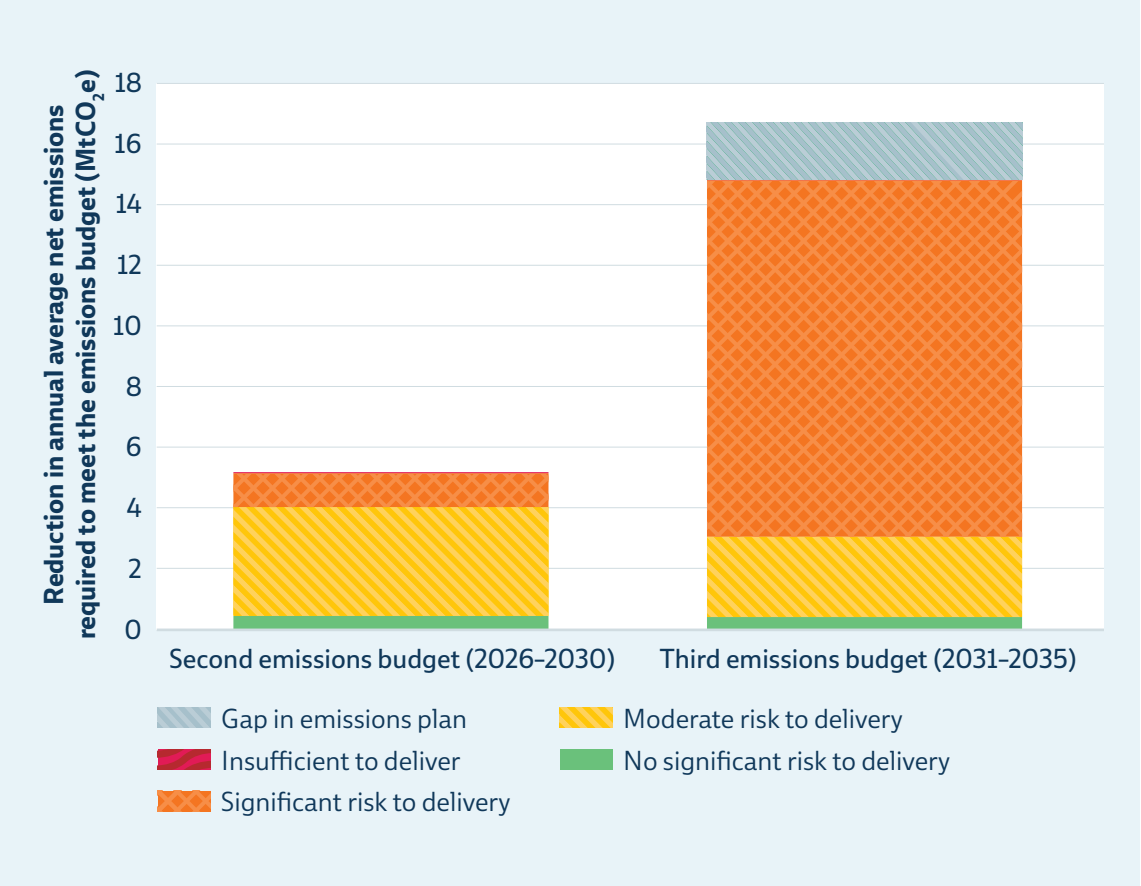
In December 2024 the Government released its second emissions reduction plan. The policies in that plan are expected to reduce emissions by an estimated 3.2 $MtCO_2e$ in the second emissions budget period, and by 17.1 $MtCO_2e$ in the third budget period.

- Progress is being made to reduce emissions, and our assessment shows the emissions budgets can be met if further action is taken (see 'Question 4' for options identified).
- However, our assessment of risk has increased in the last year, particularly for the third emissions budget (Figure A1).
  - For the second emissions budget, there are moderate risks of not achieving planned reductions in most areas; and some areas of significant risk.
  - While the third emissions reduction plan is not due until 2029, current plans are insufficient to meet the third budget and further action is required. There are also significant risks for meeting the 2050 target unless further action is taken.

Risk assessments

- The risk of not achieving emissions reductions in electricity generation increased in the last year. There are also significant risks around whether planned carbon capture and storage in the gas sector will be realised.
- There is risk in relying on a single sector for a large proportion of reductions. In the third budget, 46% of planned emission reductions are through forest removals of CO_2.
- Spreading planned action across a wide range of sectors in the economy reduces the concentration of risk and cost on a single sector, and can deliver a range of benefits to the whole country (e.g. health benefits and cost savings from transport shifts and electrification).
- The Government has identified a range of positive and negative impacts from emissions reduction policies, and some policies to address these impacts, but risks and opportunities remain.
- Around the late 2030s, the net emissions cap within the NZ ETS is expected to reach zero, limiting the scheme's effectiveness beyond that point. If the scheme is to be an effective tool to reduce net emissions in the 2030s and beyond, it will need to be amended.

Figure A1: Overall assessment of risk to meeting the emissions budgets under current policies and plans



Source: Commission analysis

The Government's projections

- The Government's projections for the second emissions budget in the second emissions reduction plan show that budget of 305 $MtCO_2e$ would be achieved by 2030 by a narrow margin. The central projection is 303.1 $MtCO_2e$.
- The projections for the third budget show emissions in 2035 would exceed that budget of 240 $MtCO_2e$. The central projection of 249.2 $MtCO_2e$ is 9 $MtCO_2e$ over the budget.
- The second emissions reduction plan was set according to the current budgets. The Commission's emissions budget advice in November 2024 indicated that improvements to how emissions are measured, and higher rates of forest planting, meant the current budget levels no longer represented the reduction of actual emissions intended when they were set.
  - If the Government amends the budgets to bring them back into line with the intent when they were set, an additional 15 $MtCO_2e$ of reductions would be required in the second emissions budget period and 18 $MtCO_2e$ in the third.

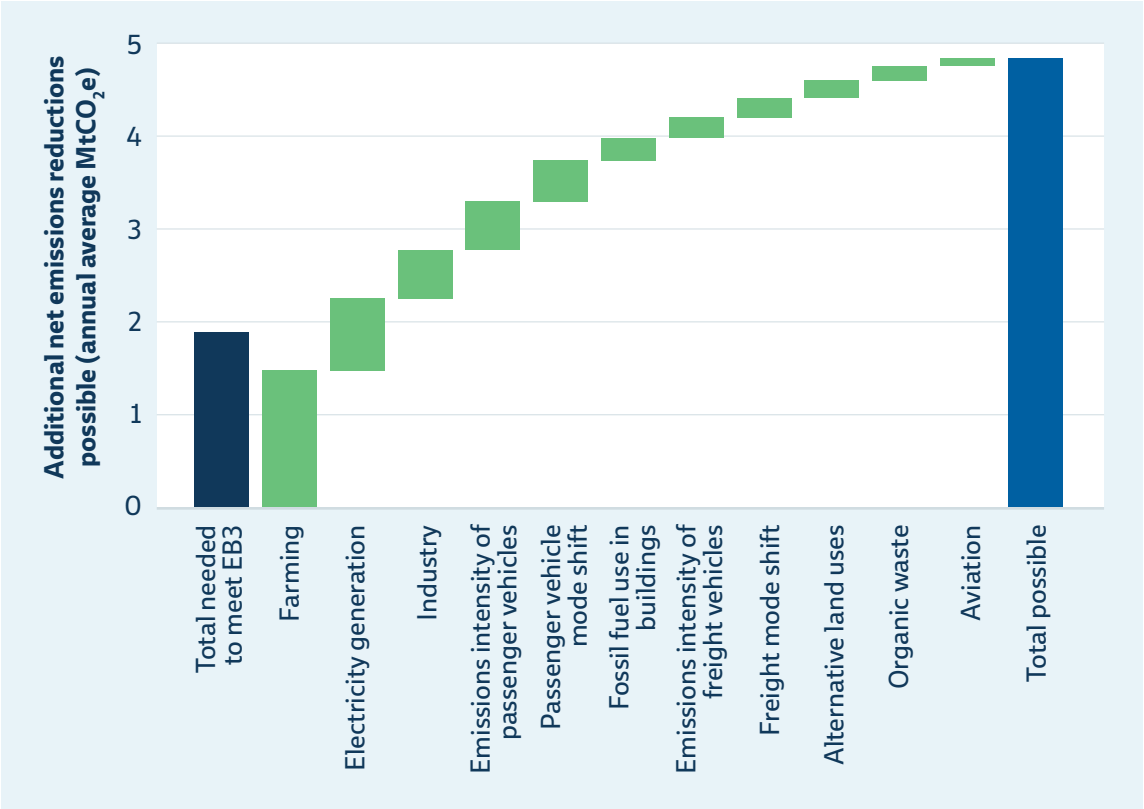
Question 4: What is needed for Aotearoa New Zealand to be on track for future emissions budgets and the 2050 target?

- It is possible to meet the third emissions budget (2031–2035) and the 2050 target, and also to reduce risk for the second emissions budget. This will require action before the next emissions reduction plan.
- *Scale:* The policy action set out in the second emissions reduction plan is estimated to achieve 3.3 $MtCO_2e$ of emissions reductions in the second budget period. The current Government plan leaves a gap almost three times that – 9.2 $MtCO_2e$ – for the third emissions budget period. That will need to be filled by additional action.
- *Timing:* The Government needs to act ahead of the next emissions reduction plan (due in 2029) as many options that would make a difference will take time to take effect. For example, New Zealand Steel's electric arc furnace took three years to progress from funding approval to operation.

Opportunities

These opportunities for emissions reduction are feasible and would help meet the country's climate goals. They are based on a close review of the planned emissions reduction action, and our latest analysis of opportunities for further reductions. Figure A2 shows the relative size of different options, compared to the total needed (left) and total possible (right). See Table 2.4 in *Chapter 2: Our findings* for more information.

Figure A2: Further reductions possible in the third emissions budget period



Source: Commission analysis of the second emissions reduction plan path compared to the Commission's demonstration path from its advice on the fourth emissions budget

Priority action to realise opportunities for Aotearoa New Zealand

- **Maintain and strengthen the NZ ETS** –
  A considered and well-signalled evolution of the NZ ETS is required to support the credibility of the scheme and the confidence of the private sector to invest in emissions reductions and durable removals. Updating unit supply and price control settings in a predictable way is also necessary to maintain market confidence. Alternative ways to address emissions leakage could better support industrial emitters to reduce emissions at lower cost to taxpayers.
- **Additional, targeted policies** – As the Government noted in the second emissions reduction plan, further policies may be needed to complement the NZ ETS. Opportunities for policy action that can remove market barriers, reduce risks for the economy and return wider benefits include:
  - Taking advantage of falling prices for solar, electric vehicles and batteries to accelerate the shift to an affordable and reliable energy system with lower emissions
  - Facilitating take-up of new technology and farm practice in ways that suit agricultural producers to maximise the country's competitive advantage and to realise full benefits of the Government's research and development investments.
- **Supporting private sector and Māori-led climate action** – Government has options to support climate action by businesses and at community level without significant fiscal cost. Action that would assist includes evolution of the NZ ETS, maintaining effective climate-related disclosures, clarifying expectations so banks can effectively participate in competitive markets to finance the transition, and exploring options to leverage emissions incentives offered by large companies.

  Access to capital and constraints on developing and managing Māori land remain a barrier to Māori contributing fully to the market-led transition to a low emissions economy. Strengthening partnership with iwi/Māori can return benefits for the whole country while helping the Crown meet its obligations under Te Tiriti o Waitangi/The Treaty of Waitangi.

Building resilience and reducing long-term cost

- Acting to reduce emissions across the economy can strengthen the country's resilience to changing global conditions. Delaying action may increase cost, and miss the advantages of a smooth transition. Our analysis shows available options for emissions reduction could reduce costs and economic risk, and provide opportunities and benefits for the country's economy, society, environment and future generations.
  - For example, health benefits and cost savings from faster climate action in transport and electrification include health gains from improved air quality valued at NZ$1.1 billion per year by 2035 (see *Chapter 6: Impacts and benefits*).
- Acting on these opportunities would set the country up to meet the third emissions budget in a way that puts it squarely on the path to the 2050 target. This provides governments with flexibility to respond to changing conditions over a long time-horizon.

For more information

Chapters 1–2: Introduction & findings

Chapters 3–6: Evidence from system analysis

Chapters 7–11: Evidence from sector analysis

Technical Annex on our website: detail and method

Chapter 1

Introduction

This is the second annual monitoring report on reductions in Aotearoa New Zealand's greenhouse gas emissions. These objective assessments will form a picture over time, showing how the country is tracking towards its climate change goals.

This chapter provides context for the independent assessment of progress on emissions reductions by He Pou a Rangi Climate Change Commission (the Commission) under the Climate Change Response Act 2002 (the Act).

It sets out the purpose of annual monitoring within the country's system for reducing emissions, and how this connects to other parts of Aotearoa New Zealand's climate change response, and global climate action. The chapter includes an overview of our approach; for more about our methodology and information base, see the Technical Annex, which can be found on our website.

Purpose of the report

What this monitoring provides

The emissions budgets set up under the Act turn Aotearoa New Zealand's long-term 2050 target into achievable steps, and provide predictability and stability for government, business and community action.

Independent monitoring of progress against those budgets supports governments to keep the country on track with climate action, and to continually improve their plans. The report provides insight on achievements and challenges, as well as opportunities and risks for meeting the emissions budgets and 2050 target. It provides evidence to inform decision-making, to support the achievement of the long-term target.

Monitoring reports also provide transparent evidence and information for people to hold governments accountable, which builds trust in the system.

What we mean by 'tracking progress on reducing greenhouse gas emissions'

The annual monitoring reports present an objective assessment of:

- the adequacy of the Government's emissions reduction plans and their implementation
- how the country is tracking against the 'emissions budgets' that serve as stepping stones to the long-term emissions reduction target
- progress towards that 2050 target.

This monitoring covers reductions in gross emissions, and removals of greenhouse gases from the atmosphere (carbon dioxide absorbed by forests as trees grow), to report against the country's net emissions target.

The focus of this assessment

This 2025 emissions reduction monitoring report tracks progress towards achievement of:

- the first emissions budget (2022–2025)
- the second budget (2026–2030)
- the third budget (2031–2035) and
- the 2050 target.

The plans and policy in focus

This report assesses the adequacy of both the first and second emissions reduction plans, and progress in their implementation.

Since our last report the Government has published its second emissions reduction plan. We have updated the benchmark that we use to assess adequacy, to reflect the modelling used for the second emissions reduction plan.

Our review covers government policy and action in the 12 months up to 1 April 2025.

Significant developments since 1 April 2025 include Budget 2025 funding changes, Government decisions on the New Zealand Emissions Trading Scheme (NZ ETS), and new public information around carbon capture, utilisation and storage. These developments do not form a core part of our assessment but are noted where relevant.

The budgets in focus

We have completed our annual monitoring of emissions reduction against the current budgets and plans, as required by the Act.

Our 2024 recommendation to revise the first, second and third budgets is important context. The Commission's advice on the fourth emissions budget also contributes to this report, as it underlies some of the opportunities identified as options for Government action, based on the EB4 demonstration path (see *Chapter 2: Our findings*).

Adequacy of plans and their implementation: Our assessment of the adequacy of the Government's emissions reduction plans covers the first *and* second emissions reduction plans. This is reported as risk of not achieving the current budgets for the first, second and third periods, and the 2050 target.

Tracking progress: We track progress in reducing emissions, using the latest available data and the projections in the Government's second emissions reduction plan. We have included, where possible, a view of current progress compared to both the *current* and the *revised* budgets we recommended. Providing that comparison allows decision-makers to see how much further action would be required to achieve the emissions reductions as intended when the budgets were set.

Overview of our approach

Our assessment applies the framework for monitoring progress on reducing emissions that the Commission developed in 2024, based on international best practice and models.

This section summarises the key elements of that approach, showing how we combine analysis of the latest available data and the relevant emissions reduction plans and policies to create the progress assessment required under the Act (Table 1.1). The section notes changes for the 2025 assessment, with more detail in the Technical Annex on our website.

Table 1.1: Emissions reduction monitoring requirements in the Climate Change Response Act 2002

The Act requires annual monitoring reports to include these elements:	The Act requires monitoring and reporting of progress towards meeting emissions budgets and the 2050 target, which must consider, where relevant, these issues and impacts:
• measured emissions and removals for the most recent year where data are available from New Zealand's Greenhouse Gas Inventory (GHG Inventory) • the latest projections for current and future emissions and removals • an assessment of the adequacy of the emissions reduction plan and progress in its implementation, including any new opportunities to reduce emissions.	• current available scientific knowledge • existing technology and anticipated technological developments, including the costs and benefits of early adoption of these in New Zealand • the likely economic effects • social, cultural, environmental, and ecological circumstances, including differences between sectors and regions • the distribution of benefits, costs and risks between generations • the Crown–Māori relationship, te ao Māori (as defined in section 5H(2)), and specific effects on iwi and Māori • responses to climate change taken or planned by parties to the Paris Agreement or United Nations Framework Convention on Climate Change.

Assessing progress, adequacy and opportunities

To assess progress on emissions reduction, and the adequacy of the plans and their implementation, we have combined a review of the available data on greenhouse gas reductions with analysis of the effects of government policy and action. Our assessment, including the part that looks at wider systems and issues, is focused primarily on tracking government action.

It also draws on our previous work and engagement with iwi/Māori, communities, councils, businesses and other interested people to inform our understanding of how policy impacts can affect emissions reduction.

Our engagement with iwi/Māori and with stakeholders has included reviewing how our reports are used, and has led to improvements in how we provide information – including summaries for different audiences available on our website.

These are the core building blocks of our monitoring approach.

- *Analysis of the available data:* this covers measured and estimated reductions, and projections for future periods – see 'The information available for this report' following.
- *Analysis of new opportunities to reduce emissions:* This includes quantifying opportunities to further reduce emissions beyond the actions set out in the Government's second emissions reduction plan.
- *Benchmarks* for assessing adequacy of plans: We need a measure of 'expected progress at particular points' to carry out this kind of assessment. Our benchmark is updated for 2025, to reflect modelling used for the Government's second emissions reduction plan. We supplement that 'ERP2 path' – which reflects the Government's plan, with the 'EB4 demonstration path' used for the Commission's 2024 advice on a fourth emissions budget – which reflects what is feasible for further emission reductions.
- *Cross-cutting review* of government policy and action in key areas of the wider system, and review of the impacts and benefits of emissions reduction policy and action on businesses and communities.
- *Sector-based analysis* of emissions reductions and removals, including a review of indicators to measure change, and scorecard assessment of the likely effects of current policy and plans for emissions reductions in key sectors.

Chapter 2: Our findings presents a synthesised assessment of progress and of the adequacy of plans and policies, framed by the four questions used in our 2024 report (**Box 1.1**).

Note: *monitoring maps* that make visible the connections between actions and overall policy goals are published in the Technical Annex on our website, along with *identified data gaps*.

The information available for this report

As required in section 5ZK of the Act, our analysis is based on the latest available data from New Zealand's Greenhouse Gas Inventory (GHG Inventory), combined with "the latest projections for current and future emissions and removals".[iv]

The GHG Inventory published in April 2025 provides data up until the end of the 2023 calendar year: the second year of the first emissions budget. We complement the GHG Inventory data with emissions estimates and projections to provide a more up-to-date picture of progress. Projections have an inherent level of uncertainty associated with them, which results in risks to meeting future budgets that need to be managed; details of this and any information gaps are explained in the Technical Annex.

We use data collated by the Climate Change Chief Executives Board for their quarterly reports, to assess implementation progress for our scorecard assessment of the adequacy of the Government's plans.

iv Climate Change Response Act 2002, s 5ZK(2)(a).

Box 1.1: The questions at the heart of this report

The report asks the same four questions as in the 2024 report:

1. What progress have we seen in emissions reductions to date?
2. How is the country tracking towards meeting the first emissions budget for 2022–2025?
3. How is the country tracking towards meeting the second emissions budget (2026–2030), the third emissions budget (2031–2035) and the 2050 target, under current emissions reduction policies and plans?
4. What is needed for Aotearoa New Zealand to be on track for future emissions budgets and the 2050 target?

The context of this report

This section provides an overview of recent change in the global context, and outlines how emissions reductions fit in the overall climate response system in Aotearoa New Zealand.

Global climate response

World reached 1.5 degrees in 2024, rapid action needed to reduce emissions

The World Meteorological Organization confirmed 2024 was the hottest year on record. The global average surface temperature was 1.55°C above the 1850–1900 average.[1]

The Intergovernmental Panel on Climate Change's Sixth Assessment Report (AR6) emphasised the need for rapid action to bring warming back down below 1.5°C – across all scenarios.[v,2] The UN Emissions Gap 2024 report found that if the second round of nationally determined contribution (NDC) pledges did not deliver stronger emission reductions than the first, the world would be on course for a temperature increase of 2.6–3.1°C.[3]

International climate action continuing

Carbon pricing mechanisms continue to expand in use globally. In 2024 the World Bank reported approximately 24% of global greenhouse gas emissions were subject to carbon pricing, either through emissions trading schemes or carbon taxes.[4] In November 2024 the UK announced an NDC target to reduce all greenhouse gas emissions by at least 81% by 2035, compared to 1990 levels.[5] In January 2025 the United States announced its withdrawal from the Paris Agreement, to take effect in January 2026.[6]

However, the previous announcement of US withdrawal from the Paris Agreement, in 2017, did not deter international action on climate change, rather galvanising other nations to reaffirm and intensify efforts.

v AR6 included only one scenario close to limiting warming to 1.5°C above pre-industrial levels. Even then, 1.5°C is exceeded and the world must achieve net negative emissions of CO_2 shortly after 2050 to return below 1.5°C.

Businesses face challenges in short term, remain committed to long-term reductions

Investors are looking for stronger environmental, social and governance commitments from businesses, while major corporations are increasingly requiring climate action across their supply chains.[7] For example, Fonterra introduced incentive payments for farmers reducing emissions due to international supply chain contracts with Mars and Nestlé.[8]

The Sustainable Business Council's 2025 trends report noted that supply chain decarbonisation remained a focus, with growing business use or planning for scope 3. ('Scope 3 emissions' refers to emissions generated by the use of a company's products and by the production of inputs that it purchases from others.) The report highlighted growing influence of nationalist and illiberal movements; a geopolitical context of economic uncertainty and demographic shifts; rapid technology advance including artificial intelligence (with increased polarisation), changing viability for businesses' 2030 targets; increased focus on dependence on nature; and more availability of sustainable finance.[9]

Rapid technology growth is driving reductions in emissions

Global electricity demand is growing 4% per year as countries electrify; 95% of the increase in demand is forecast to be met by renewable electricity generation.[10] While electric vehicle sales have been falling in this country, globally electric vehicle sales grew by 25% in 2024.[11] One of a range of new agri-technologies, a methane-reducing bolus, is expected to launch commercially in Australia in October 2025.[12]

The country's climate change response framework

The Act sets out the country's approach to reducing emissions (**Figure 1.1**), including putting into law a 2050 emissions reduction target; breaking that down into emissions budgets, to be achieved through emissions reduction plans and policies; and establishing the Commission to provide independent, evidence-based advice on the target, budgets and plans, and to monitor the country's progress on reducing emissions.

The Commission's monitoring role – across emissions reduction and adaptation

Under section 5B of the Act, the Commission has responsibility for monitoring and reporting progress on the Government's goals for emissions reduction[vi] and progress on the Government's national adaptation plan. This is further set out in sections 5ZJ, 5ZK, 5ZL and 5ZU.

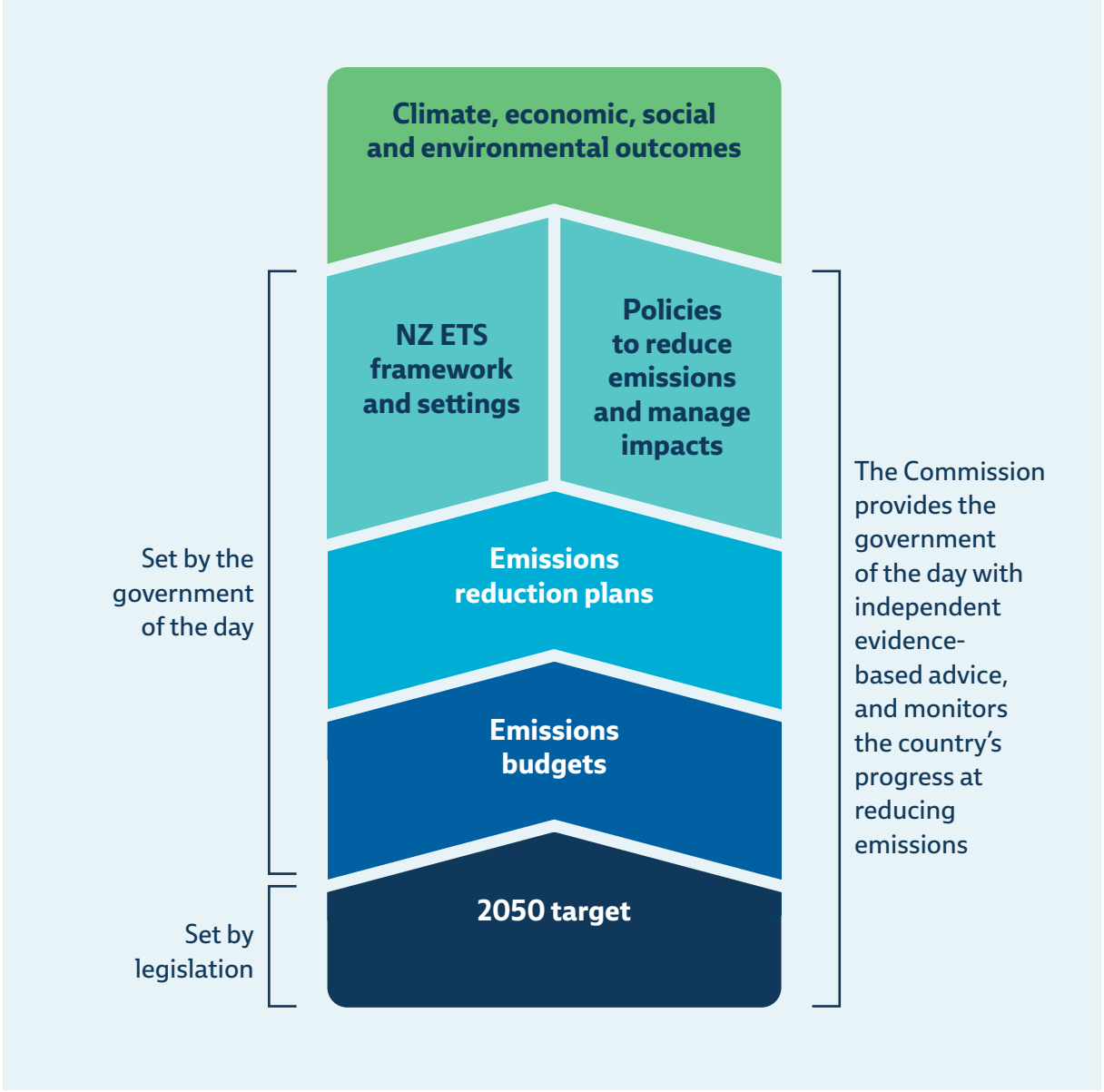
Monitoring reports are provided to the Minister of Climate Change and published by the Commission. The Minister must provide a response to each emissions reduction monitoring report within three months, noting any amendments to relevant emissions reduction plans.

There will also be end-of-budget reports at the end of each emissions budget period, providing an evaluation of progress made in that time. The first is due in 2027, two years after the end of the first emissions budget period (2022–2025).

The Commission is also responsible for delivering progress assessments on the Government's national adaptation plan (every two years) and national climate change risk assessments (every six years). These are next due in 2026.

vi The Commission monitors progress on domestic emissions budgets and the long-term target set under the Act. This report is not monitoring progress towards Aotearoa New Zealand's nationally determined contribution (NDC), which is the country's international commitment under the Paris Agreement.

Figure 1.1: Aotearoa New Zealand's system for reducing emissions



Source: Commission analysis

The structure of this report

The overview

Chapter 1: Introduction

Chapter 2: Our findings

The evidence

Chapter 3: Enabling systems

Chapter 4: Emissions pricing

Chapter 5: Whakahekenga rehukino

Chapter 6: Impacts and benefits

Chapter 7: Energy, industry and buildings

Chapter 8: Transport

Chapter 9: Agriculture

Chapter 10: Waste and fluorinated gases

Chapter 11: Removals

Source documents

These five documents are core resources for this analysis. Other references for source material are provided as endnotes.

For our supporting material, see the Commission website: climatecommission.govt.nz/ERM-2025

Ministry for the Environment publications:

- (2025). *New Zealand's Greenhouse Gas Inventory 1990–2023*. environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-19902023
- (2024). *Our journey towards net zero – New Zealand's second emissions reduction plan 2026–2030: Tā Aotearoa mahere whakaheke tukunga tuarua*. environment.govt.nz/publications/new-zealands-second-emissions-reduction-plan
- *(2024). New Zealand's second emissions reduction plan 2026–30: Technical annex environment.govt.nz/publications/second-emissions-reduction-plan-technical-annex/*
- (2022). *Te hau mārohi ki anamata – Towards a productive, sustainable and inclusive economy: Aotearoa New Zealand's first emissions reduction plan*. environment.govt.nz/publications/Aotearoa-New-Zealands-first-emissions-reduction-plan/

Stats NZ:

- (2025). Quarterly greenhouse gas emissions by sector: up to December 2024 quarter. Customised report and licensed by Stats NZ for re-use under the Creative Commons Attribution 4.0 International licence. Supplied by the Climate Change Chief Executives Board. Published on our website: climatecommission.govt.nz/ERM-2025

Chapter 2

Our findings

This chapter sets out the findings from our assessment. These cover progress made towards meeting emissions budgets and the 2050 target, the adequacy of the emissions reduction plan, and new opportunities.

The conclusions of our analysis across the economy as a whole are presented in this chapter. This is supported by more information about our findings in particular areas – in the cross-cutting topic and sector chapters – with detail in the separate Technical Annex available on our website. There is also a high-level overview of key findings in the *At a glance* summary and our approach is outlined in *Chapter 1: Introduction*.

This is the second annual emissions reduction monitoring report by He Pou a Rangi Climate Change Commission (the Commission). We have built on our assessment from last year, repeating the core method with some improvements, which also reflect changes since in the information available and the plans in review.

All references to budgets in our findings are to the set emissions budgets, unless specified otherwise.

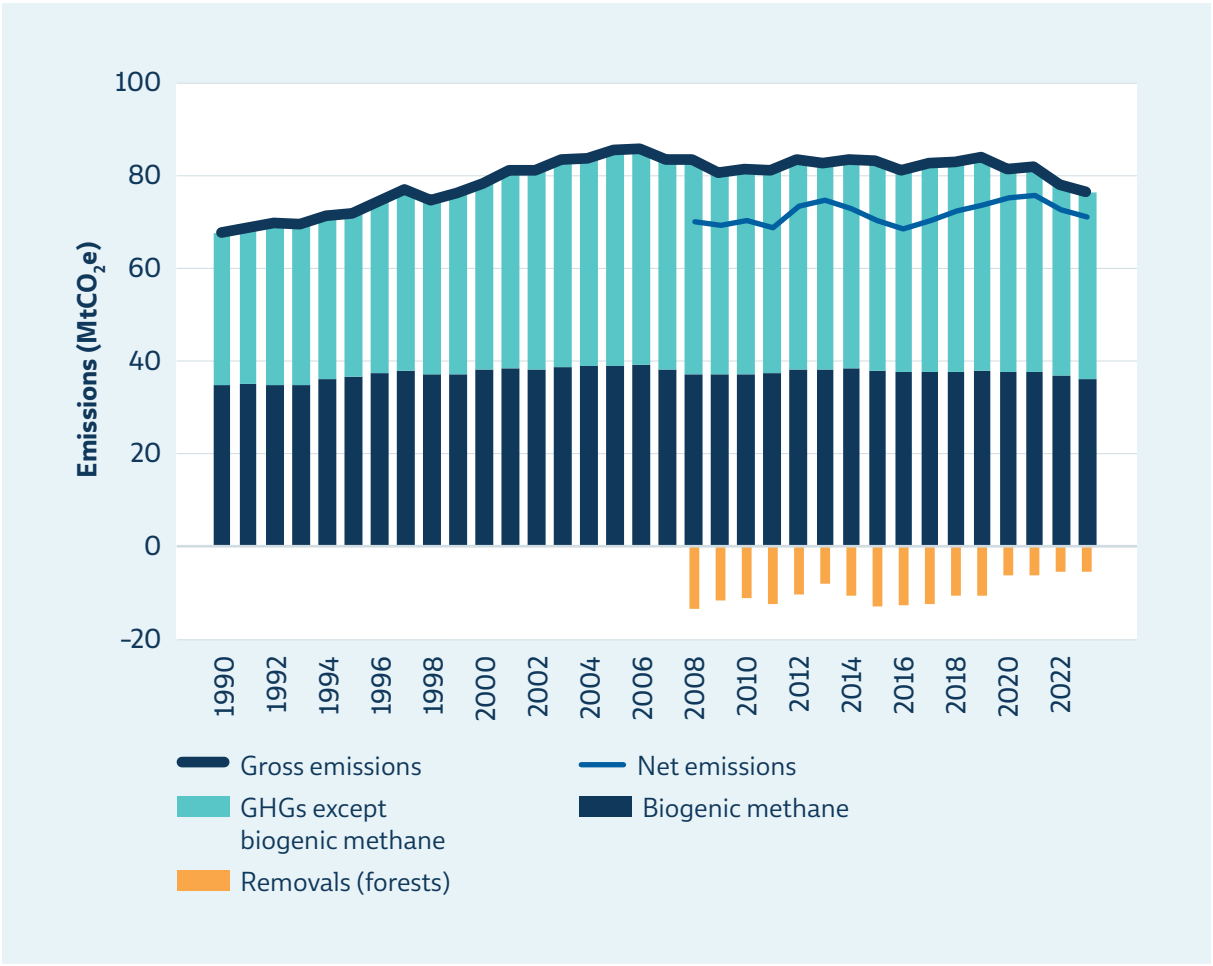
Question 1: What progress have we seen in emissions reductions to date?

The numbers

From 2019 to 2023, the country's total gross greenhouse gas emissions have declined steadily across the economy (**Figure 2.1**). This is before we account for removals of carbon dioxide (CO_2) through forests. In 2023 there was a 2% reduction (1.6 $MtCO_2e$) from 2022 levels. The 2023 level (76.4 $MtCO_2e$) is the lowest level of gross emissions since 1999.

Note for reading Figure 2.1: Aotearoa New Zealand has a 'split gas' target for domestic emissions, which considers biogenic methane separately from all other greenhouse gases. This reflects the different impact that methane has compared with other greenhouse gases, such as carbon dioxide.

Figure 2.1: Gross and net emissions, 1990–2023

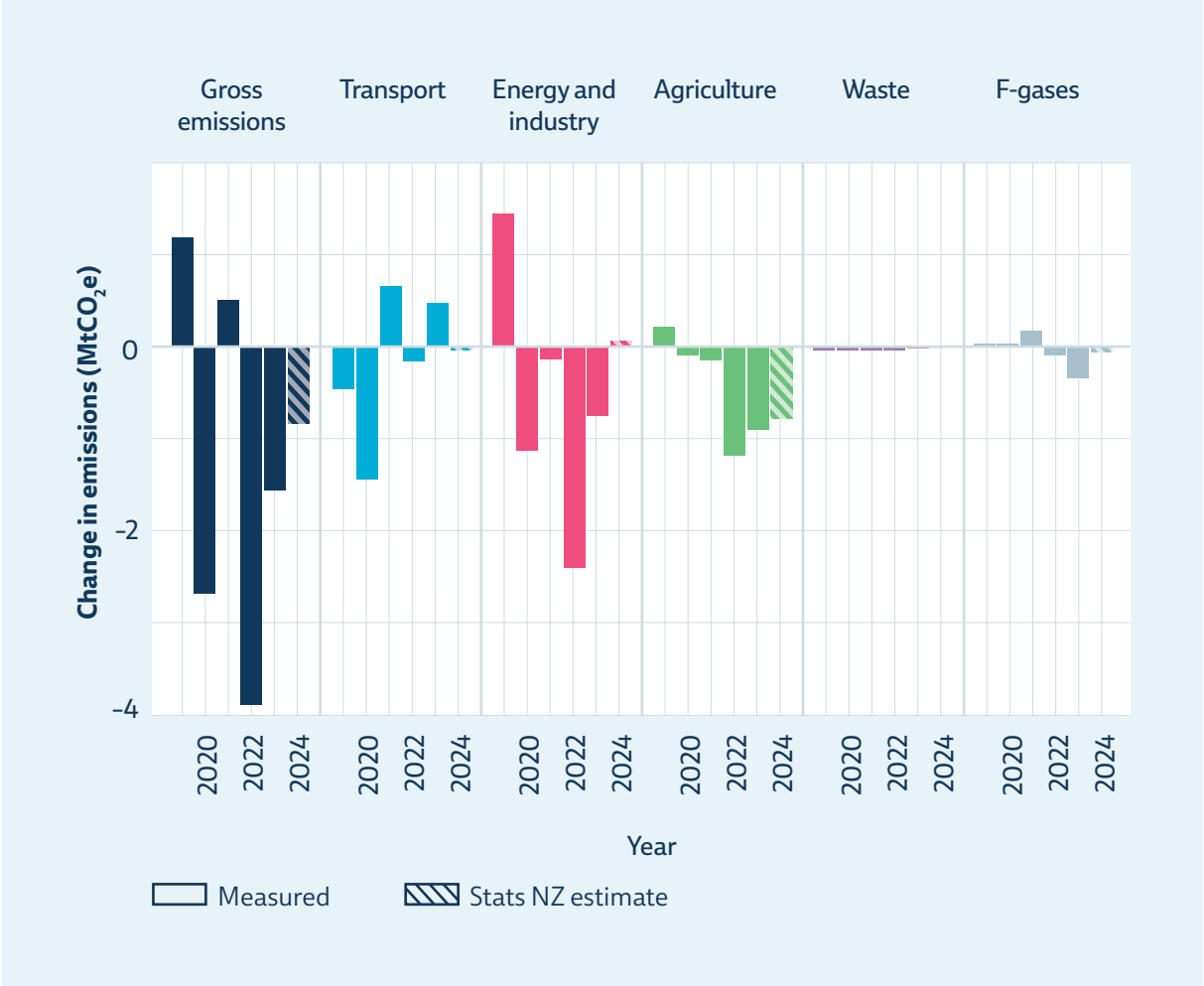


Source: Commission analysis of GHG Inventory 1990–2023

Transport sector emissions are trending up from a COVID-19 low. Emissions in all other sectors have declined since 2019. **Figure 2.2** shows these changes year on year – incorporating Stats NZ information, which provides another year of provisional data. This illustrates that in the latest year gross emissions declined in all sectors between 2023 and 2024, except in energy. This increase was from a rise in emissions from electricity generation.

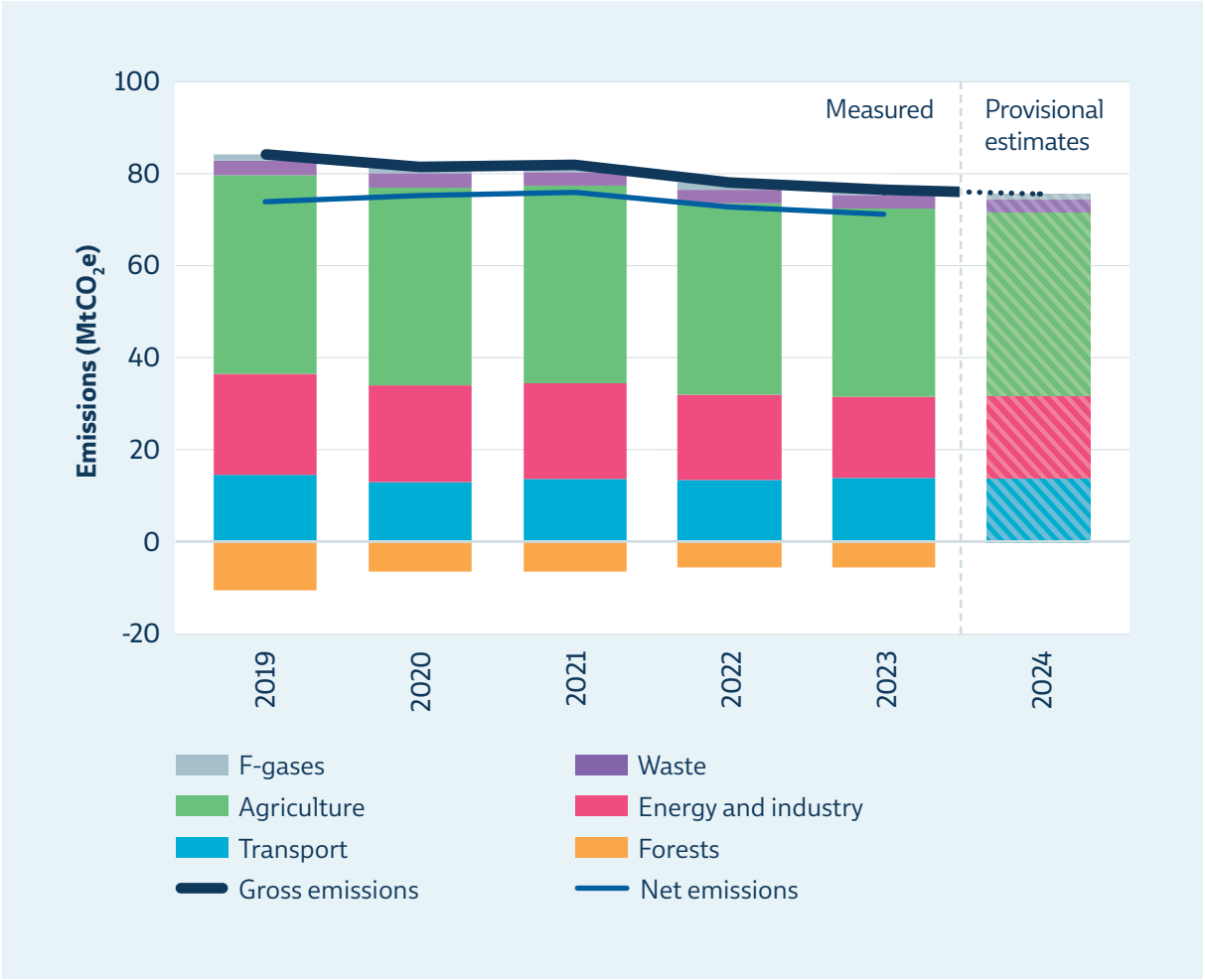
Aotearoa New Zealand's net emissions (under target accounting rules) have been declining since the start of the first emissions budget in January 2022 (**Figure 2.3**). In the latest year they declined by 2%.

Figure 2.2: Annual changes in gross emissions by sector since 2019



Source: Commission analysis of GHG Inventory 1990–2023 and Stats NZ 2024 provisional emissions estimates

Figure 2.3: Emissions by sector applying net emissions under target accounting, 2019–2024



Source: Commission analysis of GHG Inventory 1990–2023 and Stats NZ 2024 provisional emissions estimates

The technology

New technology to reduce emissions continues to improve in availability and cost. For example, prices have dropped for resources, such as solar panels and batteries, that support low-emissions options for flexible and distributed electricity generation.[13]

The country has also seen agricultural technologies to reduce methane emissions advance in the last year and come closer to commercialisation – including ruminant bolus and farm effluent systems.[14] These add to the growing toolkit of technologies and practices farmers can choose.

The policy

Government policy action taken or signalled in the 12 months up to 1 April 2025 that could support reducing emissions includes updating the NZ ETS settings,[15] confirming rail capability for new Cook Strait ferries,[16] and streamlining consenting for new electricity generation from renewable sources.[17] There are also proposals to increase tree planting on Crown-owned land to remove more carbon dioxide,[18] and to develop options for other carbon capture systems.[19]

Policy action taken or signalled in the last year that may increase emissions includes the introduction of electric vehicle (EV) road user charges,[20] re-opening oil and gas offshore exploration,[21] and winding down the New Zealand Green Investment Finance (NZGIF) portfolio.[22]

The issues

For a view of options available to address these issues, see 'Question 4'.

Recent high energy prices emphasise the importance of managing energy affordability and reliability of supply. Long-standing energy supply and competition issues including insufficient investment in new generation and a steadily declining gas supply contributed to industrial closures in the last year. Action by the Government to address this would improve household and business access to affordable, reliable energy, while also reducing the country's emissions. This can be achieved through action to boost renewable electricity supply, deploy new technologies to enhance system flexibility, and improve housing quality to lift energy efficiency, while continuing to transition away from fossil fuels.

Primary sector producers and rural communities are navigating diverse pressures including climate impacts, changing land use and environmental regulations. There is need for more clarity and stronger policy coordination around emissions reduction and land-use change (particularly to forestry), to mitigate impacts on the groups affected. This would support the delivery of economic, social and environmental benefits, and provide a strong base for climate action by business and communities (see *Chapter 6: Impacts and benefits*).

Global shifts create increasingly uncertain conditions in the physical and political environment. International climate action continues, and exporters face increasing requirements to demonstrate they have reduced emissions, from global supply chains and international markets.

Question 2: How is the country tracking towards meeting the first emissions budget for 2022–2025?

The first emissions budget is likely to be met due to a combination of emissions reductions and changes to accounting methods.

The Commission's emissions budget advice in November 2024 noted that methodological improvements to the GHG Inventory meant the current first emissions budget effectively requires 7 $MtCO_2e$ less reductions than was originally intended.[vii]

The remaining risks are external factors that are now outside the Government's control.

- There could be higher-than-expected emissions from electricity generation, if low rainfall levels for hydroelectric generation combine with declining gas reserves.
- Loss of forest area (e.g. from deforestation, storm or wildfire) could result in lower-than-expected levels of carbon dioxide removal.

The GHG Inventory is updated annually and incorporates methodological improvements. There is a risk that these methodological improvements lead to changes which make the emissions budget harder to achieve.

These risks show the importance of allowing a significant buffer when creating emissions reduction plans to ensure budgets can be delivered despite changes outside government control.

The projections in the Government's second emissions reduction plan

The Government's projections in its second emissions reduction plan show net emissions within budget for the first budget period. The central projection (i.e. the figure the Government modelling indicates is what will happen) is for 284.1 $MtCO_2e$, which is 6 $MtCO_2e$ below the first emissions budget.

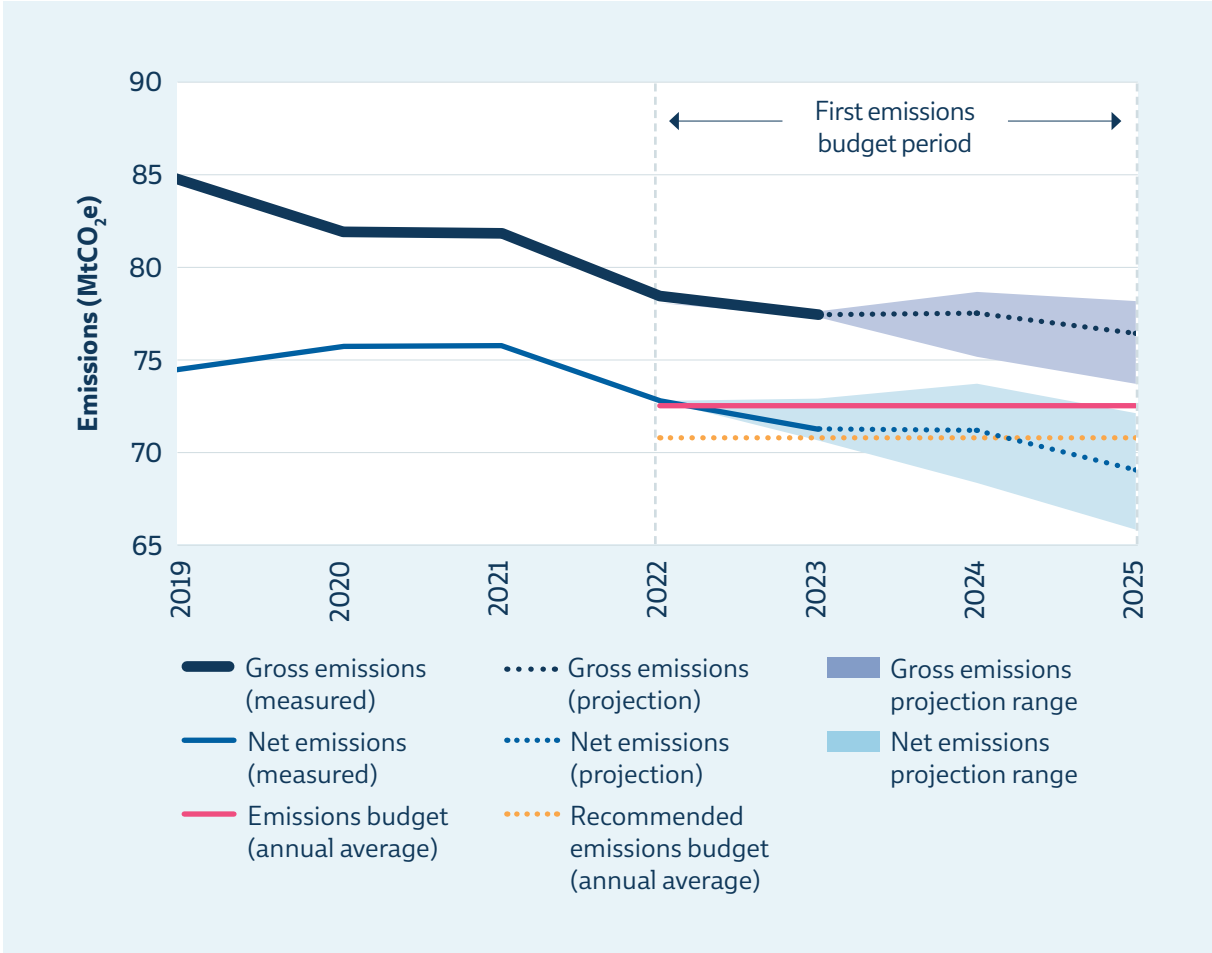
In the plan's higher-than-expected emissions scenario, there would be a 1.4 $MtCO_2e$ over-run of the first emissions budget, meaning it would not be met.

Comparison to the Commission's recommended revised budgets: The recommended revised first emissions budget can be achieved only at the lower end of Government projections for emissions reductions for that period. Analysis shows the revised first budget would be achieved under the low-emissions scenario in the Government's second emissions reduction plan, but would be slightly exceeded under the central projection.

This comparison is shown in Figure 2.4, with the values set out in Table 2.1.

vii The Commission has separately recommended the first three budgets are revised to bring them in line with the intent when they were set, see *About emissions budgets and reduction plans*.

Figure 2.4: Historic and projected gross and net emissions in the first emissions budget period (2022–2025)



Source: Commission analysis of New Zealand's second emissions reduction plan 2026–30 and Commission advice on the fourth emissions budget

Table 2.1: Estimates of total net emissions in the first emissions budget (2022–2025)

First emissions budget	($MtCO_2e$)		
Budget as set	290		
Revised budget recommended by the Commission	283		
Government's second emissions reduction plan	**Projected net emissions 2022–2025 ($MtCO_2e$)**		
	Central estimate	**High estimate**	**Low estimate**
Net emissions in ERP2 path	284	291.4	277.4

Source: Commission analysis of New Zealand's second emissions reduction plan 2026–30 and Commission advice on the fourth emissions budget

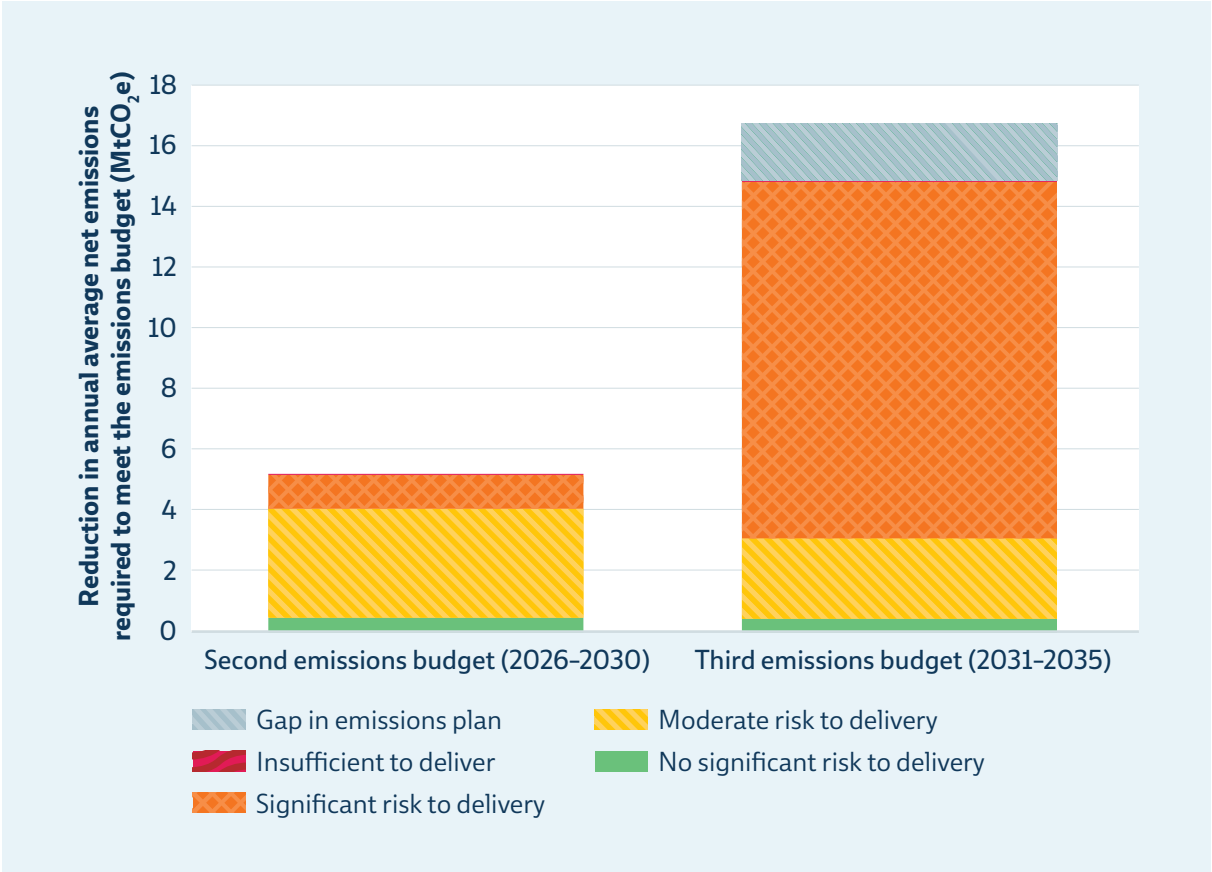
Question 3: How is the country tracking towards meeting the second emissions budget (2026–2030), the third emissions budget (2031–2035) and the 2050 target, under current emissions reduction policies and plans?

In December 2024 the Government released its second emissions reduction plan. The policies in that plan are expected to reduce emissions by an estimated 3.2 $MtCO_2e$ in the second emissions budget period, and by 17.1 $MtCO_2e$ in the third budget period.

Progress is being made to reduce emissions, and our assessment shows the emissions budgets can still be met if further action is taken (see 'Question 4' for options identified). However, our assessment of risk has increased in the last year, particularly for the third emissions budget.

For the second emissions budget, there are moderate risks of not achieving planned reductions in most areas; and some areas of significant risk. While the third emissions reduction plan is not due until 2029, current plans are insufficient to meet the third budget and further action is required. There are also significant risks for meeting the 2050 target unless further action is taken (**Figure 2.5**).

Figure 2.5: Overall assessment of risk to meeting the emissions budgets under current policies and plans



Source: Commission analysis

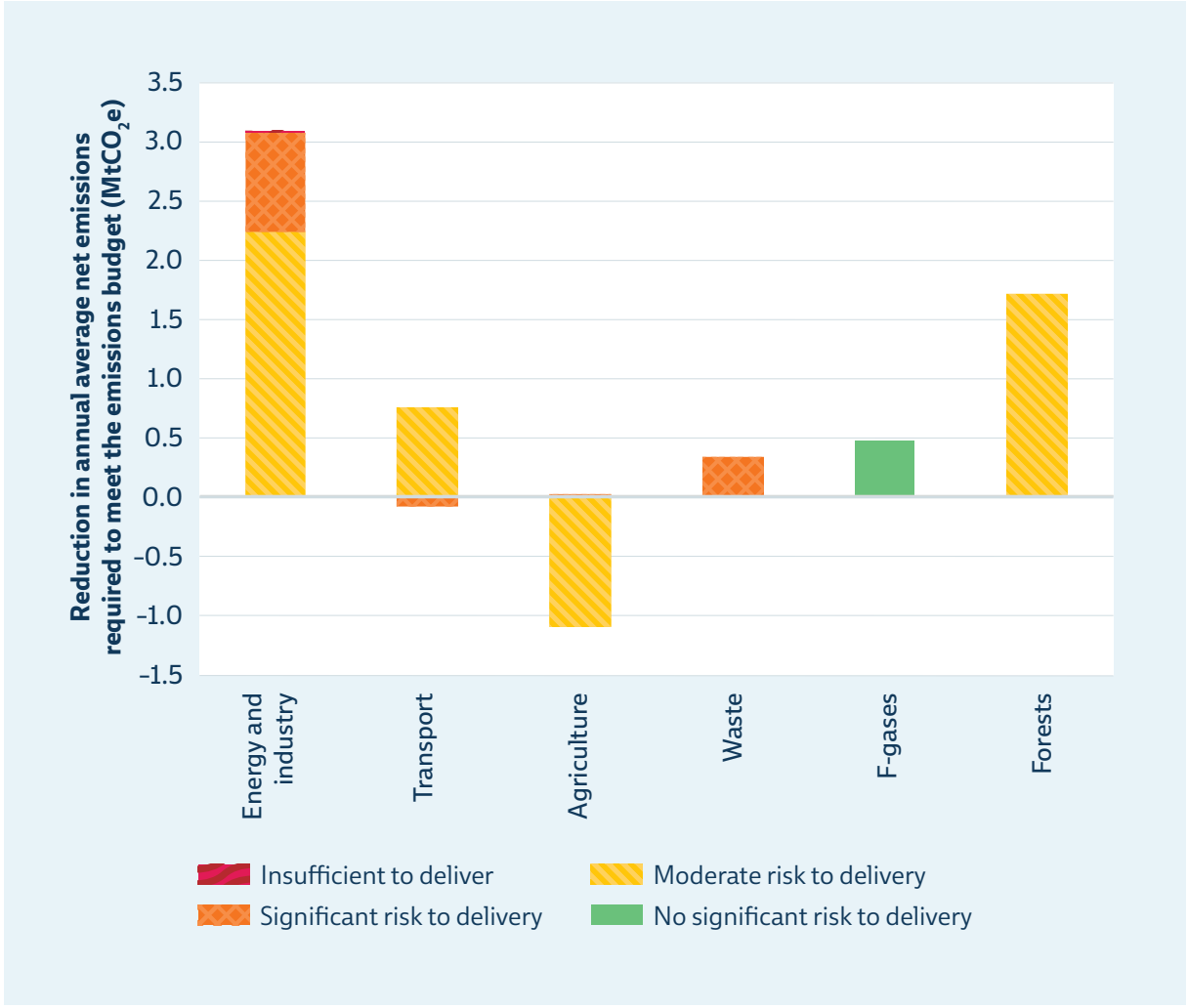
Risk assessments for sectors of the economy

The risk level to meeting emissions budgets varies by sector with the largest risks coming from the energy and industry and forest sectors (Figure 2.6, Figure 2.7). We have also assessed these risks down to the level of outcome areas within each sector (Table 2.2).

The risk of not achieving emissions reductions in electricity generation increased in the last year. There are also significant risks around whether planned carbon capture and storage in the gas sector will be realised.

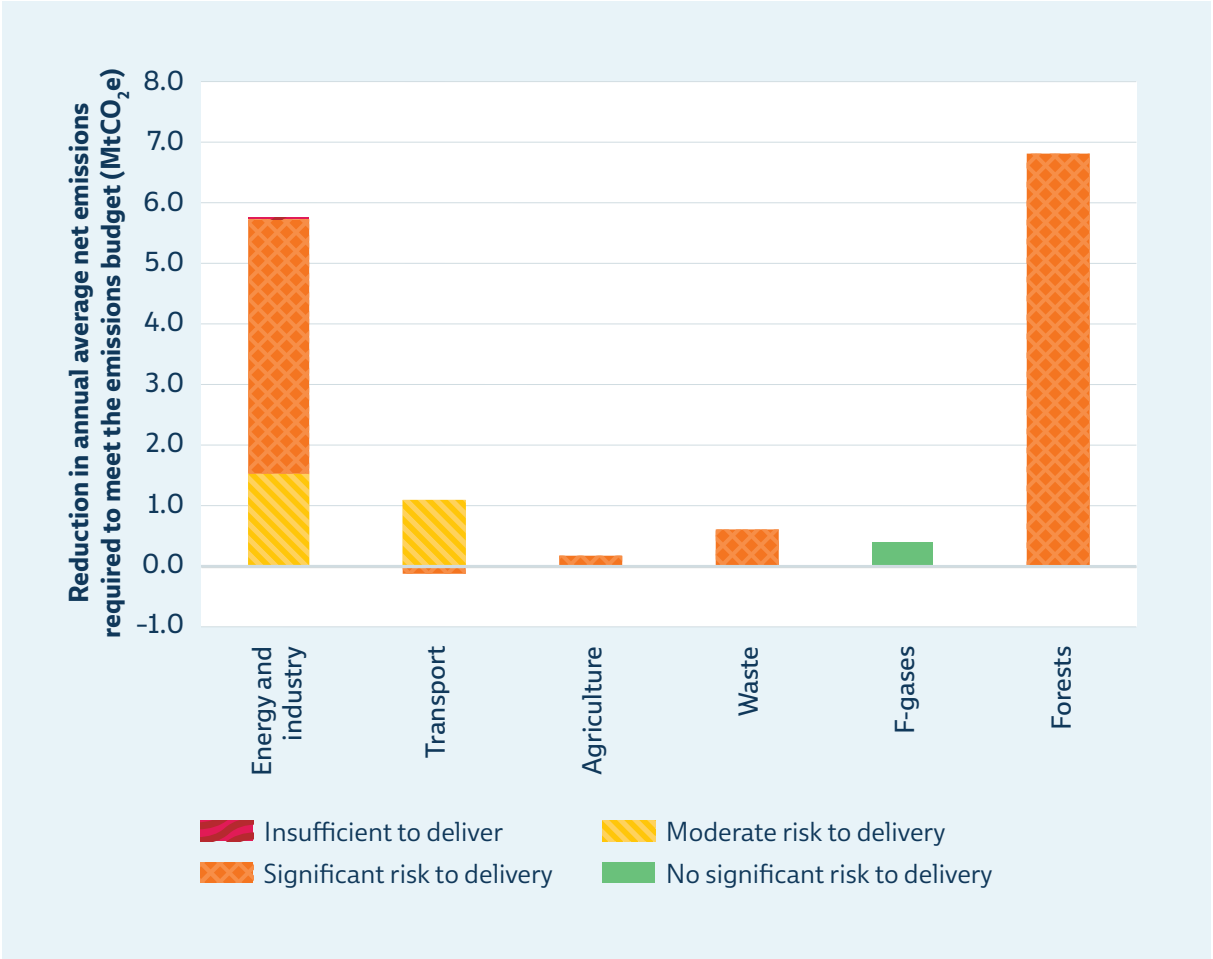
There is risk in relying on a single sector for a large proportion of reductions. In the third budget, 46% of planned emissions reductions are through forest removals of CO_2. Spreading planned action across a wide range of sectors in the economy reduces the concentration of risk and cost on a single sector, and can deliver a range of benefits to the whole country (e.g. health benefits and cost savings from transport shifts and electrification).

Figure 2.6: Assessment of risks to sectors' contributions to emissions reduction under current policies and plans – for the second emissions budget period (2026–2030)



Source: Commission analysis

Figure 2.7: Assessment of risks to sectors' contributions to emissions reduction under current policies and plans – for the third emissions budget period (2031–2035)



Source: Commission analysis

Table 2.2: Results of our policy scorecard assessment for the second and third emissions budgets, based on expected contributions in the Government's second emissions reduction plan

Sector	Outcome area	% of total net emissions reductions (benchmark)		Overall assessment		Main tools		Funding and finance		Other barriers & opportunities		Timeline	
		EB2	EB3	EB2	EB3	EB2	EB3	EB2	EB3	EB2	EB3	EB2	EB3
Energy and industry	Reduce electricity generation emissions	8%	10%										
	Reduce emissions intensity of production	36%	19%										
	Reduce emissions in gas networks	0%	0%										
	Reduce upstream emissions from oil and gas	6%	2%										
	Phase out fossil fuels in buildings	11%	7%										
Transport	Reduce demand for carbon-intensive passenger transport	0%	0%										
	Reduce passenger vehicle emissions intensities	14%	8%										
	Reduce freight vehicle emissions intensities	-1%	0%										
	Reduce demand for carbon-intensive freight transport	0%	0%										
	Reduce aviation emissions intensity	-1%	0%										
Agriculture	Reduce emissions from farming	-21%*	1%										
	Transition to lower-emissions land uses	0%	0%										
Waste	Reduce organic waste sent to landfill	1%	1%										
	Improve and expand landfill gas capture	6%	4%										
F-gases	Reduce hydrofluorocarbon (HFC) emissions	9%	3%										
Forests	Increase net removals by forests	33%	46%										

Insufficient to deliver Significant risks Moderate risks No significant risks

Source: Commission analysis. See the Technical Annex for more information on our scoring approach.

* An emissions increase is shown for agriculture due to different assumptions around stocking rates and fertiliser use between the Commission's 2022 current policy reference scenario used as the baseline for this assessment, and the modelling path in the second emissions reduction plan. It does not necessarily mean an increase in emissions is planned.

Assessment of strategy and impacts

The Government has identified a range of positive and negative impacts from emissions reduction policies, and some policies to address these impacts, but risks and opportunities remain.

Cost-of-living support provided in Budget 2024 contributes to households meeting energy costs, but there remains a risk of energy hardship due to poor housing quality and other barriers. Access to affordable, reliable, low-emissions electricity and improved housing stock would provide an enduring solution.

Electrification of transport and the broader economy provides air quality, health and operational cost benefits and the Government could enable more of these by addressing barriers to household and private sector investment in electrification.

The reliance on forests for a large proportion of emissions reduction is likely to increase the long-term cost of meeting the 2050 target and increase impacts on future generations. This approach means more forest planting may be necessary beyond 2050 to maintain net-zero emissions, which comes with economic trade-offs for land use. Modelling in previous Commission advice demonstrated that a greater focus on reducing gross emissions could help manage these impacts and trade-offs.[viii]

There are gaps in the Government's impact strategy to ensure transport access across the population and to enable proactive transition planning for all regions, sectors and groups.

Around the late 2030s, the net emissions cap within the NZ ETS is expected to reach zero, limiting the scheme's effectiveness beyond that point. If the scheme is to remain an effective tool to reduce net emissions in the 2030s and beyond it will need to be amended. More clarity on how the Government will manage the emissions cap over time would support market confidence. Clarifying expectations so banks can effectively participate in competitive markets to finance the transition will support low-emissions investment.

The Government's projections in the second emissions reduction plan

The Government's projections for the second emissions budget show that budget of 305 $MtCO_2e$ would be achieved by 2030 by a narrow margin (**Figure 2.8**). The central projection is 303.1 $MtCO_2e$.

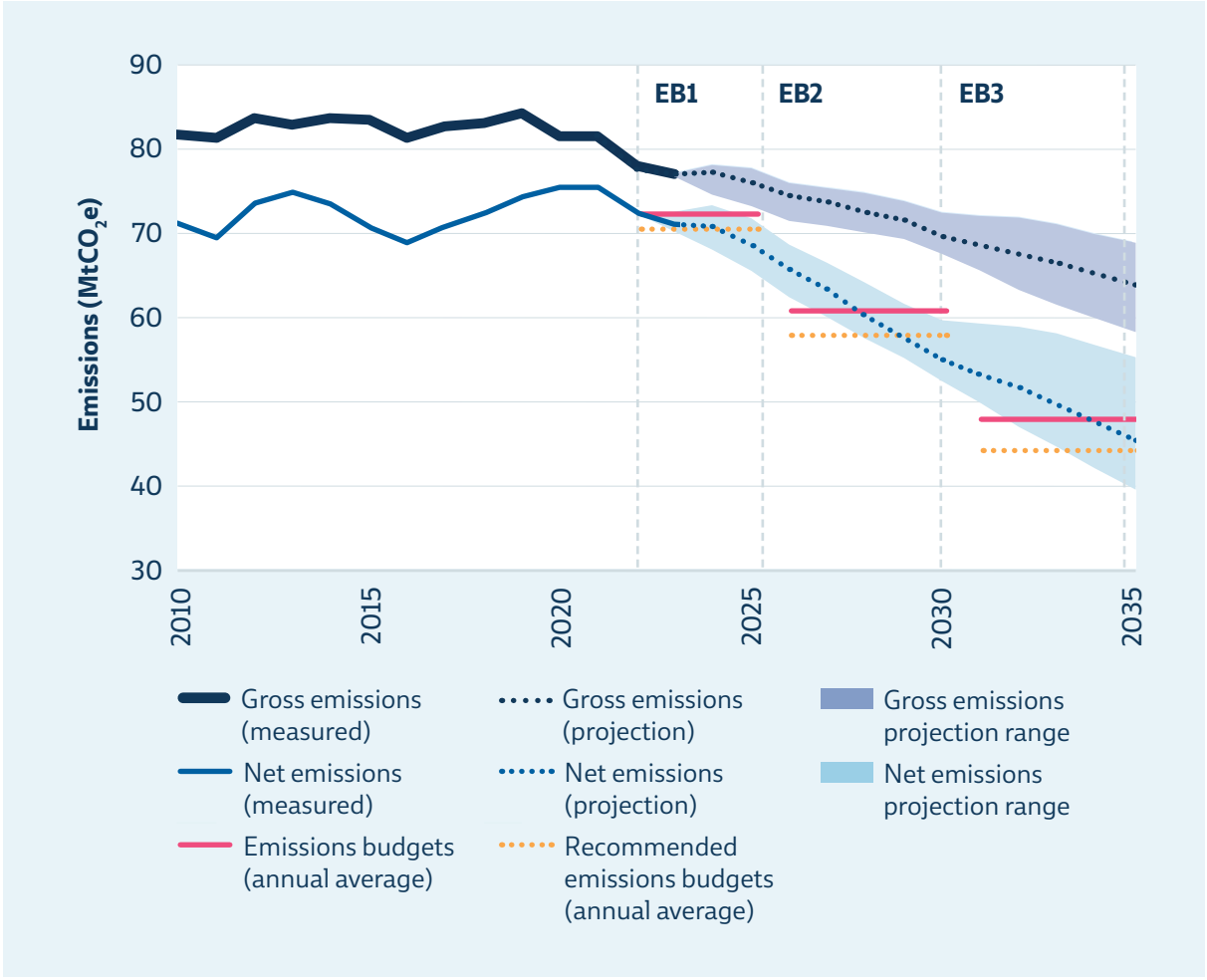
The projections for the third budget show emissions in 2035 would exceed that budget of 240 $MtCO_2e$. The central projection of 249.2 $MtCO_2e$ is 9 $MtCO_2e$ over the budget.

The second emissions reduction plan was set according to the current budgets. The Commission's emissions budget advice in November 2024 indicated that improvements to how emissions are measured, and higher rates of forest planting, meant the current budget levels no longer represented the reduction of actual emissions intended when they were set.

If the Government amends the budgets to bring them back into line with the intent when they were set, an additional 15 $MtCO_2e$ of reductions would be required in the second emissions budget period and 18 $MtCO_2e$ in the third.

viii The Government's second emissions reduction plan modelling (ERP2 path) shows an additional 800,000 hectares of exotic forests, 700,000 fewer hectares of sheep and beef land, and 100,000 fewer hectares of dairy land by 2070, compared to the Commission's modelling for its November advice on a fourth emissions budget. The EB4 demonstration path has a greater focus on gross emissions reduction than forestry and achieves greater net emissions reductions overall.

Figure 2.8: Historic and projected gross and net emissions in the first, second and third emissions budgets



Source: Commission analysis of New Zealand's second emissions reduction plan 2026–30 and Commission advice on the fourth emissions budget

Table 2.3: Historic and projected gross and net emissions in the first, second and third emissions budgets

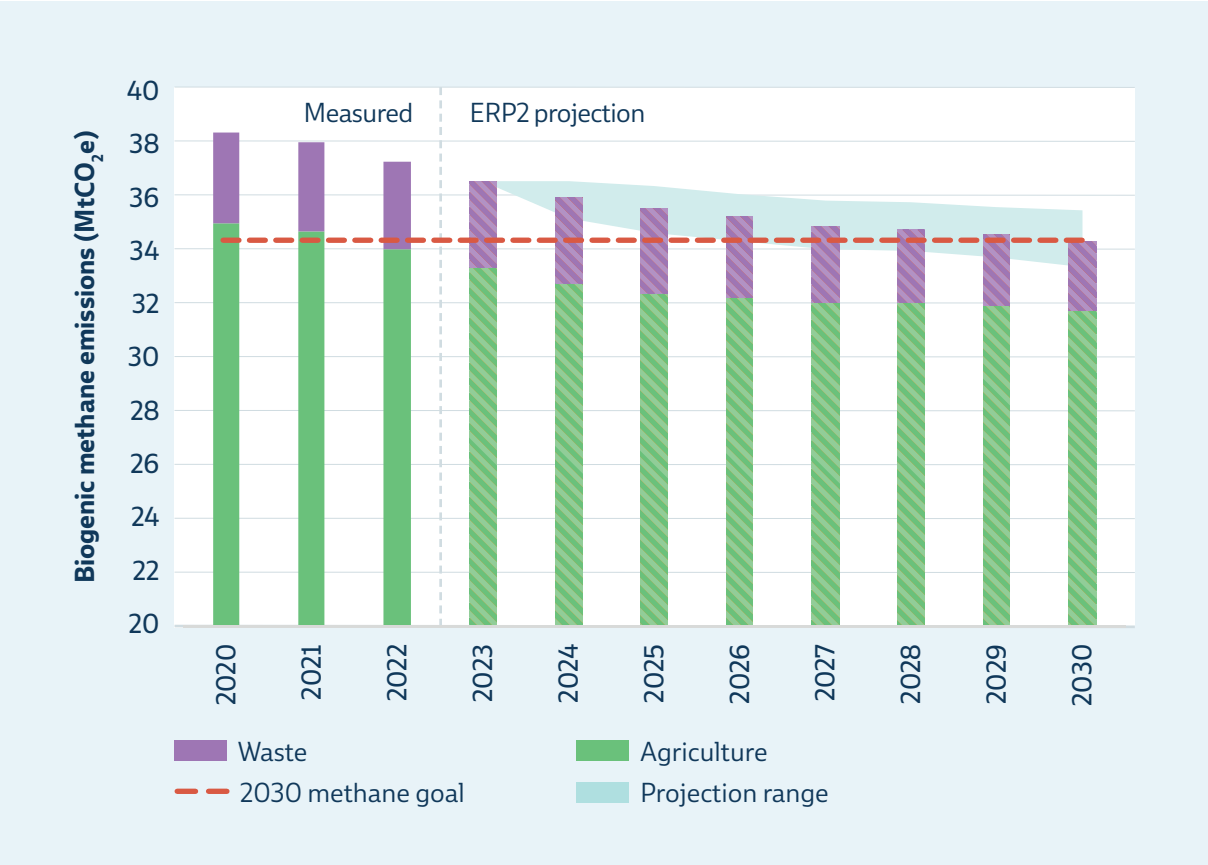
	Net emissions ($MtCO_2e$)		
	EB1	EB2	EB3
Set emissions budgets	290	305	240
Commission recommendation for revision to the emissions budgets	283	290	222
ERP2 (central estimate)	284.1	303.1	249.2
ERP2 (low estimate)	277.4	288.6	224.6
ERP2 (high estimate)	291.4	321.8	289.7

Source: Commission analysis of New Zealand's second emissions reduction plan 2026–30 and Commission advice on the fourth emissions budget

The Government's projections also show it on track to meet the biogenic methane goal in 2030 but with a narrow margin (Figure 2.9).

There are risks identified to both waste and agricultural emissions reductions; if one of them does not achieve the reductions planned this will need to be compensated for by additional reductions in the other sector.

Figure 2.9: Biogenic methane emissions projections by sector in the Government's second emissions reduction plan



Source: Commission analysis of New Zealand's second emissions reduction plan 2026–30

Question 4: What is needed for Aotearoa New Zealand to be on track for future emissions budgets and the 2050 target?

Box 2.1: Recommendation

We recommend the Government acts ahead of the third emissions reduction plan, to reduce risk for the second emissions budget and get on track for the third budget and 2050 target, by:

- strengthening the New Zealand Emissions Trading Scheme (NZ ETS) to ensure it can be effective as a key policy tool for reducing emissions *and*
- implementing additional targeted policies to complement the NZ ETS, focused on renewable energy, transport and agriculture.

This recommendation reflects that while the third emissions reduction plan is not due until 2029, early action will reduce investment uncertainty, avoid more disruptive measures later, and help put the country on track to meet the third emissions budget (for 2031–2035) and the 2050 target.

It is possible to meet the third emissions budget (2031–2035) and the 2050 target, and also to reduce risk for the second emissions budget. This will require action before the next emissions reduction plan.

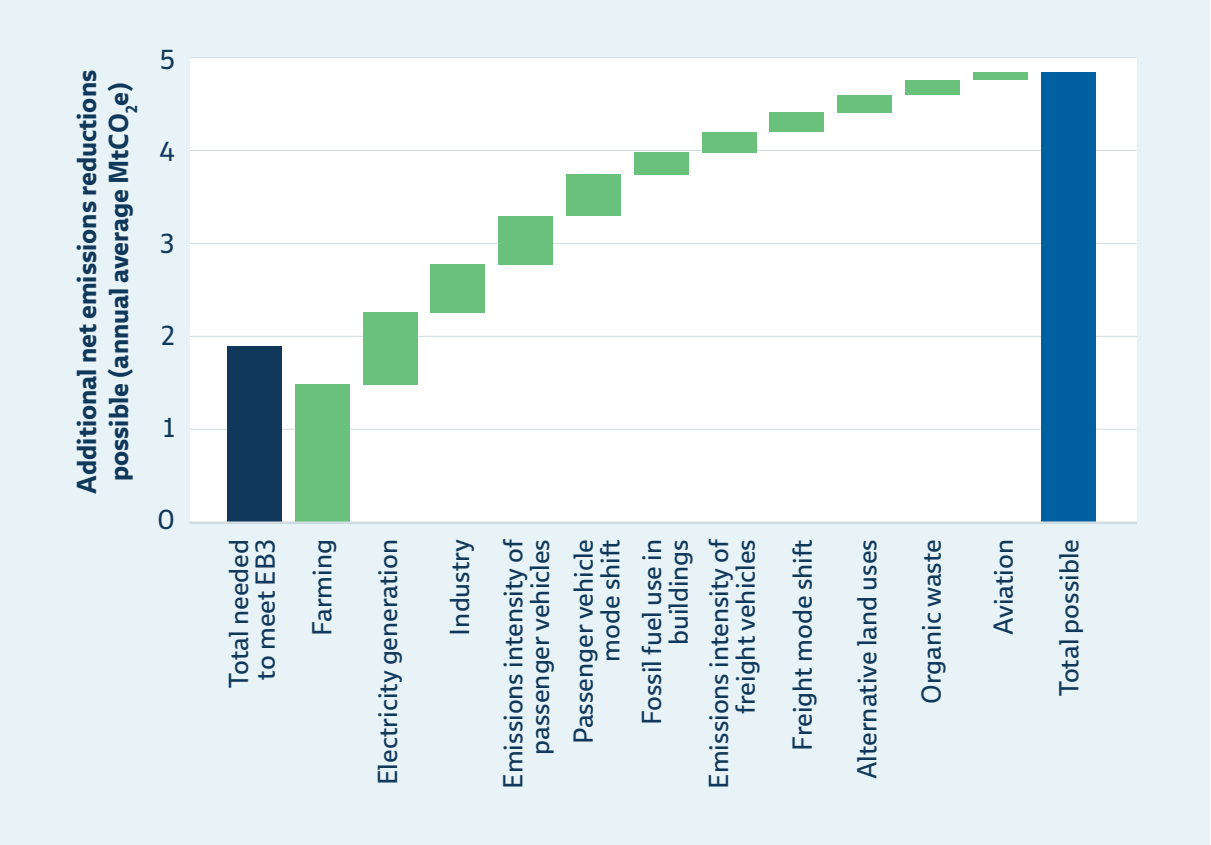
Scale: The policy action set out in the second emissions reduction plan is estimated to achieve 3.3 $MtCO_2e$ of emissions reductions in the second budget period. The current Government plan leaves a gap almost three times that – 9.2 $MtCO_2e$ – for the third emissions budget period. That will need to be filled by additional action.

Timing: The Government needs to act ahead of the next emissions reduction plan (due in 2029) as many options that would make a difference will take time to take effect. For example, New Zealand Steel's electric arc furnace took three years to progress from funding approval to operation.

Opportunities

These opportunities for emissions reduction are feasible and would help meet the country's climate goals. They are based on a close review of the planned emissions reduction action, and our latest analysis of opportunities for further reductions. Figure 2.10 shows the relative size of different options, compared to the total needed (left) and total possible (right). The specific volumes of potential reductions are shown in Table 2.4.

Figure 2.10: Further reductions possible in the third emissions budget period



Source: Commission analysis of the second emissions reduction plan path compared to the Commission's demonstration path from its advice on the fourth emissions budget[23]

Table 2.4: Further reductions possible in the third emissions budget period

Outcome area	$MtCO_2e$
Reduce electricity generation emissions	-3.9
Reduce emissions intensity of industry	-2.6
Phase out fossil fuels in buildings	-1.1
Reduce emissions intensity of passenger vehicles	-2.6
Reduce demand for carbon-intensive passenger transport	-2.3
Reduce demand for carbon-intensive freight	-1.2
Reduce emissions from farming	-7.4
Reduce organic waste sent to landfill	-1.1
Other reductions	-2.2

Source: Commission analysis of the second emissions reduction plan path compared to the Commission's demonstration path from its advice on the fourth emissions budget[24]

Priority action to realise opportunities for Aotearoa New Zealand

More information on how to realise these opportunities is set out in sector chapters.

Maintain and strengthen the NZ ETS – A considered and well-signalled evolution of the NZ ETS is required to support the credibility of the scheme and the confidence of the private sector to invest in emissions reductions and durable removals. Updating unit supply and price control settings in a predictable way is also necessary to maintain market confidence. Alternative ways to address emissions leakage could better support industrial emitters to reduce emissions at lower cost to taxpayers.

Additional, targeted policies – As the Government noted in the second emissions reduction plan, further policies may be needed to complement the NZ ETS. Opportunities for policy action that can remove market barriers, reduce risks for the economy and return wider benefits include:

- Taking advantage of falling prices for solar, electric vehicles and batteries to accelerate the shift to an affordable and reliable energy system with lower emissions
- Facilitating take-up of new technology and farm practices in ways that suit agricultural producers to maximise the country's competitive advantage and to realise full benefits of the Government's research and development investments.

Supporting private sector and Māori-led climate action – Government has options to support climate action by businesses and at community level without significant fiscal cost. Action that would assist includes evolution of the NZ ETS, climate-related disclosures, clarifying expectations so banks can effectively participate in competitive markets to finance the transition, and exploring options to leverage emissions incentives offered by large companies. Access to capital and constraints on developing and managing Māori land remain a barrier to Māori contributing fully to the market-led transition to a low emissions economy. Strengthening partnership with iwi/Māori can return benefits for the whole country while helping the Crown meet its obligations under Te Tiriti o Waitangi/The Treaty of Waitangi.

Areas for attention

A key part of monitoring is identifying areas the Government can act and make adjustments to stay on track to meet emissions budgets and achieve the country's long-term target. We have identified further areas for attention for each sector and for the wider policy areas that could assist the Government to do this. More detail on these areas for attention can be found in individual chapters later in this document.

These include issues that may not have been highlighted in our key findings above – each section of this list should be read alongside those findings for a complete picture of our assessment of opportunities and challenges.

Identified areas for attention – by sector

Our analysis shows these are key areas of opportunity and challenge for the Government's emissions reduction plan to reduce risks.

Energy and industry

- Developing a long-term plan to manage key energy sources.
- Advancing training and development to support a skilled and available workforce.
- Implementing a considered, well-signalled evolution of the NZ ETS to drive emissions reductions.
- Removing financial and information barriers hindering emissions reductions.
- Developing a stable and durable planning and consenting system that enables emissions reductions.

Transport

- Integrating planning for transport infrastructure and urban development, and optimising freight movement across road, rail and coastal shipping.
- Developing policies to increase use of zero emissions heavy vehicles.
- Making it easier to use low-carbon liquid fuels and sustainable aviation fuels.

Waste and fluorinated gases (f-gases)

- Avoiding increasing pressure on the agriculture sector to reduce methane emissions through harnessing opportunities for waste avoidance and reduction.
- Building a transparent path to achieve the assumed improvements in landfill gas capture.
- Developing a resource recovery infrastructure strategy to increase investor confidence and address infrastructure gaps.
- Addressing the risk that thermal waste energy facilities using non-renewable feedstock could undermine emissions reduction efforts.
- Developing training and accreditation for f-gases handling to reduce leakage and increase the uptake of f-gas alternatives with lower Global Warming Potential.

Agriculture

- Addressing the risk of over-reliance on technological solutions.
- Supporting extension and advisory services for farmers.
- Incentivising earlier uptake of new farming practices and technology.
- Supporting Māori farm businesses.
- Establishing biodiversity credits and non-forestry removals supporting gross emissions reductions and adaptation.

Removals

- Addressing the risk of over-reliance on forestry removals.
- Implementing a considered, well-signalled evolution of the NZ ETS to support market confidence and investment.
- Careful consideration of the Crown-owned land afforestation proposal.
- Ensuring incentives for indigenous afforestation and permanent forests.

Identified areas for attention – across the wider system

Our analysis shows these are key areas of opportunity and challenge for the Government's emissions reduction plan to reduce risks.

Enabling systems

Covering funding and finance; urban design, planning and infrastructure; research, science, technology and innovation; nature, the circular economy and bioeconomy; adaptation; and governance.

- Considering how to address likely under-investment by the private sector and individuals in low-emissions technology with high capital cost, such as heating, transport and rooftop solar.
- Improving confidence for the financial sector in the transition to a low emissions economy through clear signals and regulatory stability.
- Supporting full participation of businesses and organisations in the Māori economy in the low-emissions transition, by addressing issues with access to capital.
- Expanding the scope of government monitoring (by the Climate Change Chief Executives Board) of emissions budgets to include the impacts of climate policy, private financial flows and mātauranga Māori.

- Providing strategic direction to support alignment of other areas with emissions reduction goals for energy, land use, research, sustainable finance and infrastructure.

The NZ ETS

- Implementing a considered, well-signalled evolution of the NZ ETS to ensure it is fit for purpose in the 2030s and beyond.
- Considering how emissions leakage risk can best be managed while aligning with emissions goals.
- Providing more clarity on how the NZ ETS emissions cap will be managed over time.
- Continuing to make decisions on a predictable basis on how the NZ ETS unit limits and price controls will align with emissions goals.

Whakahekenga rehukino (iwi/Māori)

- Refreshing the timeline and funding for the Māori climate platform, the key mechanism through which the Government looks to build a climate response partnership with iwi/Māori.
- Taking up available opportunities to support hapū-led incorporation of mātauranga Māori in climate action.
- Removing barriers to gaining access to capital, and constraints on developing and managing Māori land, to facilitate full contribution from iwi/Māori to the market-led transition to a low emissions economy.
- Developing measures to address energy hardship that remove the risk those measures will not address the specific circumstances for Māori households.

Impacts and benefits

- Addressing the risks to businesses and households of high energy costs. A reliable, low-emissions electricity system and improved housing stock and related data would help to address this.
- Acting faster on transport decarbonisation and broader electrification, which could deliver significant benefits, provided finance options are available.
- Addressing the barriers to low-emissions travel – including for people on lower incomes and iwi/Māori.
- Proactive transition planning for sectors, regions and with groups at higher risk of harm.
- Providing stronger policy coordination on the impacts of land-use change could deliver economic, social and environmental benefits, and a strong base for climate action by businesses and rural communities.

The evidence

Chapter 3

Enabling systems

This chapter covers the enabling systems that will set Aotearoa New Zealand up for success in meeting its emissions budgets and the 2050 target: funding and finance; urban design, planning and infrastructure; research, science, technology and innovation; nature, the circular economy and bioeconomy; adaptation; and governance.

Under the Climate Change Response Act 2002 (the Act), each emissions reduction plan must include a multi-sector strategy to meet emissions budgets and improve the ability of sectors to adapt to the effects of climate change.[ix] Action in these areas may not directly reduce emissions but can make it easier to do so.

We look at how the Government has considered these areas, including progress in the last 12 months, coverage of the main barriers, opportunities and issues highlighted in previous advice, and risks to policy effectiveness.

Key points

- The Government has indicated it is relying on private sector action and investment for a cost-effective transition to a lower emissions economy. However, market barriers mean underinvestment by the private sector is likely without Government action to address these barriers.
- Good progress has been made in building the 'financial infrastructure' for a market-led transition, but scrutiny of bank lending practices, review of the climate-related disclosures regime, and regulatory change for forestry are creating uncertainty. Good information, clear signals and regulatory stability will need to be accompanied by sufficient carbon price incentives to drive investment.

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ix Section 5ZG(3)(b).

- Access to capital for Māori small to medium enterprises (SMEs) and constraints on developing and managing Māori land remain a barrier to the Māori economy contributing fully to the low-emissions transition.
- There is opportunity for the Government to build on the incentives offered by food companies to low-emissions farms.
- There are early signs the economics of woody biofuels are improving. Expanding the scope of the bioenergy taskforce and de-risking regional biomass supply chains would support the broader bioeconomy.
- A biodiversity credits scheme could offer a valuable alternative land-use option through native afforestation on farms.
- Recent planning system and funding changes will likely have mixed effects on low-emissions urban development. Lack of integration in transport, housing and infrastructure planning, and lack of overall direction on low-emissions development remain a barrier.
- Government has set three adaptation goals but there is not enough information to assess Government actions until specific policies have been developed.
- The regular reporting to the Prime Minister on emissions budgets is an effective lever for retaining Government focus. There is opportunity to expand the scope of monitoring indicators to cover impacts of climate policy, private financial flows, and mātauranga Māori.
- There is opportunity for clearer strategic direction in policy areas related to emissions reduction: energy, land use, research, sustainable finance and infrastructure.

Funding and finance

How this area can contribute

The global transition to a low emissions, and climate-resilient economy involves public and private investment being directed towards different activities and assets.

Government can direct public spending so its own activities support climate goals. Although the carbon price affects public sector procurement, public agencies may have limited incentives for energy efficiency investments if capital and operating budgets are held in different places. Public sector procurement of low-emissions technologies can give manufacturers and importers confidence to increase the supply of these, providing more options for households and businesses.

Meanwhile public investment in infrastructure can enable people and firms to access broader benefits, such as congestion reduction and transport access from public transport.

Government debt finance can bring forward low-emissions investment in areas where returns take too long for the private sector. Earlier investment may reduce total transition costs and smooth economic adjustment.[25]

Funding support for iwi/Māori as part of the Crown–Māori relationship is also a key consideration for the Government.

The private sector may underinvest, despite a carbon price, due to other market barriers and because of broader benefits for society which private investors are not incentivised to achieve. Government can introduce policies to address these issues.

Government can also influence private sector investment through strategies, signals and information. Aligning Government and private sector strategies may help New Zealand exporters compete internationally and mitigate economic risks relating to market access.[26] Regulatory stability and clear signals from Government can help inform private sector investments. Standards and disclosure requirements can ensure businesses produce transparent, reliable information about their emissions, risks and actions.

Specific measures that can help Aotearoa New Zealand in this space are:[27]

- a centralised climate finance approach, to coordinate public and private sector actions through public financial commitments and signals for the private sector
- taking advantage of green finance for public debt (such as Sovereign Green bonds)
- low-emissions criteria for public procurement
- specific funding mechanisms for iwi/Māori
- regulatory measures or public funding where the private sector underinvests due to market barriers
- support to realise the health, social, economic and fiscal benefits of better air quality, lower running costs of electric machines, affordable, reliable electricity supply, and efficient buildings
- a sustainable finance taxonomy so investors can readily identify sustainable activities.

Progress to date

This section summarises recent developments within the public and private sectors that could increase or decrease emissions.[x]

Public sector actions and funding

- The Government's second emissions reduction plan follows a market-led approach to encourage private investment in the low-emissions transition. Planned actions include:
  - developing a sustainable finance strategy and taxonomy
  - establishing a sustainable finance reference group to advise Ministers
  - collaborating with Australia on sustainable finance policy alignment
  - sharing knowledge internationally
  - investigating a biodiversity credits market
  - continued partnership with the private sector in the AgriZeroNZ Joint Venture to develop agricultural emissions reduction technology.
- The Centre for Sustainable Finance Toitū Tahua plans to publish an initial sustainable finance taxonomy (focusing on agriculture and forestry) in late 2025.
- The Government is winding down:
  - New Zealand Green Investment Finance
  - the Energy Efficiency and Conservation Authority (EECA) State Sector Decarbonisation Fund.
- The Ministry of Business, Innovation and Employment (MBIE) consulted on reducing compliance costs of the Climate-Related Disclosures (CRD) regime by:
  - raising thresholds to apply to fewer large entities
  - reducing liability exposure for directors.
- The External Reporting Board (XRB) amended climate reporting standards to allow a 1-year delay on some disclosure requirements.

x The Technical Annex provides further details and references on these developments.

- Increased scrutiny and reform proposals in the banking sector:
  - Finance and Expenditure Committee inquiry into banking competition
  - Select Committee consideration of the member's bill on Financial Markets conduct[28]
  - Commerce Commission investigation into banks' net-zero strategies.

International action and sustainable finance

- The United States (US) indicated its withdrawal from the Paris Agreement in January 2025. US state-level initiatives continue despite federal withdrawal.
- Action via carbon pricing initiatives continues in other key jurisdictions including the European Union (EU), China and Australia (see further details in the Technical Annex)
- Following the 2024 US election, the US Federal Reserve and Treasury withdrew from the Network for Greening the Financial System and several US and Canadian banks exited the Net Zero Banking Alliance.
- Outflows from global ESG funds (investment vehicles that focus on Environmental, Social and/or Governance factors) may signal reduced capital available for low-emissions investments.

Domestic private sector targets and disclosures

- Science Based Target Initiative (SBTI): as of Dec 2024: 12 Aotearoa New Zealand companies had SBTI-verified targets; 2 more were awaiting approval. Air New Zealand withdrew its 2030 SBTI target in July 2024.
- In February 2025 Fonterra introduced emissions incentives for their Aotearoa New Zealand suppliers via higher milk prices and emissions efficiency tools, supported by customers Mars and Nestlé.
- Businesses made their first reports under the New Zealand CRD regime by the end of 2024.

Gaps, risks and opportunities

There has been progress in building private sector capability but gaps remain

While Aotearoa New Zealand's private sector is becoming better equipped to support the low-emissions transition, capability gaps – particularly among smaller firms – remain a barrier to widespread progress.

Increasing requirements from overseas firms and jurisdictions, Aotearoa New Zealand's climate-related disclosures and the proposed sustainable finance taxonomy are creating awareness, transparency, skills and data ready to support investment in the transition.

Once the taxonomy is completed for all sectors, this preparation puts firms and the financial sector in a better position to attract international 'green finance' and to meet climate expectations from global supply chains. Note that a taxonomy is only a tool for distinguishing more and less sustainable activities – it needs to be accompanied by effective policies including carbon pricing to drive changes in investment.

Smaller entities are struggling to invest in emissions measurement and verification necessary to access cheaper finance. Small businesses[xi] accounted for 42% of the economy in 2021[29] and could likely contribute significantly to reducing emissions with appropriate finance, incentives and other support. There is an opportunity for the Government to support small businesses to measure and verify emissions. Singapore offers funding[30] in this area, and approaches with lower fiscal cost may also be possible.

xi 0–19 employees.

Unclear signals to the private sector could limit low-emissions investment

Uncertainty in policy and regulatory signals is dampening private sector confidence and could constrain investment in low-emissions initiatives.

The Government has reduced public funding for emissions reduction and has indicated it expects increased investment by the private sector. However, uncertainty is created by current scrutiny of bank lending practices and the possibility of new legislation in this area, along with proposals to raise CRD reporting thresholds. We heard from financial sector stakeholders that current uncertainties are reducing progress and innovation in sustainable finance initiatives.

Competitive markets and a stable regulatory environment are critical for the financial sector to effectively allocate financial capital. Resolving any concerns about competition in relation to low-emissions action by the banking sector will enable the Government to provide clear signals about the role of the financial sector in the transition.

More broadly, investment returns depend on the carbon price, which is uncertain, and under current legislated settings will come to be dominated by the influence of forestry decisions in the 2030s. Prior to the 2030s, the Government will need to continue improving the certainty and incentives provided by NZ ETS settings to achieve efficient investment to reduce net emissions (see *Chapter 4: Emissions pricing*).

The private sector will underinvest in some areas

Despite carbon pricing the private sector is likely to underinvest in key areas critical to the low-emissions transition due to persistent market barriers.

Important market barriers include:

- high capital cost for low-emissions technology, combined with split incentives for landlords and tenants, and difficulty accessing capital
- higher risk for business investments in early technology adoption, new supply chains, or areas with regulatory uncertainty.

We discuss opportunities to address these barriers and access these benefits in other parts of this report, including:

- for agricultural emissions technology, the bioeconomy and Māori SMEs later in this chapter
- for better air quality, warmer homes and more reliable, affordable electricity in *Chapter 6: Impacts and benefits*.
- for space and water heating technology and rooftop solar in *Chapter 7: Energy, industry and buildings*
- for electric vehicles in *Chapter 8: Transport*.

A recent development that may help reduce capital barriers is the change to tax rules in Budget 25 that allows businesses to claim immediate tax deductions on 20% of the value of new assets.[xii] We may analyse the impacts of this policy in future reports.

Better data is needed on private sector investment

Robust, accessible data on private sector investment is essential to track progress and guide policy in the low-emissions transition – but current systems fall short.

There is not currently adequate data to track investment aligned with the transition to a low emissions economy. Investment data could reveal action across sectors, years ahead of emissions reductions being observed. This could inform market decisions and allow quicker adjustments to government policy.

xii This policy does not specifically target low-emissions assets, but may support low-emissions economic activity as it tends to be more capital intensive than high-emissions activity.

Both the Aotearoa New Zealand taxonomy and climate-related disclosures offer the opportunity for more timely tracking of private sector emissions and actions. In Europe, mandatory disclosures against the European Sustainable Finance Taxonomy have enabled better tracking of investment flows.[31]

To support this opportunity the Government would need to consider any standards required for digital reporting and sharing of climate data.

There is opportunity to build on food company actions to reduce agricultural emissions

Government and food sector efforts to reduce agricultural emissions are beginning to align, creating a valuable opportunity to accelerate progress through stronger public–private partnerships.

AgriZeroNZ is a joint venture between the government and the private sector in agricultural emissions technology. It is intended to align private investment with emissions goals and capture value from public research and development (R&D). AgriZeroNZ proposes to have its first tools available for farmers in 2026 and two to three tools in widespread use by 2030.[32]

As part of managing their scope 3 emissions,[xiii] food companies have begun offering financial emissions incentives to farmers in Aotearoa New Zealand. There is an opportunity for the Government to partner with the private sector to provide greater incentives to farmers who act on emissions. This could help overcome early-adopter risk, encourage private finance, and contribute to meeting emissions budgets.

Māori businesses and landowners face barriers accessing capital

Structural and financial barriers are limiting Māori businesses' ability to invest in the low-emissions transition, risking inequitable outcomes.

Māori SMEs have well-documented barriers to accessing capital.[33, 34] The Reserve Bank (RBNZ) found in 2022 that on average Māori firms pay up to 50 basis points higher interest on finance. A high proportion of Māori land has barriers to development or use as collateral for loans due to constraints under Te Ture Whenua Māori Act, fragmentation across small titles, multiple owners, and/or lack of management structure.

Difficulty accessing capital will make it relatively harder for Māori firms to invest in capital equipment, R&D and land-use change for emissions reduction, resulting in slower reduction and/or greater impacts for this group.

The RBNZ has a work programme in this area[35] and we found some action in the banking sector,[36] but these issues remain a barrier to investment by the Māori economy in the low-emissions transition.

Urban design, planning and infrastructure

How this area can contribute

The shape of cities and towns affects emissions across land use, transport, buildings, energy, and waste over the long term. The location and form of transport networks can have unequal impacts across different regions and groups. Existing urban form in Aotearoa New Zealand is not aligned with meeting our climate goals, while transport and urban development funding and planning systems are siloed and disjointed.

xiii 'Scope 3 emissions' refers to emissions generated by the use of a company's products and by the production of inputs that it purchases from others.

Denser urban form drives lower emissions, improves economic productivity by concentrating businesses and services, and reduces the costs of development and congestion.[37, 38]

Meeting the 2050 target will require a transformation of the energy and transport infrastructure, but Aotearoa New Zealand's historic infrastructure deficit and consenting issues may limit the rate of transformation.[39]

Infrastructure investment will be supported by collaboration and investment with iwi/Māori and the Māori economy, as acknowledged by the Government's recent infrastructure summit.[40]

Progress, gaps, risks and opportunities

Recent infrastructure and planning developments present both progress and uncertainty, with risks that current policy settings may not fully support a low-emissions urban transition.

At the time of analysis, significant components of the Government's resource management reform programme remain in development and we present only limited analysis of the programme's overall potential effects. The Fast-Track Approvals Act 2024 provides an easier route for consenting infrastructure and has approved renewable energy projects, rapid transit projects and housing developments. However, there is no clear mechanism to ensure the infrastructure portfolio aligns with Aotearoa New Zealand's emissions reduction goals and related policies such as the National Policy Statements for Renewable Energy Generation and Electricity Transmission.

Public transport investment through the Land Transport Management Fund will support lower-emissions urban centres. However, ongoing reform of the planning system creates uncertainty for infrastructure investment. Combined with Government direction to increase public transport fares,[xiv,41,42] decreased active travel funding, and existing coordination issues, this will likely inhibit low-emissions urban development.

In future, proposed changes to the development levy and targeted rates regime may allow councils to use price signals to drive more intensive development, but this depends on detailed rules still to be developed.[43]

Research, science, technology and innovation

How this area can contribute

Research, science, technology and innovation can help meet emissions goals by reducing emissions from producing goods and services and by creating new lower-carbon products. Mātauranga Māori provides additional insights and perspectives to Western knowledge systems and is an opportunity for partnership with iwi/Māori on climate change action.

Aotearoa New Zealand's science system is small, and much of the technology and knowledge to decarbonise Aotearoa New Zealand's economy will come from overseas. However, being an early adopter of overseas technology is risky for a business, while Aotearoa New Zealand's particular agricultural emissions challenge and science specialisations create opportunities for local R&D to reduce emissions.

xiv The 2024 Government Policy Statement on land transport indicates the Government expects Public Transport Authorities (PTAs) to recover a greater share of public transport costs from users (farebox recovery), and the New Zealand Transport Agency (NZTA) is working with PTAs to implement this. This is likely to put increased pressure on public transport fares going forward.

There is a role for government to address these issues through:

- growing long-term funding for the science system
- a research strategy setting priorities to contribute to emissions budgets
- encouraging private sector R&D investment
- de-risking uptake of new technologies through public investment and regulatory settings.

Progress, gaps, risks and opportunities

Technology development and science policy are key to long-term emissions reductions, and there is opportunity for the Government to build on its current approach.

Globally, performance and costs for solar panel[44] and battery technology[45] continue to improve with technology development, economies of scale and standardisation. It is not clear if or how the reduction in the US government's climate ambition and changing global tariffs will affect the price path. Long-term growth in markets and economies of scale are likely to continue pushing prices down. Realising the full cost savings from these technologies in Aotearoa New Zealand will depend on overcoming other barriers to uptake.

The Government has increased support for agricultural emissions R&D in partnership with the private sector. It is also proactively working to address potential regulatory and market barriers to technology uptake and continues to support Māori-led research on biological emissions through the Ag Emissions Centre. These actions increase the likelihood of viable technology solutions to reduce agricultural emissions becoming available.

In other areas the Government reduced the public funding available for science and research in Budget 2025, but it is too soon to tell what the consequences of that may be for long-term improvements in emissions reduction technology. MBIE's continued work on the New Zealand Research Information System[46] may help us assess this in future reports.

The Government is liberalising genetic technology. Although this may enable faster development of new traits in animals and plants, the overall impact on future emissions is unclear since we cannot predict how effective this technology will be or how it will be applied.

EECA provides early-stage technology support for energy and transport and the Government has an opportunity to mirror this function by considering the role of public and private on-farm extension services.

The Government is making a series of science system reforms, including creating:

- Invest NZ to attract overseas investment
- four new Public Research Organisations (PRO)
- the Prime Minister's Science, Innovation and Technology (SIT) Advisory Council.

The SIT council will help set the long-term priorities for government-funded science and innovation following these reforms. There is an opportunity to prioritise investment in a long-term, strategic research pipeline of emissions technologies to support climate goals.

Nature, the circular economy and bioeconomy

How this area can contribute

Biofuels and natural products can displace fossil fuels in energy production, increase carbon storage in long-lived products, reduce waste emissions and add economic value. Greater use of woody biomass from forestry could help decarbonise the Aotearoa New Zealand economy but comes with risks related to competition with other land uses, environmental and biodiversity impacts, and emissions from land-use change, transport and processing.

The role for government in this area includes avoiding perverse emissions outcomes by accurate recognition of lifecycle emissions, managing negative impacts, forecasting bioenergy feedstock supply, de-risking supply chain investment, standards, mandates, and active partnership with Māori.

A more circular economy means encouraging re-use, repair, regeneration and recycling to optimise energy and resource use and reduce imports. Circular economy opportunities for Aotearoa New Zealand include cement, steel, plastic and aluminium products and for construction, demolition and food waste.

Nature-based solutions to remove emissions often have multiple broader benefits and could be progressed as part of land-use transitions due to climate change impacts.

Progress, gaps, risks and opportunities

Government support for bioenergy, circular economy, and emerging bioeconomy initiatives is growing, but stronger coordination and safeguards are needed to ensure environmental integrity and unlock regional potential.

Bioenergy and the bioeconomy

The Government's approach is focused on the opportunity for using woody biomass for bioenergy, including through a ministerial bioenergy taskforce, supporting studies on sustainable aviation fuel (SAF), and EECA's ongoing information role.

The share of biomass (including solid, liquid and gas biofuels) in consumer energy in Aotearoa New Zealand has been largely unchanged for several decades[xv,47,48] although there are some early signs that the economics are changing with recent investments announced in 'black pellet' fuel supply[49] and use[50], and wood-derived chemicals.[51]

Studies have revealed significant potential biomass supply in Aotearoa New Zealand from 'waste' resources including forestry residues,[52,53] organic waste,[54] landfill gas capture,[55] and construction and tyre waste.[56] Using such sources would reduce competition with land for other uses, such as food production.

There is opportunity for increased Government support to de-risk and accelerate development of regional bioenergy and SAF supply chains. This could involve funding, government purchasing and/or regulatory approaches. There is also opportunity to broaden the scope of the Bioenergy Taskforce to support high-value bio-products and to integrate its work with regional land-use transition planning and economic development and the new Bioeconomy PRO.

Any new policies to support bioenergy create risks of negative impacts and perverse outcomes. Issues to consider include the net, lifecycle impact on emissions, and the implications of any new biomass production for existing land uses and the environment. The Parliamentary Commissioner for the Environment notes the increased risks for erosion that more frequent harvesting of short-rotation 'bioenergy' forests pose for regions with erodible soils such as the East Coast.[57]

Nature-based solutions

We heard from stakeholders there is enthusiasm for native afforestation among some farmers, if it can be made privately financially viable relative to other land uses. Faster progression of a biodiversity credits scheme would align with international sustainable finance trends and improve the economics of native afforestation. This could provide farmers with more land-use transition options.

xv Consumer energy is energy used by households and businesses, excluding losses during transformation and distribution. Biomass has contributed between 6% and 8% of consumer energy since 2000.

Circular economy

Progress in the circular economy includes a proposed Waikato steel-recycling facility approved under the Fast-track regime[58] and Government work with the construction sector on measuring embodied emissions as reported in the second emissions reduction plan. A circular economy strategy would enable the Government to identify further options and take a more integrated approach to waste, pollution, and retaining embodied energy across the economy.

Māori-led consideration of mātauranga Māori within circular economy policy design would enable wider Aotearoa New Zealand to learn from tikanga Māori.

Adaptation

How this area can contribute

Emissions reduction should be considered alongside climate change adaptation to ensure actions and investments are aligned in the economic transition.

Progress, gaps, risks and opportunities

While the Government has set important adaptation goals, there remain gaps and evolving opportunities to integrate adaptation with emissions reduction efforts.

The Government has set three adaptation goals in the second emissions reduction plan which appear to cover the broad areas where action is required across adaptation and mitigation. The Government is developing an adaptation framework which aims to clarify cost-sharing for adaptation between the Crown and others. Specific policy is being developed but there is not enough information to assess whether actions will be sufficient to meet the stated adaptation goals.

Discontinued actions from the first emissions reduction plan on resource management reform, transition support for regions and industries and the 'Right Tree, Right Place' programme, as well as the implementation of the Regional Infrastructure Fund may change how mitigation and adaptation are managed.

Other areas not specifically mentioned in the second emissions reduction plan that offer opportunity for joint adaptation and emissions reduction benefits are:

- new technology that could improve animal and pasture performance in terms of both emissions and resilience to a changing climate
- support by farm advisory services
- benefits of distributed, renewable energy systems for continuity of power supply after extreme weather events
- including nature-based elements as part of transport corridors and housing developments.

Governance

How this area can contribute

Governance is important to ensure policies are integrated and aligned across actors including central and local government, the private sector and iwi/Māori, and so that effective monitoring and management is in place to keep Aotearoa New Zealand on-track.

Progress, gaps, risks and opportunities

Enhanced reporting, adaptive management, and clearer local government roles present key opportunities to strengthen monitoring and coordination of the low-emissions transition.

The Government has introduced quarterly progress reporting on emissions budgets to the Prime Minister by the Climate Change Chief Executives Board, as Target 9 of the Government Targets. This reporting is an important lever to retain Government focus and provide public transparency on emissions reduction between less frequent, statutory climate deliverables.

The second emissions reduction plan proposes an 'Adaptive Management' approach to monitoring policy delivery and responding to changing circumstances. Indicators are proposed across a range of external factors, government actions and technologies, which will be more valuable than emissions data alone in tracking the transition. There is opportunity to provide a richer picture by also including:

- indicators of capital investment flows
- indicators of energy resilience, energy affordability and building stock quality
- indicators informed by mātauranga Māori.

Local government plays a critical role in the transition. Councils make decisions on land use, urban design, road and transport services, housing, water, waste, and managing flood risk.

Local government have previously told us they need more clarity on their role in the transition, accompanied by appropriate funding and legislative tools. It is difficult for the Commission to monitor what progress is being made in this regard.

There is an opportunity for the Government to use strategies to align activities with the low-emissions transition and climate resilience across the private sector, central and local government for:

- the energy sector
- the financial sector
- publicly funded research
- land-use transition, regional development and rural communities
- infrastructure development.

Areas for attention

- Consider how to address likely under-investment by the private sector and individuals in low-emissions technology with high capital cost, such as commercial and residential space and water heating, transport and rooftop solar.
- Improve confidence for the financial sector in the transition to a low emissions economy through clear signals and regulatory stability.
- Support full participation of businesses and organisations in the Māori economy in the low-emissions transition by addressing issues with access to capital.
- Expand the scope of government (Climate Change Chief Executives Board) monitoring of emissions budgets to include the impacts of climate policy, private financial flows, and mātauranga Māori.
- Provide strategic direction to support alignment of other areas with emissions reduction goals for energy, land use, research, sustainable finance and infrastructure.

Chapter 4

Emissions pricing

The New Zealand Emissions Trading Scheme (NZ ETS) is the main emissions pricing tool in Aotearoa New Zealand.

This chapter looks at progress on actions relating to the NZ ETS and key issues likely to impact its effectiveness in future.

Key points

- The current structure of the NZ ETS is likely to deliver mostly forestry removals and insufficient incentives for most gross emissions reductions.
- Around the late 2030s, the net emissions cap within the NZ ETS is expected to reach zero, limiting its effectiveness beyond that point.
- If the NZ ETS is to remain a key policy tool to reduce emissions, it needs to be amended to address the challenges of the 2030s. Beginning a process now for a clearly signalled and well-considered evolution of the NZ ETS will help to build confidence in the long-term future of the scheme. Addressing future challenges soon will help provide the regulatory predictability that businesses need to invest in the emission reductions and afforestation needed to meet emissions goals.
- Industrial free allocation is provided to industrial emitters to mitigate the risk of emissions leakage. This approach also weakens the incentive for emitters to decarbonise and increases the cost to Government of meeting emissions goals. Considering alternative ways to address emissions leakage could better support industrial emitters to reduce emissions, at lower cost to taxpayers, than free allocation of units. It is possible to combine different alternative approaches, tailoring policies to particular industries' circumstances and mitigation options.
- The Government has aligned the unit volumes and price control settings with contributing to meeting emissions budgets in line with Commission advice. Continuing to align unit limits and price control settings with emissions goals is essential for the NZ ETS to support meeting them.

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- The Government's decision in the second emissions reduction plan on the provisional NZ ETS emissions cap provides clarity for market participants on the emissions reductions expected from NZ ETS sectors. Further clarity on how the Government will manage the emissions cap over time would enhance this.
- The Government has announced restrictions on the type of land that can register into the NZ ETS to limit whole-farm conversions to forestry. How this policy will affect afforestation rates and the NZ ETS incentive for gross emissions reductions is uncertain.

How this area can contribute

The NZ ETS is a powerful tool to reduce emissions

Pricing emissions changes the relative prices of goods and services across the economy. It influences the behaviour of both producers and consumers by discouraging high emitting activities and rewarding low-emissions choices.

Emitters covered by the NZ ETS are required to surrender one New Zealand Unit (NZU – the unit of trade in the NZ ETS) to the Government for every tonne of carbon dioxide equivalent they emit. NZUs can be generated by eligible forests, or acquired at Government auctions. Some units are also provided directly to eligible industrial emitters. Participants trade NZUs among themselves and the market determines the price. By limiting the supply of units, the Government incentivises emitters to reduce their emissions.

The NZ ETS applies to emissions and removals from energy, transport, industrial processes, municipal landfills, fluorinated gases (f-gases) and post-1989 forestry. Overall, in 2023 the NZ ETS covered 44% of gross emissions (approximately 33 $MtCO_2e$), with the major exception being biological emissions from agriculture.

The Government has chosen the NZ ETS as its main policy tool

In the second emissions reduction plan, the Government stated that it intends to rely on the NZ ETS as its main policy tool to reduce emissions. The second emissions reduction plan states that it prioritises supporting a credible NZ ETS and restoring broader market confidence by providing regulatory predictability and strengthening market governance. The plan also highlights the Government's intention to align the scheme with the second emissions budget through:

- making decisions on NZ ETS settings for unit limits and price controls
- setting the NZ ETS cap
- updating industrial allocation settings.

Issues to address

There are a number of issues with the design of the NZ ETS which could affect emissions reductions planned:

- The NZ ETS cannot guarantee a fixed level of emissions in any given budget period so it should not be solely relied upon to meet emissions budgets and the 2050 target.
- The NZ ETS as currently structured will incentivise afforestation but will not drive significant gross emissions reductions.
- Around the late 2030s, the net emissions cap within the NZ ETS is expected to reach zero, limiting the scheme's effectiveness beyond that point. Further removals will still be needed to meet the net-zero target for emissions other than biogenic methane. Some of these emissions (mainly nitrous oxide from agriculture) are not covered by the NZ ETS and will need to be balanced by further removals.
- Addressing these issues soon is necessary to provide the signals and regulatory predictability to enable private sector investments to meet the 2050 target.

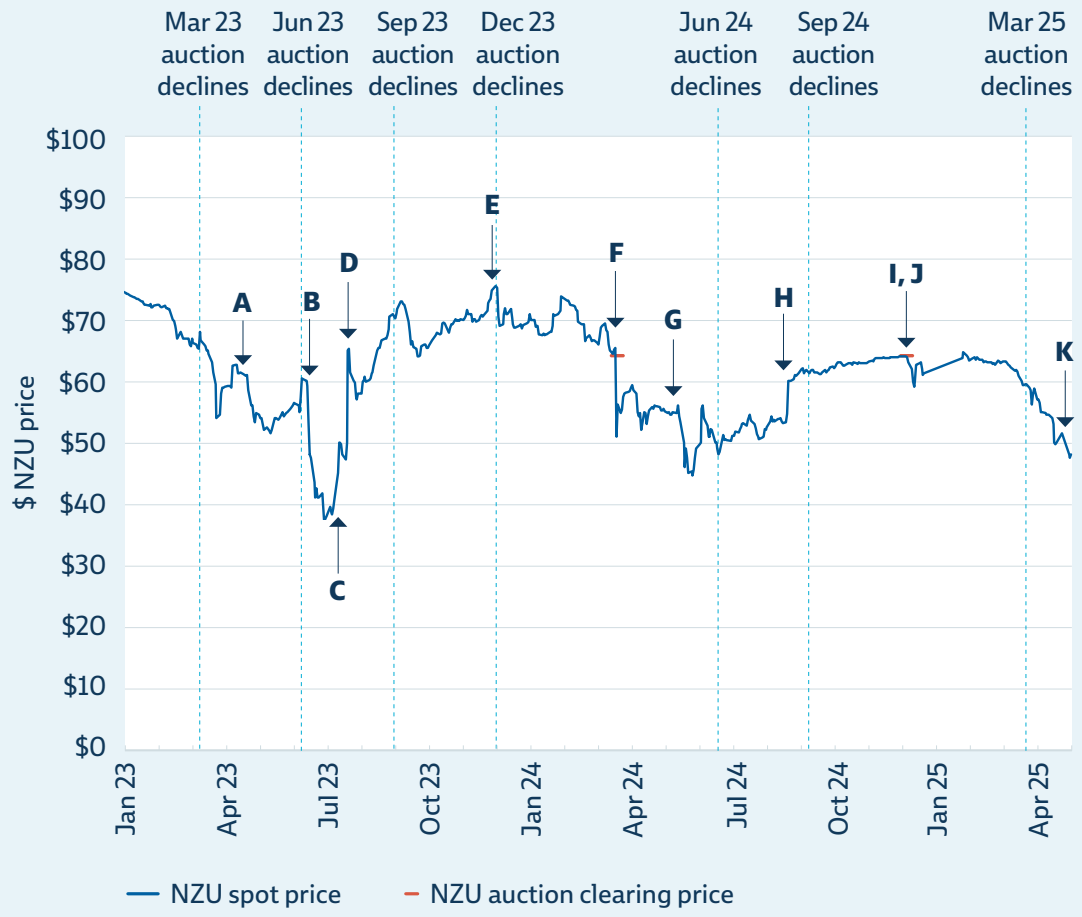
Progress to date

Market developments

Figure 4.1 shows the spot price of NZUs since January 2023. The NZU spot price experienced significant price volatility over 2023 and 2024. This coincided with a period of policy uncertainty, including a review of forestry within the NZ ETS, and changing Government decisions on auction settings. Over this period, several auctions declined, including the June and September 2024 auctions.

The Government's adoption of the Commission's recommended unit limits and price control settings in August 2024 ushered in several months of relative price stability. From early March 2025 prices began to slide. Market commentary cited a range of possible causes for this, such as the timing of forestry unit allocations,[59] difficult economic conditions prompting foresters to sell units that they otherwise might hold,[60] and turmoil in global markets more broadly.[61] Spot prices reached a low of NZ$48 in late April 2025, coinciding with the release of the Commission's advice on NZ ETS settings for 2026–2030, before recovering to around NZ$55 in May 2025.

Figure 4.1: NZU spot prices and relevant market events January 2023 – April 2025



A	Commission's second NZ ETS settings advice (2024–2028) released
B	Government launches NZ ETS review consultation
C	High Court announces decision on judicial review of Government's NZ ETS settings decision
D	Government adopts new NZ ETS settings for 2024–2028
E	Government announces halt to NZ ETS review
F	March 2024 auction partially clears at floor price
G	Government consultation on NZ ETS settings begins, includes option of lowering price control settings
H	Government announces decision on NZ ETS settings for 2025–2029
I	December 2024 auction partially clears at floor price
J	Government announces restrictions on exotic forests registering in NZ ETS
K	Commission releases fourth NZ ETS settings advice

Source: The Ecanmole (2025)[62]

Policy changes

This section sets out changes to NZ ETS policy that could increase or decrease emissions.

- Over 2023 and 2024 the Government reviewed and updated allocative baselines for industrial free allocation. The updated baselines came into force on 1 January 2025.[63]
- On 20 August 2024 the Government announced it was adopting the Commission's recommended unit limits and price control settings for the period 2025–2029.[64]
- On 28 May 2025 the Government began consulting on the unit limits and price control settings for 2026–2030. This included an option to accept the Commission's recommendations that more units could be auctioned over the period, and an option to maintain the existing settings.[65]
- The second emissions reduction plan set out provisional decisions on the emissions cap for the NZ ETS for 2026–2030, indicating a cap on net emissions of 91.3 $MtCO_2e$ for the period.
- The second emissions reduction plan stated that NZUs will not be vintaged, and forestry units will not be treated differently than non-forestry units.
- On 4 December 2024 the Government announced new restrictions on the registration of land newly planted with exotic forest species into the NZ ETS. The restrictions would be based on the land-use capability class (LUC) of the land converted to forestry. This policy aims to limit farm to forestry conversions.[66] The Government intends to legislate for these restrictions by October 2025, which will have retrospective effect from the date of the initial announcement.[67] There are exemptions planned for landowners in the process of afforesting and for some land owned by Māori.

  Key limits are:
  - a ban on registering exotic species of forest land in the NZ ETS if planted on LUC class 1 to 5 farmland
  - a national annual hectare limit of 15,000 hectares for exotic forest land registered in the NZ ETS if planted on LUC class 6 farmland to be allocated by ballot.

  Up to 25% of LUC class 1 to 6 land on a farm would be exempt from the above limits.
- The Government reviewed the cost recovery arrangements for forestry in the NZ ETS and reduced the annual per hectare charge for post-1989 foresters in the scheme.[68]
- The Government began consulting on options to update the default carbon tables for exotic forests and expand the specificity of the tables to a wider range of species.[69] These tables specify how much carbon a forest of a given type has sequestered at different ages.
- In December 2024, the Government put out a request for information seeking private sector interest in working with the Government to plant trees on Crown-owned land.[70]

Gaps, risks and opportunities

Government decisions on settings have provided some clarity and begun to restore market confidence

The Government's focus for the NZ ETS in the second emissions reduction plan and in its public statements has been to restore confidence in the market. The Government's 2024 decisions on unit limits and price control settings (NZ ETS settings) for 2025–2029 maintained the price control settings on their existing trajectory and reduced auction volumes in line with the Commission's advice.

Making settings decisions on a predictable approach using an established methodology supports confidence in the market. Feedback from our discussions with market participants over recent months suggests that confidence is returning but remains fragile. We heard that participants remain concerned about uncertain policies, such as how rules around limits on forestry will work.

Further clarity on the emissions cap is needed to support investment

The emissions cap is the targeted level of net emissions the Government is seeking to achieve from sectors covered by the NZ ETS. The emissions cap is an essential element for determining the annual unit limits and price control settings in the NZ ETS (the NZ ETS settings), which set the volume of units to be auctioned. The second emissions reduction plan set out an emissions cap for the NZ ETS for the second emissions budget period (2026–2030) of 91.3 $MtCO_2e$. This decision provided clarity on the emissions reductions the Government expects to come from NZ ETS sectors, which helps to build the confidence in the scheme necessary for participants to invest in reducing net emissions.

However, the Government has not clarified how it will manage the emissions cap over time. The provisional emissions cap was set based on projected emissions. While these projections met the second emissions budget level, they did not meet the third emissions budget. In 2026 the Government will make NZ ETS settings that cover the third emissions budget. Before then, the Government will need to make deliberate decisions about how much of the additional reductions in net emissions needed to meet the third emissions budget are to be achieved inside and outside the NZ ETS.

Developing a consistent approach to how the cap is set and managed over time, and setting out the circumstances in which the cap might change, would enhance the predictability of the NZ ETS, better enabling emitters in the scheme to take a longer-term view on the emissions price and factor it into investment decisions.[71]

Continuing evolution of the NZ ETS is needed

Addressing how the NZ ETS will operate and stay effective in the 2030s and beyond is a gap in Government policy. If we extrapolate the Government's provisional decision on the NZ ETS cap to the end of the third emissions budget, the emissions cap would reduce from 26 $MtCO_2e$ in 2025 to around 6 $MtCO_2e$ by 2035. Without changes to the scheme, the net emissions cap will continue to decline and reach zero soon after 2035.[xvi] In the years leading up to the cap reaching zero industrial free allocation will exceed the cap and there will no longer be volume under the cap to be auctioned. As auction volumes decrease, unit supply from forestry is expected to start dominating the scheme. The influence and relevance of the price control settings will diminish, and the NZ ETS price would likely tend towards the relatively low marginal cost of forestry. This leads to three issues for meeting emissions goals.

First, after the emissions cap reaches zero additional removals will still be needed to meet the 2050 target that the NZ ETS will not incentivise. Once the emissions cap reaches zero all gross emissions in the scheme will be balanced by forestry removals. However, additional removals will still be needed to balance emissions under the 2050 target that are outside the NZ ETS – principally agricultural nitrous oxide. The Government has announced a policy of partnering with the private sector to plant trees on Crown-owned land which could deliver these additional removals; however, there are risks to the proposal. See *Chapter 11: Removals*.

xvi The exact timing of the emissions cap reaching zero cannot be precisely forecast since the Government has not yet set emissions budgets past 2035. Previous analysis of this issue relied upon sector sub-targets the Government had set in the first emissions reduction plan.

The second issue is that if in the 2030s or beyond, Aotearoa New Zealand needs to further decarbonise, other tools or policies may need to be used as the NZ ETS may not be capable of driving material gross emissions reductions. While the Government is currently pursuing emissions reductions on a net basis (i.e. it is agnostic as to whether emissions under the net-zero target are reduced or balanced with forestry removals), the current trajectory of the scheme means the Government will lose a key policy tool if in the future it decides to change course.

The third issue is that this approach could also leave the NZ ETS in an unstable state, with the unit supply from forests not well matched to demand from emitters. This risks the NZU price falling below the marginal cost of forestry, enabling deforestation and increasing net emissions. This could lead to boom-and-bust cycles of forestry, and large swings in net emissions that could put meeting emissions budgets and the 2050 target at risk.

If the Government is to maintain the ability of the NZ ETS as an effective tool to reduce emissions, the scheme will need to be amended. There are a range of potential solutions to these issues. We canvassed some of them in our advice on the second emissions reduction plan. While frequent or unpredictable changes to the scheme can inhibit emitters' confidence to invest in emissions reductions, a well-considered and clearly signalled process for addressing these issues early can minimise the disruption to the NZ ETS' effectiveness. Addressing these issues early will allow more time for the impact of any changes to work through the market causing less disruption.

Industrial allocation has been updated but remains misaligned with the 2050 target

Emissions-intensive trade exposed emitters are allocated some units for free (industrial free allocation) to reduce the risk that emissions pricing drives production of goods overseas, resulting in an increase in global emissions (emissions leakage). Over 2023 and 2024 the Government went through a process to update allocative baselines used to calculate rates of industrial allocation for different activities. The updated allocative baselines accounted for changes in the emissions intensity of the production processes for eligible products and came into force from 1 January 2025. This resulted in a reduction in the forecast amount of industrial free allocation expected to be given out in the future.

This process did not reapply eligibility thresholds for emissions intensity of activities, or reconsider how appropriate the existing thresholds are to the risk of carbon leakage today. The emissions intensity thresholds have not been reconsidered since they were established in 2010, and concerns have been raised they were set too low, since they were originally based on Australian benchmarks.[72] This means that some firms that receive industrial allocation may not need it. Providing industrial allocation where it is not needed is an unnecessary cost to the Government, and puts a greater burden of emissions reductions on other emitters.[73] Industrial allocation also exacerbates the issue of the NZ ETS cap reaching zero, bringing forward the date when there will be no volume under the cap to auction.

As legislated industrial allocation is forecast to continue after 2050, increasing the cost of meeting the 2050 net-zero target. There is merit in investigating other approaches to managing emissions leakage that could be more conducive to meeting the 2050 target and come at lower cost to taxpayers. Different solutions may be more suitable for different industries. A hybrid option could allow options to be tailored for industries' specific circumstances.

The impact of restrictions on registering forests into the NZ ETS is not yet clear

As mentioned above, the Government has announced it will implement restrictions on newly planted exotic forests registering into the NZ ETS based on LUC class. This policy is aimed at limiting whole-farm conversions to exotic forestry.[74] While not the stated goal, it is possible that these restrictions could partially address the issue of the NZ ETS incentivising mostly forestry removals, displacing gross emissions reductions.

The LUC restrictions on registering exotic forest land in the NZ ETS are intended to slow the rate of afforestation on high or medium versatility farmland (LUC classes 1–6), and include several exceptions. While the Government has indicated it expects this policy will not limit the overall rate of afforestation, we have not seen detailed analysis on the impact of this policy.

Iwi/Māori face specific barriers to participating in the NZ ETS

Through our engagement on past advice we have heard that many iwi/Māori face barriers to taking up the incentive offered by the NZ ETS to plant forest on their land. These include physical limitations of land returned to Māori, complex ownership structures that make it difficult to finance development, and the fact that much of the forest land returned to Māori is ineligible to generate emissions units.

Changes to the NZ ETS can disproportionately affect iwi/Māori since the specific barriers identified above make it more difficult for iwi/Māori to adapt by changing land use. In addition, NZ ETS changes can disproportionately affect iwi/Māori by changing the value of land returned under past Treaty settlements and of land that could be returned in future settlements. How the NZ ETS evolves to address future challenges must account for the specific barriers to participation and the historical circumstances of land owned by iwi/Māori and options should be developed in partnership with iwi/Māori.

Market governance reforms

The lack of a framework for market governance risks serious misconduct damaging the credibility and integrity of the scheme. The review of the NZ ETS in 2015 found that existing rules do not ensure market integrity, efficiency and confidence, and fail to address potential misconduct.[75] On 27 May 2025 the Government announced it would strengthen the NZ ETS market governance requirements to provide greater transparency over NZU trading and to prohibit price manipulation and misleading conduct.[76] Moving to implement these reforms as soon as possible is essential to mitigate these risks.

Areas for attention

- Begin now to consider how the NZ ETS needs to evolve to be fit for purpose in the 2030s and beyond. Supporting market confidence means a careful evolution of the scheme, clearly identifying problems without making hasty amendments. Beginning this process soon means there will be time to consult widely and provide clear signals about the Government's process, before changes would need to be in place.
- Consider how emissions leakage risk can best be managed while aligning with emissions goals. This could include:
  - reviewing the phase-out rates and/or eligibility for industrial free allocation
  - looking at alternative approaches to industrial free allocation.
- Provide more clarity on how the NZ ETS cap will be managed over time.
- Continue to make decisions on a predictable basis about how NZ ETS unit limits and price controls will be aligned with emissions goals.

Chapter 5

Whakahekenga rehukino

This chapter assesses the progress, risks and further opportunities in emissions reduction actions centred on iwi/Māori.

The chapter also looks at the impacts of emissions reduction actions on iwi/Māori and on the Crown–Māori relationship, as required in the Climate Change Response Act 2002 (the Act).

Section 5ZG(3)(c) of the Act requires the Government to include in its emissions reduction plans a strategy to mitigate the impacts that emissions reductions will have on iwi and Māori (section 5ZG(3)(c)). In its monitoring role, He Pou a Rangi Climate Change Commission (the Commission) assesses the adequacy of the Government's plan. The Commission is also required under section 5M(f) to consider the Crown–Māori relationship, te ao Māori, and specific effects on iwi and Māori in our work.

Iwi/Māori play an important role in emissions reduction in Aotearoa New Zealand. They provide leadership in reducing emissions in communities and sectors across Aotearoa New Zealand.

This chapter highlights progress, as well as risks and further opportunities, in the area of partnership, in mātauranga Māori as a foundation for climate action, and in support of the Crown's obligations under Te Tiriti o Waitangi/The Treaty of Waitangi. It also looks at what can get in the way of effective action by iwi/Māori, and how Government action to reduce emissions can be adjusted to mitigate impacts.

Key points

These are key areas for attention for emissions reduction centred on iwi/Māori and for the Crown–Māori relationship:

- Our analysis and engagement found many examples of iwi/Māori taking steps to reduce emissions.
- The key mechanism through which the Government looks to build a climate response partnership with iwi/Māori – the Māori climate platform – is inadequately funded and it is uncertain it will continue beyond June 2026.
- There are opportunities to support hapū-led inclusion of mātauranga Māori in climate action.
- Access to capital and constraints on developing and managing Māori land remain a barrier to Māori contributing fully to the market-led transition to a low emissions economy.
- There is a risk the Government's measures to address energy hardship will not address the specific circumstances for Māori households.

Context

Iwi/Māori play an important role in climate action

Since the Commission was established, we have consistently heard that iwi/Māori are leaders in climate change.[77] We have heard about the important role iwi/Māori have played in helping communities respond to climate change events – Cyclone Gabrielle and the Auckland Anniversary weekend floods being prominent examples of this.

Equally important is the less visible leadership that iwi/Māori provide in reducing emissions in communities and sectors across Aotearoa New Zealand. Although faced with the same market pressures as non-Māori, as well as unique challenges (covered in more detail in the 'Barriers and impacts' section of this chapter), we have heard many iwi/Māori are focusing on emissions reductions in their asset management and future planning, in alignment with an intergenerational perspective.[78]

We have also heard about the need to resource iwi/Māori climate leadership in line with iwi/Māori priorities and aspirations, and the prominent role mātauranga Māori can play in reducing emissions within hapori and across sectors. In our second emissions reduction plan advice we said that through partnership, the Government and iwi/Māori can accelerate the transition to lower emissions and collectively build climate-resilient communities. The benefits of ensuring that emissions reduction leadership is accelerated will be felt by Aotearoa New Zealand as a whole.

Our approach

We acknowledge the diversity of needs and aspirations amongst iwi/Māori in relation to emissions reduction, and the complexity in considering different perspectives. In our 2024 emissions reduction monitoring report, we signalled we would take a consistent approach to our analysis and build a greater level of detail and focus over time. To achieve these objectives, this year we combined a foundation of guiding principles with diverse insights shared with us through engagement and in discussion kanohi ki te kanohi in Te Taitokerau.

Guiding principles

As we stated in our 2024 monitoring report, this emissions reduction advice is guided by the principles of te ao Māori, ki tua, taiao ora, and mātauranga ake. The philosophy and knowledge system of te ao Māori underpins the intersectional approach to our analysis. The other principles are central to our work at the Commission and are reflected in how we engage: ki tua, ensuring te taiao remains thriving for generations to come; taiao ora, the collective belief that tangata and taiao are inextricable and connected; and mātauranga ake, recognition of iwi, hapū and whānau knowledge systems and practices.

Engagement

This year, our approach evolved to include engagement with a broad range of stakeholders who shared their time and whakaaro with us, covering representatives from a Māori-led climate action organisation, a Māori trust, Te Tumu Paeroa, and members of a Māori research strategy and partnerships team engaged in agricultural emissions reduction. Through the engagement process, we heard concerns about the future of the Māori climate platform and the lack of a plan to support Māori-led climate action, opportunities for hapū-led integration of mātauranga Māori into climate action, the impacts of Māori underrepresentation in science, and barriers and difficulties

accessing capital to develop whenua Māori. The perspectives and insights shared with us through the engagement process helped inform the direction of this analysis.

Te Taitokerau case study

Earlier this year, Commission staff visited Te Taitokerau to listen and learn about climate related-risks and local responses around the region. We were privileged to see firsthand, many examples of iwi/Māori making steps to prepare for a changing climate, while working to reduce emissions. This included rūnanga farming operations in Kaitaia, and community-led projects across the region.

Being on the ground, kanohi ki te kanohi, brought home the value and challenges of iwi/Māori climate action, as well as the significant opportunities for further action at hapori level and in wider networks.

In the future

We will continue building our approach by working with Māori to develop mātauranga-informed place-based indicators. Through engagement we heard support for including case studies and we will explore that option for future emissions reports. Improving detail and focus over time will ensure we continue to meet our obligations to iwi/Māori.

Box 5.1: Māori business and the economy

The Māori economy refers to the contribution of Māori-owned businesses, collective entities and self-employed Māori to the broader Aotearoa New Zealand economy. As of 2023, this contribution is estimated to be 8.9% and the iwi/Māori commercial asset base is valued at NZ$126 billion.[79] Māori businesses and collective entities contribute to all sectors of the Aotearoa New Zealand economy, and their contribution and emissions reduction efforts have been discussed in relevant sections throughout this report.

Many iwi/Māori businesses bring an ao Māori perspective into their decisions and are making investment decisions in alignment with their obligations to future generations and kaitiaki duties. These aspirations are balanced with the imperative to be profitable. At the same time, many iwi/Māori businesses face unique and more prevalent barriers and constraints in the external business environment, that may hamper their ability to undertake emissions reduction action.

Iwi/Māori businesses and collective entities are significant participants in the primary sector and other emissions-intensive sectors, including transport. This means the Māori economy may be disproportionately affected by emissions reductions and policies may be needed to address the unique barriers discussed in this report. There is no current published emissions profile for the Māori economy. In previous advice, we stated that iwi/Māori should also be supported to quantify their emissions profile, to understand their contribution to the national emissions profile. Without a full account of the iwi/Māori contribution to our national emissions profile, it is difficult to design equitable policy.

Partnership

Partnership between the Crown and iwi/Māori is an opportunity for the diversity of iwi/Māori insights and priorities to shape inclusive climate policies and create climate-resilient communities. It provides the opportunity to accelerate the shift to a low emissions economy, for the benefit of all in Aotearoa New Zealand. Funding is an important element of supporting Māori-led action, building trust, and demonstrating Government commitment to developing partnership with iwi/Māori in emissions reduction.

Māori climate platform

Our earlier advice has included recommending the Government develop partnership with iwi/Māori in the climate response.[80] The Māori climate platform is the key mechanism through which the Government looks to build such partnerships. Progress on work to deliver the platform on time is rated 'green' (meaning on track) in Government reporting;[xvii] more detail on progress on the Māori climate platform is in our Technical Annex.

Both mitigation and adaptation actions require increased funding. A 2024 project to improve flood resilience of 35 marae in Te Taitokerau will cost an estimated NZ$630,000,[81] while recent geospatial analysis of 869 marae nationwide found that approximately a third are at risk from flood-events.[82]

Through engagement we heard concerns that the Māori climate platform is not adequately resourced to effectively support iwi/Māori emissions reduction efforts, and we note that Budget 2025 reduces funding allocated for the Māori climate platform for 2022–2026 by NZ$5 million. The remaining NZ$10.2 million of funding finishes in June 2026.[83,xviii] The ability of the platform to achieve its objectives could be increased by an extended timeframe enabling more effective administration of the allocated fund, noting only NZ$3.8 million has been spent since 2022[84] and just one pilot project has been completed.[85] Slow delivery of the platform, inadequate current funding, and the lack of any signalled funding post June 2026 have reduced the ability of iwi/Māori to contribute to emissions reduction; this introduces risks the Government's commitment to partner with iwi/Māori in climate action will not be seen as genuine.

Strategic partnership through the transition

The Government does not have a specific lever to achieve strategic partnership with iwi/Māori through the transition as the equitable transition strategy was removed during the amendment of the first emissions reduction plan. This introduces risks to the adequacy of the Government's ability to support partnership with iwi/Māori in emissions reductions and address impacts of the transition to a low-emissions future.

xvii Provided by the interagency Climate Change Chief Executives Board (IEB) to the Commission 1 April 2025.

xviii Note: this funding change occurred after 1 April so does not contribute to the formal assessment in this report. However, it is important to acknowledge as spending of this fund has been slow, leaving a large unspent portion in 2025–26 even after the Budget 2025 NZ$5 million reduction.

Service delivery and implementation

Partnering with iwi/Māori on service delivery and implementation is an opportunity for the Government to deliver services while reducing the impacts of emissions reductions on Māori, such as energy hardship. One example of this is Te Whatu Ora Health New Zealand partnering with the National Hauora Coalition (NHC) to deliver the AWHI Healthy Homes service in South Auckland and the Waikato.[86] NHC is the largest Māori-led Primary Health Organisation and engages kaiwhakamana and kaiwhakatere to visit whānau and identify improvements to create warm, dry and healthy homes. Initiatives such as this that recognise cultural diversity and the social determinants of heath can promote equitable health outcomes.[87]

Other mechanisms

It is positive that the Government is using other mechanisms in addition to the Māori climate platform to resource iwi/Māori climate initiatives, such as funding for Māori-led regional infrastructure projects through the Regional Infrastructure fund.[88] There are benefits to ensuring multiple mechanisms which accelerate emissions reductions, and we encourage Government to continue this approach alongside an appropriately resourced Māori climate platform. As we have previously advised regarding the NZ ETS, having a multifaceted approach helps reduce the risk that comes from having a singular mechanism. Sustained, adequate resourcing will support ongoing iwi/Māori climate initiatives and strengthen the Crown–Māori relationship.

Mātauranga Māori

Recognising the importance of mātauranga Māori in the climate response is a way of upholding Te Tiriti/The Treaty and the Crown–Māori relationship. Enhancing collaboration across knowledge systems can lead to more inclusive and effective solutions to challenges like climate change. As recognised in the principle of mātauranga ake, the localised wealth of knowledge within mātauranga Māori offers a pathway to climate change mitigation and adaptation that benefits everyone in Aotearoa New Zealand.

Vision Mātauranga policy and capability fund

The Ministry of Business, Innovation and Employment's (MBIE) Vision Mātauranga policy and Vision Mātauranga capability fund, created in 2013, were identified in the Government's first emissions reduction plan as levers for embedding Te Tiriti o Waitangi/The Treaty of Waitangi, mātauranga Māori, and Māori aspirations in the research, science, and innovation system. Up to NZ$2 million per year over 2 years is available for projects through the fund.[89]

Government reporting[xix] states that beyond 2025, the Vision Mātauranga policy is "anticipated to continue", and the fund "may continue", but neither can be confirmed with certainty due to the science reform process. This uncertainty poses significant risks to Government recognition of the importance of mātauranga Māori. If Vision Mātauranga funding continues beyond 2025 it needs to be at a level adequate to deliver on the goals and objectives that have been set for it by Government, and if the fund is discontinued an alternative plan is required to ensure locally led and centrally supported consideration of mātauranga Māori in emissions reduction.

xix Provided by the interagency Climate Change Chief Executives Board (IEB) to the Commission on 1 April 2025.

Consolidation of Crown research institutes into public research organisations

In our previous advice we focused on the localised nature of mātauranga Māori, and the need to work in partnership with iwi/Māori at a local level to ensure mātauranga Māori is woven into climate change related work in a sustainable and appropriate way. We encourage Government to consider how the consolidation of Crown research institutes into public research organisations will incorporate mātauranga Māori in a way that is aligned with the knowledge and priorities of iwi/Māori at a hapori level. In consolidating the science sector there should also be a specific focus on ensuring that the valuable relationships between the various Crown research institutes and iwi/Māori partners are retained through these changes. The continued role of the Crown–Māori relationship and the place of mātauranga Māori within the sector and government should remain a key focus to support emissions reduction and broader climate change work.

Further opportunities

We encourage the Government to continue to look for opportunities to follow the lead of iwi/Māori in incorporating mātauranga Māori into the climate response. We advise Government to work alongside iwi/Māori partners and in consultation with hapū on the appropriate role of mātauranga Māori in the science system reform process, public research institutes, and across policy design and implementation beyond the science sector. Through engagement we heard of opportunities for broader integration of mātauranga Māori within central and local government relationships with local hapū in environmental management, and that supporting the incorporation of mātauranga Māori into climate action, particularly in agricultural emissions mitigation, can also encourage rangatahi into farming, providing additional benefits to rural communities.

Barriers and impacts

Some specific risks and opportunities identified as part of our monitoring work this year are discussed below. The Technical Annex provides more detail and references to current and previous advice on specific barriers and impacts for Māori in the areas of transport, outcomes for Māori households and the Māori workforce, access to capital, and characteristics of whenua Māori.

Historical context

Historical injustices have resulted in contemporary poorer outcomes for Māori in health, education, employment, household wealth and from land use, thereby contributing to specific barriers and impacts for iwi/Māori in climate action. Understanding this historical context and the resulting contemporary circumstances is needed to avoid current policies compounding these factors.[90]

Risks and opportunities: energy hardship

In *Chapter 6: Impacts and benefits* we highlight the elevated risk of household energy hardship due to high electricity prices stemming from long-standing energy supply and competition issues and the risks associated with current policies to mitigate impacts in this area.

The Government's second emissions reduction plan acknowledges that Māori are over-represented in low-income households, more affected by emissions pricing in energy costs, and less likely to be able to adapt by purchasing low-emissions alternatives. The Government's analysis uses a household consumption measure which indicates "Māori households are expected to be more affected than non-Māori households, but the difference is 'very small'."[91] There is a risk this analysis underrepresents the full impact of energy hardship on Māori. MBIE's 2022 reporting indicates Māori and Pacific peoples are between two to three times more likely than the general population to experience measures of energy hardship.[92]

Energy hardship can be addressed through action to boost renewable electricity supply, deploy new technologies to enhance system flexibility, and improve housing quality to lift energy efficiency, while continuing to transition away from fossil fuels.

Projects under the Māori Housing Renewable Energy Fund (MHREF) help address energy hardship for Māori, and in 2022 the Community Renewable Energy Fund (CREF) was created to build upon the success of the MHREF. New projects are expected to be selected and implemented in 2025, but the future of the CREF is uncertain.[93]

Without analysis that considers the broader drivers of energy hardship, including housing characteristics, health, geography and available infrastructure, there remains a risk that the specific circumstances of Māori are not considered and addressed by current policies.

Risks and opportunities: access to capital

The Government has indicated it expects the private sector to lead the low-emissions transition. This approach increases the importance of considering existing market barriers that may hinder an effective market response.

Māori small to medium enterprises have well-documented barriers accessing capital as discussed in *Chapter 3: Enabling systems*. There is an opportunity for government action to address these barriers to enable full participation by the Māori economy in the low-emissions transition, for the benefit of all New Zealanders.

Te reo Māori glossary

Kupu Māori
English contextual translation

hapori (Māori)
(Māori) communities

hapū
kinship group comprised of whānau who share a common ancestry

iwi
extended kinship group of whānau and hapū who share a common ancestry and are associated with a distinct territory

kaitiaki
guard, custodian, guardian, caregiver, keeper, steward

kaiwhakamana & kaiwhakatere
community support workers/navigators

kanohi ki te kanohi
face to face, in person

marae
the open area in front of the wharenui, where formal greetings and discussions take place; often used to include the complex of buildings around the marae

mātauranga Māori
Māori knowledge, the body of knowledge originating from Māori ancestors, including the Māori world view and perspectives

rangatahi
young people, youth

rūnanga
iwi authority or board

te ao Māori
the Māori world – a philosophy and knowledge system

te taiao
the world, Earth, the natural world, the environment

Te Taitokerau
Northland region

te tangata
the people

whakaaro
thoughts, plans and ideas

whakahekenga rehukino
emissions reduction

Chapter 6

Impacts and benefits

This chapter looks at the Government's progress in managing the effects of action to reduce greenhouse gas emissions across Aotearoa New Zealand.

Actions to meet climate goals can have wider benefits, such as reducing living costs or providing health co-benefits from reduced air pollution. The transition to a low-emissions country will also have some negative impacts on people, and these may not be evenly spread across groups, regions or sectors of the economy.

Managing the benefits and impacts of action to reduce emissions, and how those benefits and impacts are spread across different groups, is important to support effective policy and foster public support for that action.

The Climate Change Response Act 2002 (the Act) requires the Government to have a strategy in its emissions reduction plan to mitigate impacts[xx] and the Commission's monitoring work includes assessing the adequacy and progress of this strategy.[xxi]

This chapter sets out our assessment of the Government's plans and policies around mitigating impacts and realising the wider benefits of emissions reduction, with a focus on barriers, opportunities and risks.[xxii]

Key points

- Across its first and second emissions reduction plans, the Government has identified a range of potential positive and negative impacts for the economy, low-income households, agriculture, iwi/Māori and health.
- There are some policies in place to address negative impacts. These include cost-of-living support, home energy upgrades, work on electricity market reform, electricity consumer protections, rental housing standards, limits on afforestation under the New Zealand Emissions Trading Scheme (NZ ETS), and the Ministry of Social Development's (MSD) employment services.

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xx Section 5ZG(3)(c) requires the Government to have a strategy to "mitigate the impacts that reducing emissions and increasing removals will have on employees and employers, regions, iwi and Māori, and wider communities, including the funding for any mitigation action".

xxi The Commission also has broader obligations to consider costs, benefits and existing circumstances, where relevant (Climate Change Response Act 2002, section 5M).

xxii Our monitoring reports may focus on new areas over time to reflect the current risks and the latest evidence.

- Recent high energy prices – due to long-standing supply and competition issues, including insufficient investment in new generation and declining gas supply – emphasise the importance of managing energy affordability and reliability of supply. The Government provided additional cost-of-living support in Budget 2024, but risk of energy hardship for households remains.
- Action on those underlying issues would improve household and business access to affordable, reliable energy while also reducing the country's emissions. This requires action to boost renewable electricity supply, deploy new technologies to enhance system flexibility, and improve housing quality to lift energy efficiency, while continuing to transition away from fossil fuels.
- Collecting better data on energy hardship and building quality would support policy development.
- There are opportunities for further benefits from faster climate action in transport and electrification, including up to NZ$1.1 billion per year by 2035 in additional health gains related to air quality.
- The Government's impact strategy does not address access to reliable and affordable transport across the population or include proactive transition planning for regions, sectors and groups.
- Stronger policy coordination on the impacts of land-use change could deliver economic, social and environmental benefits and a stronger base for climate action by business and rural communities.
- Prioritising reducing gross emissions across all sectors, to limit reliance on removals through forests, would also help manage trade-offs associated with land-use change.

Mitigating impacts supports effective policy

Public support for action to reduce emissions – often described as social licence for the change required – relies on the impacts of the transition to a low emissions economy being well managed.[xxiii,94]

When the impact of reducing emissions is high, that can act as a barrier to people taking up lower-emissions options. Action to enable access for all groups to more affordable, lower-emissions alternatives can reduce the impacts of policies and reduce emissions, and help address issues of fairness across all sectors, regions and groups.

Equally, the benefits of climate policy, such as more reliable energy supply or reduced air pollution, affects the readiness of people to make changes to reduce emissions.

Key elements of an effective approach to manage the effects of reducing emissions are:

- having a robust assessment of the distribution of impacts and benefits in emissions reduction plans
- providing clear planning and signalling including at regional and industry level, so that economic sectors, employees, households and communities can manage the change
- encouraging benefits and managing negative impacts of emissions reduction

xxiii The International Panel on Climate Change (IPCC) notes 'Equity, inclusion and just transitions at all scales enable deeper societal ambitions for accelerated mitigation, and climate action more broadly'.

- funding an equitable transition strategy
- partnering with iwi/Māori
- considering, including in policy design, communities whose circumstances mean they risk facing negative impacts from climate policy.[95]

Specific impacts and barriers of concern in the Aotearoa New Zealand context are:

- air pollution from transport
- energy poverty risks
- high capital costs and split incentives in transport and housing
- future workforce needs
- retraining for workers in high-emitting sectors
- the recognised mental health effects of climate change, particularly for youth, and the benefits of enabling community action with a focus on young people
- supporting Māori to continue positive relationships with whenua and taonga species.[96]

Progress to date

In December 2024 the Government released its second emissions reduction plan. Modelling and analysis in the plan identified a broad range of impacts – positive and negative – associated with proposed actions. The impacts identified there are set out below. They provide insights into how to target further policy action to reduce costs and maximise benefits.

- The economy is modelled to continue to grow with the emissions policies in the plan, with gross domestic product (GDP) expected to be 0.4% lower in 2050 than it would be without any emissions reduction measures.
- Annual household costs are expected to increase due to the NZ ETS. The average cost of the NZ ETS would be NZ$705 in 2030, compared to an estimated average of NZ$585 without the actions set out in the plan.
- The NZ ETS will expose low-income households more to negative impacts from higher power and petrol prices, with flow-on impacts for the health system. These households spend a higher share of disposable income on energy and are less able to adapt by taking up low-emissions technology.
- The agricultural sector could grow more slowly with emissions pricing introduced from 2030, although new technology could help offset this impact. Food manufacturing is also expected to grow more slowly.
- The forestry sector will grow faster with action on emissions. Land-use change from agriculture to forestry may increase or decrease employment overall, but forestry employment is more likely to be in main centres and there is a risk of migration away from rural communities.
- There are a range of specific impacts for iwi/Māori. This includes slightly larger negative impacts from emissions pricing than for non-Māori households, and greater risk from economic transitions. Particular interests in agriculture and forestry could also result in a range of impacts for iwi/Māori.
- Electrification of transport will have large benefits for air quality.
- Faster consenting reduces energy costs long term.
- Carbon capture utilisation and storage may create jobs and increase fossil gas production.

Areas the Government has not assessed the impact of include regional variation in energy affordability; the impacts of declining gas reserves for households that cannot easily switch away from fossil gas; and the benefits of active travel for congestion and health.[xxiv]

xxiv Note congestion and health benefits are mentioned in the Government's analysis, but in relation to other areas of transport, rather than active travel specifically.

There are some policies in place to mitigate impacts

Current policies, including some introduced in the second emissions reduction plan, that could help mitigate impacts include:

- the package of cost-of-living tax and welfare measures announced in Budget 2024
- Warmer Kiwi Homes, the Healthy Homes Initiative, Healthy Homes Standards, and the Kāinga Ora Retrofit programme
- the Consumer Care Obligations for electricity retailers[97]
- new mandatory reporting by electricity retailers on disconnections by households on pre-pay plans[98]
- proposed limits on NZ ETS forestry registrations for some land-use capability classes, with the intention of "protecting food production for farmers while providing NZ ETS certainty for foresters"[99]
- ongoing Ministry of Social Development employment services and the apprenticeship boost scheme
- the current review of electricity market performance may lead to further Government action to address energy security and affordability.

Other policies that could have helped to mitigate impacts have been discontinued or changed since our 2024 monitoring report for emissions reduction, including:

- equitable transition planning, including in regions, for industries, and in partnership with iwi/Māori
- supporting access to low-emissions transport for low-income households
- reporting of energy poverty indicators
- increases to public transport fares.

Further details on policy changes are available in the Technical Annex on our website.

Gaps, risks and opportunities

This section covers key areas where our analysis shows that attention to managing impacts will address the risk of harm, achieve additional benefits, or support effective policy action to reduce emissions.

This covers issues relating to electricity supply and energy prices, access to transport, and a gap in transition planning for land-use change.

Energy system – gaps and opportunities for action

The energy system has long-standing supply and competition issues, including insufficient investment in new generation and steadily declining gas supply. These affect the affordability and reliability of energy for businesses and households. Further action by the Government at a system level would improve business and household access to affordable, reliable energy, while also reducing the country's emissions.

The contribution of the energy system to emissions reduction is set out in *Chapter 7: Energy, industry and buildings*.

Relevant recent energy developments

Energy prices

Recent high energy prices emphasise the importance of managing energy affordability and reliability of supply. Previous analysis conducted in 2023 highlights the risk of significant economic costs during energy shortages (indicatively estimated at 0.1 to 1.9% of GDP), as well as reduced ability to attract foreign direct investment.[100] Reduced business confidence in the energy system may reduce investment in electrifying production, leading to slower emissions reduction. We note these key developments.

- Wholesale power prices rose over the past few years, peaking at record levels last winter. A dry year for hydroelectricity combined with lower-than-expected gas availability has exacerbated long-term underinvestment in new generation capacity.
- There is an ongoing risk of high winter energy costs in 2025.[101] Recent updates by the Commerce Commission to regulated electricity transmission and distribution charges are also expected to increase bills.[102]
- While households are insulated from short-term, wholesale electricity price volatility, sustained, high, wholesale prices are eventually reflected in retail prices. General cost inflation has pushed up household energy bills since 2020 and likely worsened levels of energy hardship, although we do not have good data on energy hardship over time.[xxv]
- A Consumer NZ survey published in August 2024 found that in the last year over 360,000 households had difficulty paying their power bill. The Consumer Care Obligations for electricity retailers will become mandatory from 2025, which may mitigate some impacts by limiting disconnections.
- Research shows a higher proportion of low-income households, disabled people, and Māori and Pacific households experience energy hardship, which contributes to a higher respiratory health burden for Māori and Pacific peoples.[103]
- Recent pulp and paper mill closures could be a sign of economic impacts from high energy prices, although these may also have other causes.[104]

Ensuring a reliable, affordable, low-emissions electricity supply

More action is required to address high energy prices. Effective management of this issue during the electrification of the economy provides an opportunity to develop Aotearoa New Zealand's energy system and buildings to reduce emissions, while also providing cheap, reliable power and warm, healthy homes.

Work is underway to develop a policy response, including the review of electricity market performance, expected to be completed in June 2025.[105]

There is opportunity for the Government to address this issue using levers across the energy, climate, housing and welfare systems so trade-offs and joint benefits between objectives are considered.

Opportunity for cost savings from faster electrification

There is an opportunity to reduce costs to households and businesses through faster action to shift energy use for transport and heating to electricity. This would usefully be considered for emissions budget decisions.

Electrification of transport and heating can lead to considerable operational cost savings over the lifetime of an asset. For example, a recent assessment by Rewiring Aotearoa found 84% of fossil fuel machines (such as cars, heaters, lawnmowers, motorbikes, ovens and stoves) in Aotearoa New Zealand could be replaced now with mainstream, electric alternatives and save money over their lifetime, accounting for the upfront cost difference and financing.[106]

However, individuals and businesses do not always take these lifetime savings into account, and current rates of change are not realising the potential economic benefits of electrification.[107]

xxv The Ministry of Business, Innovation and Employment stopped its reporting of energy affordability measures in 2024 and there is no agreed threshold constituting energy poverty on these measures.

Addressing household energy impacts

Risks remain in the Government's approach to household energy impacts

The Government has indicated it intends to use the tax and welfare system to address the impact of rising energy costs, including for lower-income households. This includes the one-off adjustment to income tax bands made in Budget 2024 as well as existing annual adjustments of main benefits for inflation, and the existing Winter Energy Payment.

These policies will help compensate for increases in energy costs to households due to energy market issues and the NZ ETS. Government analysis for the second emissions reduction plan indicates adjustment of welfare payments compensates for around half of increasing costs from emissions pricing. Income tax brackets are not adjusted for inflation so this would require further adjustments to remain in line with future energy price changes. The Government could reduce the need for such adjustments, and associated fiscal pressure, through faster action on the drivers of high energy prices.

Many households still face significant barriers

Variation and barriers at the household level mean that tax and welfare measures are not sufficient to mitigate the impacts of energy hardship on low-income households or enable them to address their energy hardship in a cost-effective or durable way. This can have flow-on costs of energy hardship for the health system and economic productivity.

Households will face different levels of pressure from rising energy prices due to variation in household circumstances which tax and welfare relief cannot fully address, including due to regional variation in power prices.[xxvi,108] Households in rental accommodation may not be able to access the most cost-effective ways to alleviate energy hardship and make their home healthier, such as repairing gaps in walls, and installing insulation or heat pumps.

There are risks of high costs for households using fossil gas for heating and cooking from faster-than-expected declining gas reserves if they are not supported to switch to electricity, because the costs of the gas distribution network would be shared over a shrinking customer base.[109] Low-income households and tenants face greater barriers to switching to electricity.

Opportunity to reduce impacts by upgrading housing stock

Action to upgrade the housing stock could reduce the combined impacts of energy system challenges and emissions reduction policies. Upgrading homes so they are easier to heat (and cool) helps manage demands on the electricity system and protect households from high energy costs and poor health.

The Healthy Homes Initiative and Warmer Kiwi Homes are important policies to raise the quality of housing stock. Assessment of these initiatives shows extremely high benefit to cost ratios (between four and five to one) and rapid returns on investment. Fiscal savings for the health sector exceed the cost of the Healthy Homes Initiative within one year and there are broader social benefits including a 5% reduction in school absences.[110]

The Healthy Homes Standards for rental homes began rolling out in 2022 and became mandatory for all rentals from 2025. Although 2024 survey data by the Ministry of Housing and Urban Development (MHUD) show improvements in some measures since 2022, 44% of renters still reported issues with damp or mould and 42% struggled to keep their home warm in winter.[111] There are differences in the quality of properties as reported by renters versus landlords in MHUD surveys, suggesting better data is needed to inform policy.

xxvi Consumer NZ found that households in rural areas could pay up to 46% more per kWh than the cheapest urban areas.

The Green Building Council highlights significant further potential benefits from improving building stock, with a proposal for deeper retrofits of 200,000 low-performing homes.[112]

Recent research also highlights increasing risk of summer indoor overheating in Aotearoa New Zealand homes with climate warming, and disparity in access to affordable home cooling solutions.[113]

Better data are needed on building performance and energy hardship

Government policy development and understanding of progress would be assisted by more effective monitoring of the energy performance of buildings and energy hardship. Important areas to focus on include:

- regular reporting on energy hardship
- a defined threshold for energy hardship
- requirement for building energy performance certificates.

Energy performance certificates estimate a building's energy use for heating, cooling and lighting. As well as allowing monitoring of housing stock quality, this information would improve transparency on running costs for renters and home buyers, and improve expected returns for landlords and homeowners from investing in energy efficiency.

Transport – gaps and opportunities for action

There are market barriers in the transport system that limit the effectiveness of the NZ ETS at reducing transport emissions. At the same time, there are benefits from reducing transport emissions that, if accounted for, would reduce the overall cost to society of action to reduce greenhouse gases.

For example, public transport or active travel networks allow people to avoid higher fuel costs of fossil-fuelled vehicles, but do not generally attract investment from the private sector. There is also significant evidence of the benefits for cost reduction, health and safety and reduced congestion seen in cities that are more compact and mixed use, supported by walking, cycling and public transport networks. These benefits are not fully taken into account in the second emissions reduction plan.

Scaling up action on transport could have significant benefits for air quality. The second emissions reduction plan technical annex notes that every tonne of light vehicle transport emissions creates NZ$500–$850 of harm[xxvii] through lower air quality. People will experience this as respiratory illness, which decreases economic productivity and creates costs for the health system. Commission analysis estimates that scaling up action on transport could avoid air quality-related harm by NZ$1.1 billion per year by 2035.[114]

xxvii In real 2021 dollars. Note the Government's analysis describes this impact as a co-benefit for every tonne of CO_2 reduced, rather than harm for every additional tonne of CO_2 released, but these are alternative descriptions of the same effect.

Access to affordable transport is an important gap

When people cannot access reliable, affordable transport they face a significant transport disadvantage. Some groups are particularly at risk of experiencing transport disadvantage, including shift workers, those in more remote communities, and lower-income households, who may not be able to access finance for the upfront cost of more fuel-efficient vehicles.[115]

Māori also face specific impacts and barriers in relation to transport. For example, many Māori live in remote communities, have limited active and public transport options to access places of cultural significance, and face higher rates of transport-related deaths, injuries and accidents.[116]

The second emissions reduction plan has not put forward any new government policies aimed at mitigating transport disadvantage. Research also shows that recent efforts to increase the private share of public transport revenues could reduce access to affordable transport for people on lower incomes.[xxviii,117]

Planning for the transition

Supporting transition planning by sectors, regions and groups at risk of harm can help identify and mitigate impacts, manage equity concerns, ensure skills are available for transition, and contribute to social licence. There is an opportunity for the Government to integrate low-emissions planning and criteria within regional infrastructure investments, and within the proposed adaptation framework.

Future impacts of forestry and land-use change on rural communities remain uncertain

There is need for more clarity and stronger policy coordination around emissions reduction and land-use change (particularly around forestry), to mitigate impacts on the groups affected. This would support the delivery of economic, social and environmental benefits, and provide a strong base for climate action by business and communities.

Acting to reduce emissions across the economy would build resilience and reduce long-term costs. Reliance on forests for a large share of emissions reduction could increase the long-term cost of meeting the 2050 target and could increase impacts on future generations.[xxix,118] A greater focus on reducing gross emissions would help manage these impacts and the environmental, social and economic trade-offs involved in converting land to forests.[xxx]

xxviii For example, a study of the impact of the COVID-19 half-price public transport initiative found it increased public housing residents' access to transport more than for other people.

xxix For example, the Parliamentary Commissioner for the Environment has highlighted the economic, social and environmental risks from the extent of land-use change to exotic forestry driven by the NZ ETS, and argues that more deliberate, enduring policy is needed to support a more diversified forestry estate.

xxx The Government's ERP2 path shows an additional 800,000 hectares of exotic forests, 700,000 fewer hectares of sheep and beef land, and 100,000 fewer hectares of dairy land by 2070, compared to Commission analysis focused on achieving higher reductions in gross emissions (based on Commission analysis to support our advice on the fourth emissions budget).

In response to concerns about planting forestry on productive farmland and potential impacts on rural livelihoods, the Government is proposing to limit new NZ ETS forestry registrations for some land-use capability classes. There was insufficient detail about the policy available at the time of our analysis to allow us to assess its potential impacts, including whether it will account for the underlying concerns of the different groups affected by land-use change, including specific effects on iwi/Māori. An effective policy process that includes consultation would allow Government and affected groups to consider impacts and trade-offs.

There is an opportunity for stronger policy coordination by the Government in this area across the diverse range of pressures on land use. This includes greater focus on the impacts that market drivers,[xxxi] climate policy and climate change may have on rural employment, sectoral production, land prices, community wellbeing, landscape amenity, water quality and climate resilience.

Areas for attention

- Tax and welfare system measures provide some cost-of-living support to households but risk of energy hardship remains due to other barriers.
- Further work is needed to address the risk to businesses and households of high energy costs. A reliable, low-emissions electricity system and improved housing stock and related data would help to address this.
- Faster action on transport decarbonisation could provide substantial health benefits.
- Faster electrification could reduce costs, provided finance options are available.
- Recent increases in public transport fares contribute to existing barriers to low-emissions travel, including for people on lower incomes and Māori.
- There is a gap in proactive transition planning for sectors, regions and with groups at higher risk of harm.
- Stronger policy coordination by Government on the impacts of land-use change could deliver economic, social and environmental benefits, while providing a strong base for climate action by businesses and rural communities.

xxxi Market drivers include increasing environmental requirements of international food supply chains as discussed in *Chapter 3: Enabling systems*.

Chapter 7

Energy, industry and buildings

This chapter looks at greenhouse gas emissions in four areas: fossil fuel supply, buildings, industry and electricity supply.

Energy and industry emissions in 2023 were 17.6 $MtCO_2e$, which is 23% of the country's gross emissions. This sector is expected to contribute 60% of the net emissions reduction the Government is seeking in the second emissions budget period (2026–2030).

These emissions are generated by burning fuel to produce electricity, manufacture goods, operate mobile equipment, and power buildings. Emissions also result from the production, transmission, and storage of fossil fuels, and from chemical reactions that occur during the production of certain goods, like steel. We also include a section on embodied emissions, particularly as they pertain to buildings. These emissions are associated with the production of materials and construction processes throughout the lifespan of a building, including during construction, renovation, ongoing use and demolition. They result from both domestically produced and imported products.

The emissions that result from those activities can be reduced by improving efficiency, shifting to less emissions-intensive production processes, and switching from fossil fuels to renewable energy sources.

A secure, reliable and affordable supply of electricity is also a critical enabler of electrification, which has a wider role for reducing emissions in other sectors.

This chapter is supported by more detail on energy, industry and buildings emissions in the Technical Annex on our website.

Key points

- Energy and industry emissions reduced by 4% (0.8 $MtCO_2e$) in 2023 compared to 2022, on top of a 12% (2.4 $MtCO_2e$) reduction in 2021. This continues the downward trend observed since the mid-2000s, when emissions peaked, as well as reflecting the influence of short-term factors such as industrial production changes and year-to-year fluctuations in hydrological conditions (like rainfall) impacting electricity generation.
- Under the umbrella of its Electrify NZ policy, the Government introduced amendments to the Resource Management Act 1991 (RMA) and passed the Fast-Track Approvals Act 2024 (FTAA) to streamline consenting and better enable renewable energy development.

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- In the last 12 months there has been a heightened focus on energy affordability and security of supply. The Government ordered an independent review into the performance of electricity markets and established the Energy Competition Taskforce in response to high wholesale electricity prices during periods in 2024.
- We assess that the risk to achieving reductions in the emissions intensity of industrial production is now moderate in the second emissions budget and significant in the third. This reflects the increasing risk that the New Zealand Emissions Trading Scheme (NZ ETS) will not maintain a sufficient price signal under current settings, as well as a need for greater action to address capital cost barriers to investing in actions or technologies that reduce emissions. The Government's Budget 2025 Investment Boost policy, which introduces a 20% tax deduction on depreciable assets, may help reduce capital barriers, however, it is not targeted at emissions reductions, and firms may still opt for cheaper, higher-emissions equipment.
- Our assessed risk has increased in the last year for realising emissions reductions in the building and industrial sectors through electrification. We find moderate risks for electricity generation and networks and significant risks for building emissions. Energy and capacity risks and affordability issues have become more acute since our 2024 assessment; this is illustrated by decreasing industrial demand, and we note several recent industrial closures are at least in part due to sustained high energy prices.
- The emissions reductions projected from the Kapuni carbon capture and storage project may not be realised. This is a significant risk as it makes up around one third of the emissions reductions from new policies during the second emissions budget outlined in the Government's second emissions reduction plan. We also find plans to reduce emissions in gas networks are insufficient to achieve planned reductions.
- The key areas for attention in this sector are:
  - developing a long-term plan for the energy transition, covering all sectors and energy sources
  - advancing training and development to bolster workforce and skills, with a focus on addressing current and predicted shortages
  - a considered, well-signalled evolution of the NZ ETS structure to drive emissions reductions
  - addressing data and information gaps and developing mechanisms to address barriers relating to capital cost and access to low-interest financing
  - developing a stable and durable planning and consenting regime that enables emissions reductions.
- Key opportunities to reduce emissions further in this sector include accelerating the adoption of distributed flexibility resources such as solar and battery storage, where component costs continue to drop. Our modelling shows it would be feasible to achieve an additional 3.9 $MtCO_2e$ reduction of electricity generation emissions in the third emissions budget, beyond what is shown in the Government's second emissions reduction plan. Greater uptake of technology to reinject emissions at geothermal power plants could also contribute to this.
- There is also opportunity in the growing appetite within industry to switch from fossil gas, driven in part by concerns over gas prices and availability. This could contribute to 2.6 $MtCO_2e$ of further industrial emissions reduction in the third emissions budget. Further phase out of fossil fuels in buildings could contribute an additional 1.1 $MtCO_2e$ in emissions reductions.

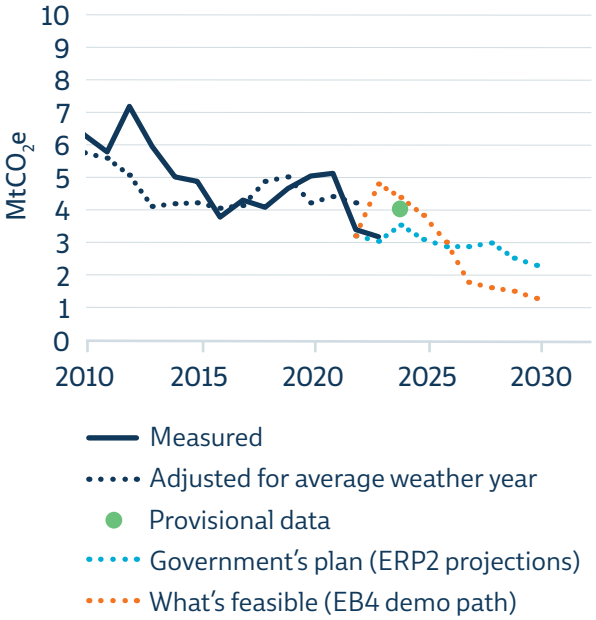
Progress to date

Emission reductions

This section sets out the key shifts in energy and industry emissions. More detailed analysis and figures are available in the Technical Annex published on our website.

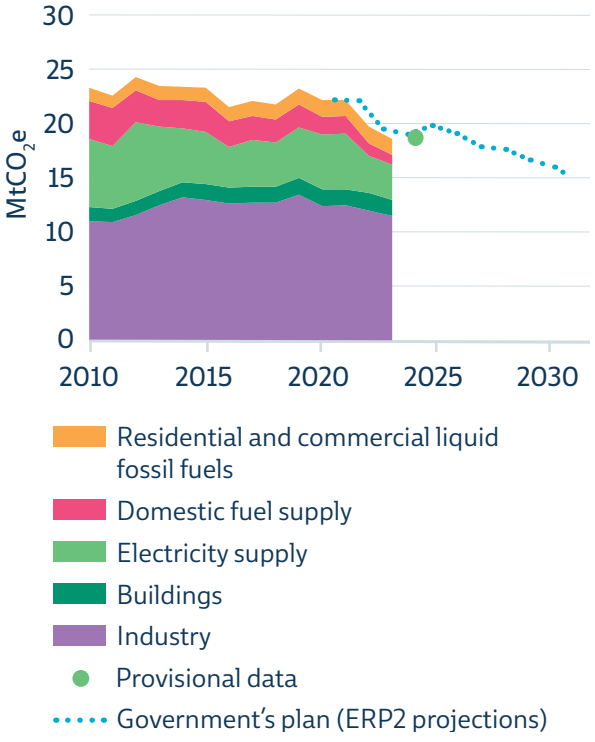
- **Electricity generation emissions reduced by 6%** between 2022 and 2023, following a 33% decrease between 2021 and 2022 (**Figure 7.1**). This was primarily a result of unusually high hydroelectricity generation due to above-average rainfall in 2022 and 2023.
- **Domestic fuel supply emissions fell 23%** between 2022 and 2023, in part due to the March 2022 closure of the Marsden Point oil refinery (**Figure 7.2**).
- **Provisional data from Stats NZ for 2024 show a 0.06 $MtCO_2e$ emissions increase** in energy and industry emissions in 2024 relative to 2023. Falls in manufacturing emissions, largely due to a reduction in industrial production, were counteracted by an increase of almost 1 $MtCO_2e$ in electricity generation emissions (**Figure 7.2**). 2024 was considered a 'dry year' with lower-than-usual hydro inflows. This led to greater use of fossil fuels in electricity generation.

Figure 7.1: Electricity generation emissions



Source: Commission analysis

Figure 7.2: Energy and industry emissions by subsector



Source: Commission analysis

Policy changes

This section sets out policy changes in energy and industry that could increase or decrease emissions.

Changes in the 12 months up to 1 April 2025

- Electrify NZ is the Government's main policy for achieving its goal of doubling renewable electricity generation. It has progressed several initiatives under this policy, including introducing amendments to the RMA and passing the FTAA[119] to streamline consenting and better enable renewable energy development.
- The Government is developing a framework with NZ ETS incentives for carbon capture, utilisation and storage (CCUS). Legislation is expected this year.[120]
- The Government has reduced direct investment in emissions reductions and is now relying more on the NZ ETS to reduce emissions.[121,122]
- Implementation of projects co-funded by the now disestablished Government Investment in Decarbonising Industry (GIDI) fund is well underway. Fonterra's first electrode boiler started operation at the Edendale plant in October 2024, with two more at the same plant expected to become operational in 2027.[123] NZ Steel continues to work on its electric arc furnace project, announcing in 2024 that they plan to bring operation forward to the end of 2025, from 2026. They also expect to reduce emissions by up to 1 $MtCO_2e$ per year, 0.2 $MtCO_2e$ per year more than initially planned.[124]
- A suite of electricity-related initiatives was announced or introduced, including:
  - a review of the performance of electricity markets (report due June 2025)
  - establishing the Energy Competition Taskforce to accelerate the strengthening of wholesale market settings and network regulation, to promote competition and provide more options for energy users. This followed an October 2024 Government Policy Statement to the Electricity Authority (EA), which, among other things, directed them to sufficiently prioritise the settings needed to promote competition and security of supply.
  - the Commerce Commission published final decisions for the default price quality path for electricity distribution businesses (DPP4) and Transpower (RCP4), beginning 1 April 2025.[125]
- Consultation on a proposed regulatory regime for offshore renewable energy was carried out in July 2024, with final regulations expected to be passed in 2025.

Changes since the start of 2022

- Forestry regulations now require the removal of large slash from erosion-prone land, with councils able to impose stricter rules, potentially boosting woody biomass for bioenergy.
- The Government is supporting renewable gases by removing barriers, updating emissions regulations, and revising gas specifications.
- National Direction under the RMA was implemented to support councils in making nationally consistent decisions on greenhouse gases when considering applications.
- Dispatch-based, real-time pricing (RTP) in the wholesale electricity market was implemented in November 2022 and April 2023, making wholesale spot prices more accurate and reflective of real-time market conditions.
- Similarly, changes to the Transmission Pricing Methodology (TPM) took effect in April 2023, which saw a shift to a benefit-based approach to transmission pricing.
- In December 2023, the Electricity Authority's (EA) Market Development Advisory Group released its final recommendations as part of the 'Price discovery in a 100% renewable electricity system' project.

Policy assessment

In this section we use scorecards to assess the adequacy of policy plans in the following outcome areas: fossil fuel supply, buildings, industry, and electricity supply.

Policy scorecard: Reduce emissions in gas networks

Overall assessment	
Insufficient	The overall assessment is that the plan is insufficient. This is due to a lack of policies that can drive sufficient change, address funding and other key barriers, or create clear timeframes for key policy developments. Replacing discontinued tools is essential for progress.

Summary of analysis informing overall assessment	
Main tools **Significant**	The NZ ETS is the main tool, as well as policies to enable the integration of low-emissions gases into the network. The current NZ ETS structure means that it is unlikely to result in decreased gas use or increased use of low-emissions gases on its own. The NZ ETS also does not target other barriers such as the availability of feedstock for low-emissions gases. A gas transition plan would reduce uncertainty and risk for industry and residential consumers.
Funding and finance **Insufficient**	Investment is needed for maintaining the declining gas network, with costs falling on a reducing number of consumers. Absent plans to mobilise private finance mean fuel switching will be limited to those who can afford the upfront cost or higher cost of low-emissions gas.
Other barriers & opportunities **Significant**	Key barriers include uncertainty around gas supply and the long-term viability of the current gas network, including the cost of maintenance. There are also financial and regulatory barriers, including high costs of renewable gases, declining gas demand, and consenting and safety standards for the use of low-emissions gases. There are already successful community energy projects led by iwi/Māori, and several groups have shared with us their aspirations to build independent renewable energy supplies.[126]
Timeline **Insufficient**	There are no plans that set out a clear roadmap for key future policy initiatives.
Change since 2024	This outcome area was not previously assessed. The Government signalling a longer-term role for gas, and rising risks from declining reserves prompted a more detailed Commission assessment.

Policy scorecard: Reduce upstream emissions from oil and gas

Overall assessment	
Significant risks	Current policies are unlikely to deliver emissions reductions at projected levels. CCUS would require urgent implementation to be viable for gas production, but it may already be too late given declining reserves and the uncertain outlook for gas, making investment uneconomic. Repealing the offshore ban could raise emissions by increasing production beyond transition-aligned demand, potentially undermining climate goals.

Summary of analysis informing overall assessment	
Main tools **Significant**	The NZ ETS and CCUS are the key emissions reduction tools. However, current policy settings are unlikely to deliver an NZ ETS price sufficient to drive investment in emissions reduction or make the uptake of CCUS economically viable.[xxxii] Todd Energy has recently stated that CCUS at its Kapuni field is "not viable under the proposed legislative and regulatory framework", highlighting an insufficient NZ ETS price and declining gas reserves.[127] The Government's reversal of the offshore oil and gas ban aims to boost domestic supply, but faces uncertainty, long lead times, and may not attract sufficient investment.
Funding and finance **No significant risks**	The second emissions reduction plan relies on market signals without public funding, assuming businesses will respond to emissions pricing and future gas demand outlooks. However, in Budget 2025, the Government indicated that it may invest in increasing fossil gas supply, though details are limited.[128]
Other barriers & opportunities **Significant**	There is a lack of long-term planning for the energy system (including an optimal path for gas in the transition), which could help to address challenges relating to energy system demand, fuel availability, energy security, and workforce planning. Advances in CCUS technology may be promising; however, there may not be sufficient support for research and development and commercialisation in Aotearoa New Zealand to benefit from these.
Timeline **EB2: Moderate** **EB3: No significant risks**	While the main tools are in place, the delayed Energy Strategy and the need to implement CCUS as soon as possible for it to be viable mean some risks for the second emissions budget. Early implementation is important to ensure there is enough gas left in the field to justify investing in CCUS. Risks for the third emissions budget are lower, assuming policy implementation by 2031.
Change since 2024	This outcome area was not assessed in 2024. An assessment was added due to the Government's new focus in the second emissions reduction plan.

xxxii See Box 5.2 of our November 2024 report, *Advice on Aotearoa New Zealand's fourth emissions budget*.

Policy scorecard: Phase out fossil fuels for operational energy and reduce energy demand in buildings

Overall assessment

Significant risks	The Government is focusing on a market-led approach for new builds and public funding for existing buildings, but key actions from the second emissions reduction plan remain uncertain, and some previous tools have been discontinued. Barriers include limited access to finance, workforce training gaps, poor building data, and inequities, particularly affecting renters and iwi/Māori. Delays in the new NZEECS and regulatory updates risk undermining progress.

Summary of analysis informing overall assessment

Main tools **Significant**	For new builds, the Government has a market-led approach involving reducing consenting times, providing consent exemptions, and information tools such as high performing home designs. For existing buildings, main tools include the State Sector Decarbonisation Fund, and the Warmer Kiwi Homes programme. Notably, the Government is now winding down the State Sector Decarbonisation Fund. The NZ ETS is also a main policy tool. It is unclear if actions from the second emissions reduction plan to reduce energy demand in buildings will be implemented within the budget period. The Government has discontinued main tools from the first emissions reduction plan such as the Building for Climate Change Programme.
Funding and finance **Significant**	For existing buildings, plans rely on contributions from public funding, such as the Warmer Kiwi Homes programme. If households and businesses are unable to privately finance building and appliance upgrades, building upgrades may be limited to those who can afford the upfront cost. For new builds, plans rely on private funding by developers. In new buildings the capital cost of a low-emissions option is not necessarily additional to that of a fossil fuel equivalent.
Other barriers & opportunities **Moderate**	Barriers include workforce access to education, a lack of data on existing buildings, and inequities between renters and landlords. Setting a target for these outcomes would send signals to the market and encourage private investment in energy efficiency. There are specific barriers for iwi/Māori including legislative restraints on whenua Māori and access to capital, underrepresentation in high skill jobs in infrastructure, and higher average implied interest rates for Māori businesses. There are also opportunities for iwi/Māori; for example, investment in renewable generation and the creation of local jobs.

Timeline **Insufficient**	There is no clear timeline for the implementation of the New Zealand Energy Efficiency and Conservation Strategy (NZEECS). Delays in establishing this strategy, as well as delays in the regulatory updates to the Energy Efficiency and Conservation Authority's regulatory regime, are putting delivery at risk.
Change since 2024	The overall risk assessment has changed from moderate to significant risks due to key tools from the first emissions reduction plan being discontinued, uncertainty around new actions, and delay in establishing the latest NZEECS.

Policy scorecard: Reduce emissions intensity of production

Overall assessment	
EB2: Moderate risks **EB3: Significant risks**	Committed GIDI projects are expected to achieve significant emissions reductions in the second emissions budget, extending into the third budget. However, the effectiveness of other key policies remains uncertain. The direction requiring the phase-out of coal boilers by 2037 may not prompt timely conversions for the second or third emissions budgets. Additionally, current NZ ETS settings may not sustain a strong enough long-term price signal to drive substantial emissions reductions.

Summary of analysis informing overall assessment	
Main tools **EB2: No significant risks** **EB3: Significant**	Key policy tools are the NZ ETS, national policy instruments under the RMA requiring the phase-out of coal boilers by 2037, and the GIDI fund. Although discontinued, committed GIDI projects are expected to reduce emissions significantly in the second emissions budget. In its current structure, the NZ ETS is unlikely to maintain a sufficient price signal through the third emissions budget and beyond to drive material reductions in emissions intensity.
Funding and finance **EB2: Moderate** **EB3: Significant**	Regulatory measures such as phasing out coal boilers and the NZ ETS are expected to drive private sector investment. However, these may not be sufficient while barriers like upfront costs and limited access to capital remain unaddressed. This is particularly likely for small to medium enterprises (SMEs). Improving access to low-interest finance could help to address this.
Other barriers & opportunities **Significant**	Workforce shortages, particularly among engineers and electricians, pose a challenge. Information gaps also create barriers: uncertainty about future demand for low-emissions energy sources makes it difficult for supply-side stakeholders to justify investment in new infrastructure. On the demand side, underdeveloped supply chains and limited data on energy options and pricing can hinder decarbonisation. The Government's Woody Bioenergy Taskforce aims to address some of these issues. Additionally, research and development support may be insufficient for industries with hard-to-abate emissions.
Timeline **EB2: Moderate** **EB3: No significant risks**	Main policies, including the NZ ETS and RMA national direction, are in place. However, some of the supporting policies and actions, including the energy strategy, electricity market actions, and Woody Bioenergy Taskforce, are ongoing or delayed, posing moderate risks for the second emissions budget.
Change since 2024	The assessed risk has risen due to the increasing risk that the NZ ETS will not maintain a strong enough price signal under current settings, funding and finance challenges, and timeline risks for supporting policies.

Policy scorecard: Reduce electricity generation emissions

Overall assessment

Moderate risks	Main policy tools are generally sound, and the renewable build-out is expected to continue, driven by favourable economics. A strong and stable emissions price, a competitive wholesale market, and measures to secure supply and maintain affordability are all critical to enabling the transition away from fossil fuels.

Summary of analysis informing overall assessment

Main tools **Moderate**	The main policy tools are the RMA and related national policy instruments, the NZ ETS, and pricing and regulatory settings relating to the electricity market. There are risks to further progress in reducing generation emissions, considering the role of thermal generation in the current system and the issues with the NZ ETS. These relate to difficulties in providing low-emissions alternatives to the current flexible generation fleet, and that coal may be needed in this role for the short to mid-term. The likelihood of this has increased since our 2024 emissions reduction monitoring report, given the further decline in the outlook for gas supply. Energy and capacity risks, along with unaffordability, may hinder progress toward electrification. While the cost of distributed generation, such as solar and batteries, is decreasing, historic underinvestment in energy infrastructure and continued reliance on a reducing supply of gas are driving up energy prices. These challenges have become more pronounced since our 2024 emissions reduction monitoring report, as evidenced by a decline in industrial demand and several recent industrial closures, at least partly attributable to sustained high energy prices. In response, there has been a heightened focus on energy affordability and security of supply. The Government ordered an independent review into the performance of electricity markets and established the Energy Competition Taskforce in response to the very high wholesale electricity prices during periods in 2024. A secure, reliable, and affordable supply of electricity is a critical enabler of electrification.
Funding and finance **No significant risks**	Additional investment is required to boost renewable electricity supply, deploy new technologies to enhance system flexibility, and maintain security and affordability. There are credible plans to deliver this investment, focusing on strong regulatory settings and price signals to attract private sector funding. Fair access to competitively priced hedging products, however, remains a concern.

Other barriers & opportunities **Moderate**	Enablers such as a skilled workforce, transparent data, and effective governance of the electricity system as a component of the wider energy system are crucial for success. While some initiatives are in place to support these areas, significant gaps remain. The limited availability of key professionals, including electrical engineers and electricians, may constrain the delivery of new projects. Shared responsibility for different aspects of the electricity system across multiple agencies introduces risks of overlap, inefficiency, and unclear accountability. The absence of an overarching energy system transition plan further hinders informed, coordinated decision-making. Although renewable build rates are currently not a major concern, existing plans to address peak demand, seasonal firming, and a smooth transition away from gas largely comprise tweaking legislation to incentivise a market response. Given the severity of the issues, the effectiveness of planned changes may be insufficient but will depend on the results of the review of the performance of the electricity market and the Government's response to this.
Timeline **Moderate**	Core policies, such as the NZ ETS and the FTAA, are in place. Timelines for other resource management regulation changes and changes in electricity market legislation are less certain, with initiatives ranging from complete to yet to begin.
Change since 2024	The overall risk assessment for this area has changed from no significant risks to moderate risks. This is due to: • challenges around fuel availability, particularly relating to gas and the transition away from gas, given the electricity sector's reliance on this fuel • risks to the electrification objective due to unaffordability and challenges relating to meeting electricity demand at times of system stress, such as during peaks and in dry periods. These issues have similarly become more significant since our 2024 emissions reduction monitoring report.

Policy scorecard: Fit-for-purpose networks

Overall assessment

Moderate risks	There is a moderate risk that current tools will not deliver desired outcomes. Regulatory settings focus on efficient service, but they may not fully account for the 2050 net-zero target or promote sufficient investment and innovation to support electrification. Significant regulatory work by the Electricity Authority and Commerce Commission is underway, though most measures will not be in place until well into the second emissions budget period. This also applies to consenting and resource management-related initiatives. Broader enablers like data access, supply chain resilience, and workforce readiness also need a stronger focus.

Summary of analysis informing overall assessment

Main tools **Moderate**	Main tools are regulatory frameworks, particularly the Commerce Act 1986 and the Electricity Industry Participation Code 2010. Resource management regulations also affect network development. Key challenges are investing sufficiently to meet growing electricity demand while maintaining affordability by avoiding overinvestment where demand is uncertain, and adapting to evolving technologies. Initiatives to update these settings are underway.
Funding and finance **Moderate**	Substantial investment in transmission and distribution infrastructure and in technologies that support system flexibility, such as automation and digital platforms, is needed. Infrastructure costs must be recovered from consumers through network charges and related fees. High ongoing investment may also raise concerns about social acceptability due to increasing consumer costs. Maximising the value of distributed flexibility resources through bundling services requires regulatory frameworks that support this to be developed.
Other barriers & opportunities **Moderate**	Barriers include workforce shortages (see electricity generation), supply chain limitations, and data gaps. Long lead times for critical equipment such as transformers, combined with limited local manufacturing, could slow progress. Improving access to smart meter data and low-voltage network visibility is also needed to unlock system flexibility. While efforts are underway to develop common standards and ensure smart functionality in new devices, there is a time-sensitive need to avoid locking consumers into outdated technology.

Timeline **Moderate**	Policy development led by regulators appears to be progressing sufficiently to deliver outcomes during the second emissions budget period. However, until measures are implemented and monitored, effectiveness remains uncertain. Government timelines for broader policy milestones are less clear, and there is no roadmap for adjustments if current plans fall short.
Change since 2024	The overall risk assessment is unchanged from 2024, reflecting ongoing moderate risk.

Areas for attention

Developing a long-term plan for the energy transition, covering all sectors and energy sources

A long-term plan is needed to manage the phase up or phase down of key fuel sources, including electricity, fossil gas and bioenergy. This plan could outline pathways to address challenges relating to energy system demand, fuel availability and energy security, and workforce planning.

Advancing training and development to bolster workforce and skills, with a focus on addressing current and predicted shortages

A 2023 national survey of construction industry participants showed a lack of knowledge of sustainable construction as well as dissatisfaction with current education and training.[129]

A qualified and available workforce with the right skills, supported by tertiary and vocational training and strong supply chains, can help the shift towards a low-emissions, climate-resilient energy system and support emissions reductions in the sector.

Research has highlighted that a shortage of engineers and electricians poses challenges for decarbonisation across multiple subsectors. There may also be an opportunity to improve the underrepresentation of Māori in such professions as part of enacting policies to address these issues more generally.

A considered, well-signalled evolution of the NZ ETS structure to drive emissions reductions

As currently structured, there is an increasing risk that the NZ ETS will not maintain a sufficiently strong long-term price signal to drive gross emissions reduction across the energy and industrial sectors. The interrelated issue of industrial allocation must be resolved: there is a need to develop an approach to protect against the real risk of emissions leakage in a manner consistent with achieving emissions budgets and the 2050 target.[130]

Addressing data and information gaps and developing mechanisms to address barriers relating to capital cost and access to low-interest financing

There are significant financial and data-related barriers that are likely to hinder emissions reductions in the energy sector. As discussed in *Chapter 6: Impacts and benefits*, the capital cost of investing in emissions reduction, including through electrification by households and businesses, remains a barrier. The Government's Budget 2025 Investment Boost policy, which introduces a 20% tax deduction on depreciable assets, may help address this to some extent. However, availability is limited to businesses, and it is not targeted at emissions reductions, meaning businesses may still opt for cheaper, higher-emissions equipment.

There is also an opportunity to accelerate efforts in areas like smart device adoption and interoperability, to enhance energy system flexibility. Policies to support particular groups' access to lower-emissions technologies and energy efficiency measures would help reduce the negative impacts of wider action to reduce emissions.

Developing a stable and durable planning and consenting regime that enables emissions reductions

The Fast-Track Approvals Act 2024 may reduce delays and costs for energy projects by streamlining approvals, with benefits expected from 2026. However, it risks undermining climate and sustainability goals due to weak links to national policies, such as the national policy statements for renewable electricity generation and for electricity transmission, limited engagement with electricity providers, and insufficient emphasis on emissions reductions and infrastructure coordination.

New opportunities

Falling prices for solar panels and batteries

Prices for distributed flexibility resources, namely solar panels and batteries, have continued to decline. One report noted that the price of solar panel modules fell by 50% in 2023, driven by a significant expansion of manufacturing capacity.[131] While this reduction did not fully carry through to the cost of installed systems in Aotearoa New Zealand, some benefits were still observed: For example, according to a recent survey, the cost of a 3 kW residential solar system decreased by $2,000 over the 2024 calendar year.[132] Similarly, for stationary storage batteries, evidence from stakeholders, as well as international reports such as CSIRO's GenCost 2024–25 Consultation draft report, indicates declining costs.[133] Prices as low as half the commonly cited ~$1,000/kWh figure[134] are already available, or are expected to be in the near future.

By creating the right enablers, such as effective pricing signals and access to stable, low-interest, long-term finance, there is an opportunity to accelerate the adoption of this technology by households and businesses. This could lead to significant energy cost savings and reduce pressure on the wider electricity system. In combination with further deployment of technology to reinject emissions at geothermal power plants (an opportunity we highlighted in our 2024 emissions reduction monitoring report), this could contribute to an additional reduction of 3.9 $MtCO_2e$ of generation-related emissions in the third emissions budget period. This is over and above what is shown in the Government's second emissions reduction plan, as identified in our EB4 demonstration path.

Growing industry appetite to switch from gas

Engagement with industry stakeholders indicates there is a growing appetite to switch from fossil gas, driven at least in part by concerns over gas prices and availability. This presents an opportunity to reduce emissions further and/or faster than previously anticipated. For example, in January 2025, Fonterra announced an NZ$150 million investment to begin electrifying some of its gas-fired processing facilities. The company noted that, while it had always intended to transition away from gas, declining gas supply had accelerated its decision.[135,136] This kind of fuel switching could contribute to an additional reduction of 2.6 $MtCO_2e$ of industrial emissions in the third emissions budget, as identified in our EB4 demonstration path, beyond what is shown in the Government's second emissions reduction plan.

There is an opportunity for further reductions in the third emissions budget period from the phase out of fossil fuels in buildings. Our modelling suggests this could contribute a further 1.1 $MtCO_2e$ in emissions reductions.

7.1 Embodied emissions

Embodied emissions are those produced throughout a product's lifecycle. These are a major contributor to building sector emissions, especially from materials like steel and cement. Embodied emissions were 2.8 $MtCO_2e$ in 2023.[137] These emissions have increased by 0.33 $MtCO_2e$ between 2018 and 2023.[138]

These emissions are often perceived as hard to reduce due to the carbon intensity of conventional materials; however, there are viable lower-carbon alternatives for most buildings. While current monitoring focuses on production and operational emissions, there is strong interest in addressing embodied emissions through a consumption-based approach. Industry members from the building sector advocate for low-emissions design and the use of lower-carbon materials like timber.

Progress to date

The Government is seeking to reduce embodied emissions in construction by simplifying building consent processes for small dwellings, improving access to innovative and sustainable materials by enabling the use of overseas building products and standards, and developing consistent measurement methods. It is partnering with industry to improve emissions tools, create a national carbon data resource, and support an online platform for sharing assessments. Additional initiatives include boosting wood processing, enhancing recycling efforts, and identifying barriers to material reuse. Upcoming work includes revising the REBRI: Reducing building waste toolbox,[139] developing a New Zealand version of the SmartWaste tool,[140] and evaluating circular construction practices nationwide.

There has also been substantial voluntary work by organisations like the New Zealand Green Building Council (NZGBC) and the Building Research Association of New Zealand (BRANZ) to provide tools and education to industry, relevant to embodied emissions.

Areas for attention

All building work in New Zealand must comply with the Building Code, even if the work itself does not require a consent.[141] However, embodied emissions are not considered in the code. Inclusion in the code would help send strong market signals and further support industry change.

There is an opportunity to coordinate tools and resources for managing embodied emissions. While actions from the second emissions reduction plan and organisations like the NZGBC and BRANZ have made significant contributions, a plan coordinated by government would maximise the effectiveness of these efforts.

Chapter 8

Transport

This chapter looks at greenhouse gas emissions in three areas: passenger transport, freight transport and aviation.

New Zealand's Greenhouse Gas Inventory (GHG Inventory) shows transport emissions in 2023 were 14.2 $MtCO_2e$, which is 19% of the country's gross emissions. This sector is expected to contribute 13% of the net emissions reduction the Government is seeking in the second emissions budget period (2026–2030).

Transport emissions come from burning fossil fuels for travel and freight movement by road, rail, air or shipping within Aotearoa New Zealand. They can be reduced by shifting travel to public transport, cycling and walking, and by lowering vehicle emissions through better fuel efficiency or alternative fuels.

Key points

- Transport emissions increased in 2023 to 14.2 $MtCO_2e$, up 0.5 $MtCO_2e$ from 2022 (3%). This growth came mainly from increased travel; 2023 was the first year since 2019 where the data does not include impacts of COVID-19 travel restrictions.
- Emissions from passenger transport, freight and aviation all grew between 2022 and 2023. Aviation emissions increased by 24% reaching 1.3 $MtCO_2e$. Passenger transport emissions grew 2% to 8.8 $MtCO_2e$. Increases in road travel were partially offset by improved fuel efficiency and more use of electric vehicles (EVs).
- Policy changes in the last year that affect emissions include changed Clean Car Standard targets and replacing public EV charger grants with an interest-free loan scheme.
- We assess there are moderate risks to achieving the planned reduction in passenger transport emissions intensity for the second and third emissions budgets due to the risk rates of EV adoption stay low without policies to lower upfront purchase costs.

continues next page

- There are moderate risks to achieving the planned shift from cars using fossil fuels to public transport, cycling and walking in the second emissions budget, and significant risks for the third budget. This is due to poor integration of land-use and transport planning, uncertainty around 'time of use charging' and reduced funding for walking and cycling after 2027.
- Freight and aviation emissions present significant risks for both the second and third emissions budgets, due to uncertainty of timing and implementation of the Low Emissions Heavy Vehicle Fund and the sustainable aviation fuel mandate, and no known action to support heavy vehicle charging, availability of low-carbon fuels for freight and integrated freight planning.
- The key areas for attention in this sector are:
  - integrated planning for urban development and transport infrastructure, and optimising freight movement across road, rail and coastal shipping
  - developing policies to increase use of zero emissions heavy vehicles
  - making it easier to use low-carbon liquid fuels and sustainable aviation fuels.
- New opportunity: falling global EV prices, driven by sharp battery cost reductions in 2024, present an opportunity to expand EV use, especially for heavy vehicles. Our modelling shows further action on transport emissions could enable additional emissions reductions of 7.5 $MtCO_2e$ by the end of the third budget period.

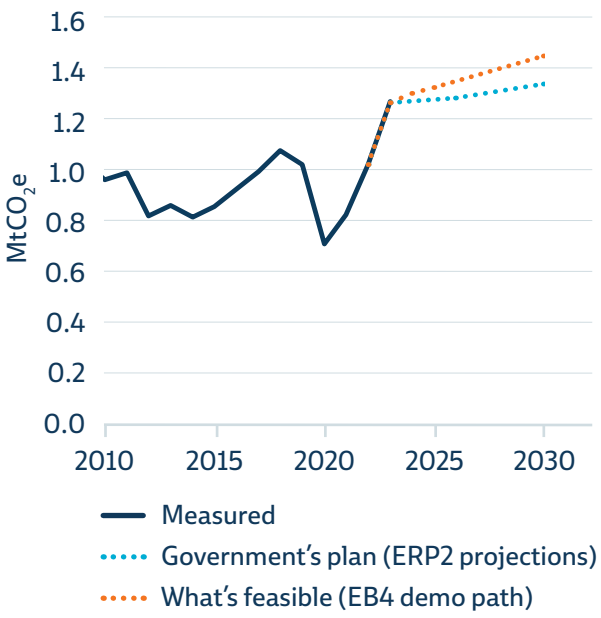
Progress to date

Emissions reduction

This section sets out the key shifts in transport emissions. More detailed analysis and figures are available in the Technical Annex published on our website.

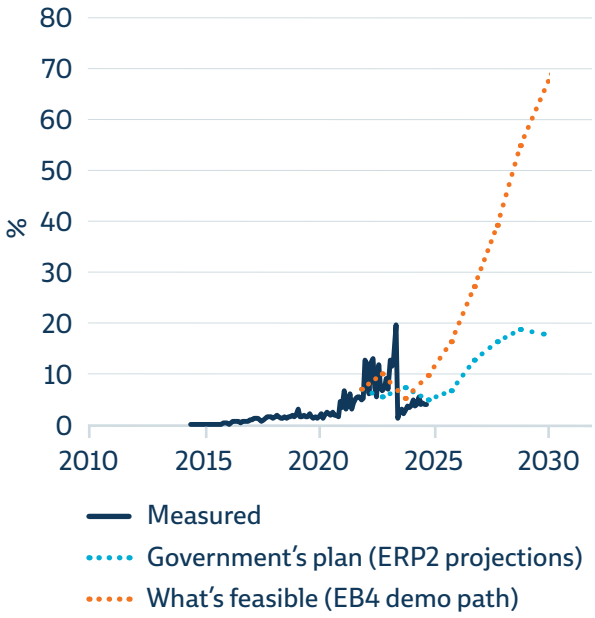
- **Aviation emissions increased by 24%** (0.25 $MtCO_2e$) between 2022 and 2023 (Figure 8.1). Based on the GHG Inventory, in 2023 domestic aviation accounted for 9% of total transport emissions but 52% of the sector's emissions growth, driven by a 23% rise in flight hours for commercial passenger aircraft and grounding of the most fuel-efficient aircraft due to maintenance issues.
- **Passenger transport emissions grew by 2%** between 2022 and 2023. The distance travelled by light vehicles, which includes cars, SUVs, vans and utility vehicles (utes), increased by 5%. This was partially offset by improvements in fuel efficiency, and uptake of zero emissions vehicles.
- **Registrations of zero emissions vehicles fell significantly in 2024.** The 'zero emissions' share of light vehicles peaked at 19% of all registered vehicles in December 2023, when the Clean Car Discount subsidy finished. Uptake rates were much lower throughout 2024. However, they are still tracking at the level set out in the Commission's 2022 demonstration path (Figure 8.2).
- **Freight emissions grew by 1%.** However, freight activity reduced between 2022 and 2023 across road, rail and coastal shipping.

Figure 8.1: Aviation emissions



Source: Commission analysis

Figure 8.2: Share of zero emissions vehicles entering the light vehicle fleet



Source: Commission analysis

Policy changes

This section sets out policy changes that could increase or decrease transport emissions.

Changes in the 12 months up to 1 April 2025

- These were finalised: Government Policy Statement on land transport 2024 (GPS 2024)[142] and the 2024–2027 National Land Transport Programme (NLTP 2024–2027),[143] including:
  - associated Rail Network Investment Programme 2024–2027 (RNIP)
  - coastal shipping activity class removed from NLTP 2024–2027 and replaced by a new Coastal Shipping Resilience Fund of NZ$30 million (2024–2027).
- The review and adjustment of the Clean Car Standard targets, and replacing public EV charger grants with an interest-free loan scheme.[144]
- The Government announced two new Cook Strait ferries due in 2029 will have road and rail decks.[145]
- The Going for Housing Growth policy includes new infrastructure funding and finance tools.[146] Part of this includes the timely provision of infrastructure, including transport infrastructure, to support communities.
- A 'time of use' charging scheme was developed in 2024, with the Land Transport Management (Time of Use Charging) Amendment Bill introduced into Parliament in March 2025.[147]

Changes since the start of 2022

- The government and industry group Sustainable Aviation Aotearoa was established, 2022.[148]
- The Aotearoa New Zealand Freight and Supply Chain Strategy was published, 2023.[149]
- An assessment report on a renewable freight certificate system was published, 2023.[150]
- Introduction of road user charges (RUCs) for EVs and plug-in hybrid electric vehicles (PHEVs), 1 April 2024.[151]
- The Clean Car Discount and vehicle kilometres travelled (VKT) targets for Aotearoa New Zealand's major urban areas were discontinued, December 2023 and December 2024.[152]

Policy assessment

We use policy scorecards to assess the adequacy of policy plans for reducing emissions from aviation, passenger and freight transport. We have broken our analysis down into outcome areas that reflect the different ways emissions in this sector could be reduced (by shifting travel to transport modes with lower emissions, and by lowering 'emissions intensity' through better fuel efficiency or alternative fuels).

Policy scorecard: Reduce demand for carbon-intensive passenger transport

Overall assessment	
EB2: Moderate risks **EB3: Significant risks**	The main policies are credible policy interventions. Likely emissions reductions are limited by lack of integration between urban land use and transport infrastructure. Progress in reducing transport emissions is also put at risk by the decrease in funding to support more walking and cycling after 2027, and lack of detailed planning beyond the NLTP 2024–2027.

Summary of analysis informing overall assessment	
Main tools **Moderate**	There are credible policies to improve public transport, walking and cycling facilities and introduce a 'time of use' charging scheme. However, delays in implementation pose a moderate risk to meeting the second and third emissions budgets. While public transport and cycling/walking initiatives are outlined in the NLTP 2024–2027, there is a risk projects may start too late, and time of use charging is unlikely to begin before 2026/27.[154]
Funding and finance **Moderate**	There is funding for public transport and walking/cycling in the NLTP 2024–2027. However, the cost of major public transport projects is uncertain which creates risk. From 2027, funding for walking and cycling is expected to decrease and the budget will likely be under more pressure in the National Land Transport Programme 2027–2030 (NLTP 2027–2030). This is due to tighter rules on using other funding streams and the need to cover maintenance costs for existing walking and cycling facilities.
Other barriers & opportunities **Significant**	The low-density, dispersed and uncoordinated development of urban areas has led to poorly integrated land use and transport infrastructure, posing a significant barrier to reducing transport emissions. This may be exacerbated under the GPS 2024, which aims to unlock access to land outside urban centres for housing. However, the Going for Housing Growth policy may help by promoting intensification along transport corridors, mixed use zoning and removing barriers to densification. There are opportunities for improved health outcomes from mode shift to active transport, and this will have an outsized benefit for iwi/Māori.

Timeline **Significant**	Detailed timelines are only available for the current NLTP 2024–2027 period. While the GPS 2024 sets strategic policy settings out to 2034, there is no roadmap for decisions and policy for the development and implementation of public transport services and infrastructure, and walking and cycling facilities.
Change since 2024	We now assess the second emissions budget as having moderate risks, with the finalisation of GPS 2024 reducing earlier uncertainty around public transport funding and policy direction that underlay our assessment of significant risk in 2024. However, the third emissions budget remains at significant risk, due to the signalled reduction of funding for walking and cycling facilities, and the current focus on investment in the roading network.

Policy scorecard: Reduce vehicle emissions intensities of passenger transport

Overall assessment	
Moderate risks	The Clean Car Standard is a credible policy to support this outcome area, but its impact may be limited without addressing the upfront and ownership cost of EVs and PHEVs. Relying on a single policy also poses a risk. Key enablers include expanding public EV charging and delivering the 'Supercharging EV infrastructure work programme'.

Summary of analysis informing overall assessment	
Main tools **Moderate**	The main tool to reduce emissions intensity of passenger transport is the Clean Car Standard, with the NZ ETS expected to play a supporting role. The Clean Car Standard is a credible policy, aligned with similar initiatives in the European Union, the United Kingdom and United States, although reliance on one key policy poses some risk.[153] Ongoing monitoring and evaluation will be important to establish its ongoing effectiveness. There is also a risk that the review and easing of the standards and not addressing the upfront cost of EVs could create an inconsistent policy environment that slows the shift to fuel-efficient vehicles or causes EV growth to stall or decline.
Funding and finance **No significant risks**	The standard has transitioned from government funding to a cost recovery model, with importers and consumers covering ongoing costs. This change aims to make the programme self-sustaining and current funding appears sufficient and stable.
Other barriers & opportunities **Significant**	The target of a network of 10,000 public EV charging points by 2030 and the 'Supercharging EV infrastructure work programme' have the potential to address the lack of charging infrastructure and consequent 'range anxiety'. There is currently no policy to address the high purchase price of EVs compared to internal combustion engine (ICE) vehicles. While the purchase price is trending downwards, they do remain high in comparison. This may be more pertinent for low-income households, of which iwi/Māori are over-represented. Moreover, the introduction of road user charges (RUCs) for EVs and plug-in hybrid electric vehicles (PHEVs) has increased ownership costs, impacting their affordability for many New Zealanders.
Timeline **Moderate**	The Clean Car Standard is an ongoing policy. There is currently no road map for reaching the target of 10,000 public EV chargers by 2030. The second emissions reduction plan notes an EV-charging infrastructure work programme to coordinate policy, investment and engagement with stakeholders will be established.
Change since 2024	Our overall risk assessment for this area is unchanged from our 2024 assessment.

Policy scorecard: Reduce domestic aviation emissions intensity

Overall assessment	
Significant risks	The main tool of a sustainable aviation fuel (SAF) mandate, and targets for aviation decarbonisation are credible policies, but a lack of clarity around policy detail, development and implementation timelines and funding sources means there is significant risk to achieving the pathway outcome for both the second and third emissions budgets.

Summary of analysis informing overall assessment	
Main tools **Significant**	The main tool for reducing aviation emissions intensity is the implementation of a SAF mandate. This is a credible tool that can incentivise airlines to utilise SAF as it costs more than fossil fuels, even with New Zealand Emissions Trading Scheme (NZ ETS) pricing. Without a mandate airlines are unlikely to use SAF due to the risk of losing competitive advantage. However, this policy is still on hold pending ministerial decision. The NZ ETS may also result in efficiency improvements and demand changes.
Funding and finance **Moderate**	There is no clear funding source for developing the SAF mandate. Policy development and implementation would likely be covered within existing operational budgets of the lead agencies if this work were prioritised. The costs of the policy will fall primarily on the private sector and consumers.
Other barriers & opportunities **Moderate**	There are opportunities to support job creation in the bioeconomy and Māori economy if domestic SAF production policies are introduced, though the SAF mandate could proceed without these co-benefits. Supporting measures include aviation emissions reduction targets through Sustainable Aviation Aotearoa and trials of low/zero emissions aircraft and airport infrastructure. Key initiatives in this outcome area have not progressed since 2024, though no major barriers pose a significant risk to delivering the SAF mandate.
Timeline **EB2: Significant** **EB3: Moderate**	Implementation of the SAF mandate and targets for aviation decarbonisation are well behind announced timelines, and it is unclear whether the Government is still pursuing these initiatives. Implementation delays are less likely to impact on the third emissions budget.
Change since 2024	Our overall rating remains unchanged from 2024, but continued policy uncertainty has raised the risk assessment of the main tools to significant. The assessments of funding and finance and other barriers and opportunities have been lowered because neither are likely to hinder implementation. Timeline risk remains significant for the second emissions budget, but delays are less likely to influence the third emissions budget.

Policy scorecard: Reduce emissions intensity for freight

Overall assessment

Significant risks	While the Low Emissions Transport Fund (LETF) and the Low Emissions Heavy Vehicle Fund (LEHVF) are credible policy tools, there is uncertainty about whether funding levels are sufficient to support a significant shift to low-emissions technologies or whether the LEHVF will continue beyond 2028. The decision on the extension of RUC for electric heavy vehicles is pending, while there is no policy for heavy vehicle charging/refuelling infrastructure, low-carbon liquid fuels or reducing emissions from rail and coastal shipping. Overall, actions would benefit from being part of a coherent, evidence-based freight decarbonisation strategy.

Summary of analysis informing overall assessment

Main tools **Moderate**	The LETF and the LEHVF are the main policy tools to address reducing emissions intensity for freight vehicles. These policy tools are credible policies for encouraging change to low-emissions freight technologies but there is uncertainty about which vehicles the market will choose, which will affect actual reductions. A decision on the extension of RUC for electric heavy vehicles is pending. There are also no concrete policy proposals for low-carbon liquid fuels, rail electrification or reducing coastal shipping emissions through alternative fuels.
Funding and finance **EB2: Moderate** **EB3: Significant**	There is a risk that the funding of the LETF and LEHVF will not be high enough to significantly reduce emissions intensity in heavy road freight. The LEHVF must be fully committed by 2028, and high demand could see it fully committed earlier with no guarantee of renewal. This presents a significant risk for meeting the third emissions budget.
Other barriers & opportunities **Moderate**	The review of the regulatory system may help remove barriers to zero emissions heavy electric vehicles, but current charging and refuelling policies are unlikely to address this barrier. The second emissions reduction plan notes that monitoring will assess whether the Government should play a role in facilitating charging infrastructure. Many Māori businesses operate in freight dependent sectors like agriculture, forestry, seafood and food-processing sectors. Iwi/Māori often face greater difficulty accessing capital and higher borrowing costs, making it harder to decarbonise.

Timeline **Significant**	While LETF funding appears ongoing, there is uncertainty around the LEHVF's end date and the future of the RUC exemption for heavy electric vehicles. There is also no clear roadmap for low-carbon liquid fuels, rail electrification or the use of alternative fuels in coastal shipping.
Change since 2024	Our overall risk assessment is unchanged from our 2024 assessment.

Policy scorecard: Reduce demand for carbon-intensive freight transport

Overall assessment

Significant risks	A key barrier to increasing the share of rail and coastal shipping freight is a lack of an integrated freight network that efficiently coordinates road, rail and coastal shipping to optimise freight movements across the system. While the Freight and Supply Chain Strategy notes the need for coordination across freight modes, there are no specific policy measures to address this, putting the pathway outcome at risk.

Summary of analysis informing overall assessment

Main tools **Significant**	The main policy is the implementation of the Rail Network Investment Programme (RNIP), supported by the Coastal Shipping Resilience Fund, which could contribute to the pathway outcome over the medium to long term assuming ongoing funding. However, these alone will not overcome barriers to shifting more freight to rail and coastal shipping. The Freight and Supply Chain Strategy provides a high-level roadmap but lacks a detailed plan of actions.
Funding and finance **Moderate**	There is ongoing NLTP 2024–2027 funding for rail and coastal shipping and funding of the two new Cook Strait ferries, due in 2029, has been confirmed. However, there is uncertainty over whether the level of funding is sufficient to address the maintenance challenges due to ageing rail and port infrastructure and climate-related weather events.
Other barriers & opportunities **Moderate**	A key enabler is freight infrastructure, especially integrated hubs that support freight movement between trucks, rail and coastal shipping. Barriers such as labour and skills shortages, health and safety issues and data sharing challenges are identified in the Freight and Supply Chain Strategy and Rail Plan but gaps in actions to address them pose a delivery risk.
Timeline **Significant**	The Freight and Supply Chain Strategy includes a high-level roadmap, and the 2024–27 RNIP also provides a 10-year forecast. More detailed timelines will be needed to track progress towards achieving emissions budget outcomes.
Change since 2024	Our overall risk assessment for this area is unchanged from our 2024 assessment. Risks to funding and finance have reduced due to confirmation of continued rail and coastal shipping funding.

Areas for attention

Integrated planning for urban development and for freight transport

There is an opportunity to guide transport infrastructure and urban development toward compact, mixed-use areas supported by public transport and walking and cycling infrastructure. This approach could achieve diverse benefits, including health savings from reduced vehicle emissions and improved climate resilience, such as better flood control.

There is also opportunity for integrated national and regional planning to optimise freight movement across road, rail and coastal shipping. This could reduce emissions by increasing the share of freight moved by rail and coastal shipping. A detailed plan with timelines based on reliable data would support effective forecasting, decision-making and resource allocation. See also *Chapter 3: Enabling systems*.

Incentives to increase use of zero emissions heavy vehicles

The Government's second emissions reduction plan identifies high upfront capital cost as a barrier to adoption of zero or low-emissions heavy vehicles. This highlights the need for some form of policy mechanism when the Low Emissions Heavy Vehicle Fund is spent.

Improving freight infrastructure – such as hydrogen refuelling or electric charging stations – also presents opportunities. Globally, this generally takes the form of subsidies or credits for the provision of this infrastructure.[155] This area of attention was also identified in our 2024 emissions reduction monitoring report.[156]

Making it easier to use low-carbon liquid fuels and sustainable aviation fuels

The Government has an opportunity to support greater use of low-carbon liquid fuels for heavy freight transport and sustainable aviation fuels by funding research, offering tax incentives or grants to fuel producers, and setting rules that encourage the use of low-carbon fuels. This area of attention was also identified in our 2024 emissions reduction monitoring report.[157]

New opportunities

EV battery prices

Global production of EVs continues to grow, while costs decline. Battery prices dropped significantly in 2024, with the global average reaching US$95 meaning electric vehicles should become cheaper.[xxxiii] Aotearoa New Zealand has the opportunity to benefit from these global cost decreases to accelerate its shift to low-emissions vehicles, especially for larger vehicles like heavy trucks.

Further opportunities to reduce transport emissions

Greater shifts to lower-emissions transport modes, such as public passenger transport and rail for freight, could feasibly achieve a further 3.5 $MtCO_2e$ reduction compared with the Government's second emissions reduction plan path. Likewise, supporting greater uptake of low-emissions and zero emissions vehicles could reduce emissions by a further 3.5 $MtCO_2e$ by the end of the third emissions budget period. This analysis is based on the Commission's 2024 advice for the fourth emissions budget.

xxxiii Equivalent to NZ$162.18 as at 13 May 2025. This includes all types of batteries weighted by their volume of sales.

Chapter 9

Agriculture

This chapter looks at reductions in greenhouse gas emissions from two areas: reducing emissions from farming, and moving to land uses with lower emissions.

New Zealand's Greenhouse Gas Inventory (GHG Inventory) shows agricultural emissions in 2023 were 40.6 $MtCO_2e$, which is 53% of gross emissions. These emissions mainly come from methane (CH_4) from ruminant livestock digestion and farm manure, nitrous oxide (N_2O) from soils and fertilisers, and some carbon dioxide (CO_2) from urea and lime use.

Reductions can be achieved through adjusting on-farm practices, adoption of low-emissions technologies, and land-use changes to lower-emissions land uses, such as horticulture or forestry. Cutting agricultural emissions is essential to meet the 2030 biogenic methane component of the 2050 target, which coincides with the end of the second emissions budget period.

Key points

- Total emissions from agriculture declined 2.2% between 2022 and 2023, reaching 40.6 $MtCO_2e$. Between its peak in 2014 and 2023, emissions in this sector have shrunk 6.0%.
- Agricultural methane emissions were 1.19 $MtCH_4$ in 2023, a 2.1% drop from 2022.
- The decline in emissions is mainly due to fewer dairy cattle, sheep and beef animals.
- Government actions in the last year that could affect emissions include delaying agricultural emissions pricing until 2030, formation of the Pastoral Sector Group, a review of biogenic methane science and reduction goals, release of a standard on-farm emissions methodology, and review of agricultural products regulation affecting emissions reduction technologies. Some of these actions may slow emissions reduction, some may speed it up.

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- We assess there are moderate risks to achieving the planned reduction in emissions from farming, and significant risks to the transition to low-emissions land uses in the second emissions budget period. In the third budget period there are significant risks to achieving reductions in both areas. This is primarily due to the reliance on technologies with uncertain timelines, limited price signals, and insufficient support for changes in land use or on-farm practice.
- The key areas for attention in this sector are:
  - addressing the risk of over-reliance on technological solutions
  - supporting extension and advisory services for farmers
  - incentivising earlier uptake of new farming practices and technology
  - support for Māori farm businesses
  - establishing biodiversity credits and non-forestry removals supporting gross emissions reductions and adaptation.
- Key new opportunities to reduce emissions from agriculture include emissions reduction technologies on the brink of commercial implementation (some with co-benefits for productivity and environmental sustainability), and new incentives in the market that may drive greater adoption of new technology. Our modelling shows adoption of options demonstrated as viable in our 2024 advice on a fourth emissions budget could secure an additional 8.2 $MtCO_2e$ of emissions reductions from agriculture for the third emissions budget.

Progress to date

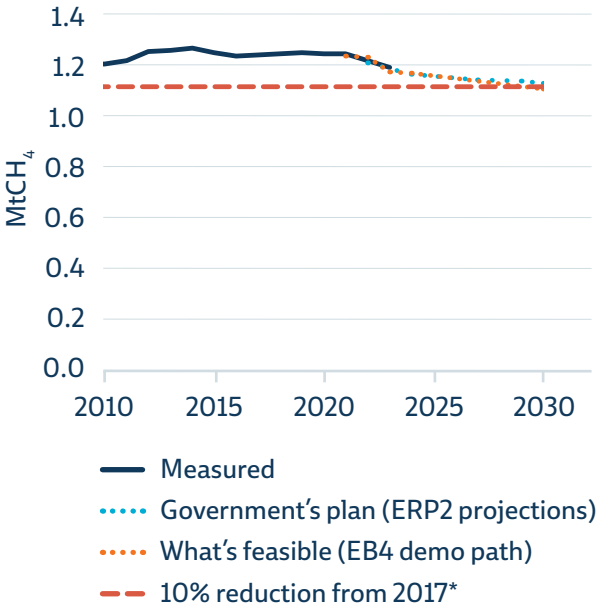
Emission reductions

This section sets out the key shifts in agriculture emissions. More detailed analysis and figures are available in the Technical Annex published on our website.

- **Emissions from agriculture are continuing to decrease.**
  Based on the latest version of the GHG Inventory, total agricultural emissions in 2023 were 40.6 $MtCO_2e$, a 2.2% reduction from a year earlier.
- **Methane reduced 2.1% to 1.19 $MtCH_4$.**
  In 2023 methane was 82.4% of agricultural emissions, which are driven by ruminant livestock numbers and production (Figure 9.1).
- **Livestock changes have driven recent emissions reductions.**
  Data behind the current GHG Inventory show dairy cattle numbers reduced 0.8% to 5.88 million in 2023 (Figure 9.2), while sheep and beef livestock units decreased 3.6% to 42.6 million stock units (Figure 9.3). The most recent Stats NZ figures[158] show dairy cattle declined another 0.8% and sheep and beef livestock units another 1.5% in 2024, which will be reflected in the emissions reported next year. The rate of declines in dairy and livestock numbers has slowed, and sheep and beef livestock units are 2.2% greater in 2024 than in the second emissions reduction plan path, which may point towards slower emissions reductions in the coming years. The land area in dairy farming increased 2.6% to 1.7 million hectares in 2023,[159] which may also point to a possibility of plateauing dairy cow numbers in the shorter term, although the area in sheep and beef farming continues to decline, reducing 0.9% to 7.4 million hectares in 2023.

- **Producers are increasing efficiency.** For example, although production has remained relatively stable at approximately 400 kg milk solids per cow from 2021 to 2023, milk quality, herd reproductive performance and genetic merit have improved in the most recent statistics.[160] These shifts in national averages stem from groundwork from the dairy sector to improve sustainability and reduce the emissions intensity of milk.
- **Nitrogen fertiliser use was down 7.5%** to 369 million tonnes of nitrogen in 2023 (**Figure 9.4**). The use of nitrogen fertiliser contributes to N_2O emissions which made up 15.9% of agricultural emissions in 2023 and reduced 1.3% from 2022. Provisional figures from the Fertiliser Association of New Zealand show a 1.9% increase in nitrogen fertiliser in 2024, which may result in fewer overall agricultural emissions reductions in the next edition of the GHG Inventory.

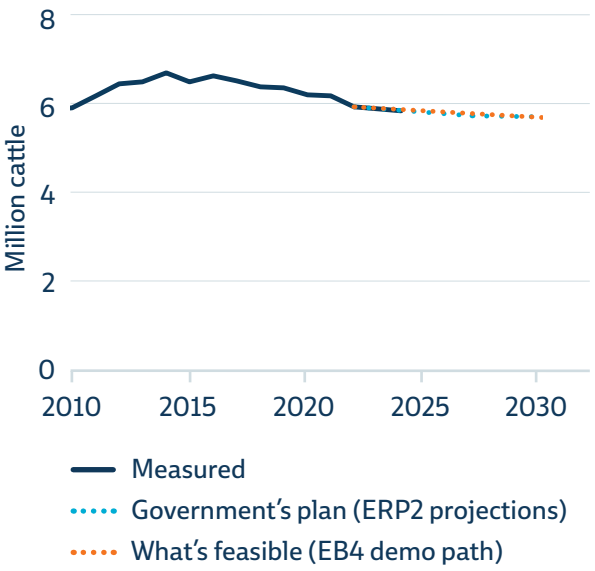
Figure 9.1: Total agricultural biogenic methane



Source: Commission analysis of GHG Inventory data

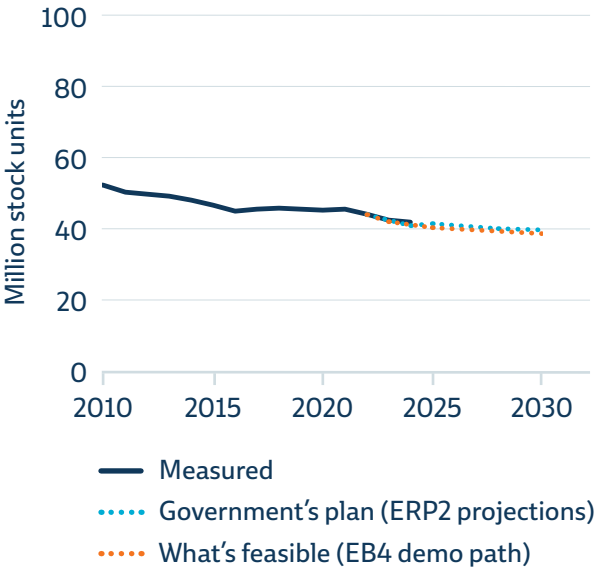
* The methane component of the 2050 target includes a 10% reduction from 2017 levels by 2030 in total biogenic methane from agriculture and waste combined. This figure shows agricultural methane only.

Figure 9.2: Total dairy cattle



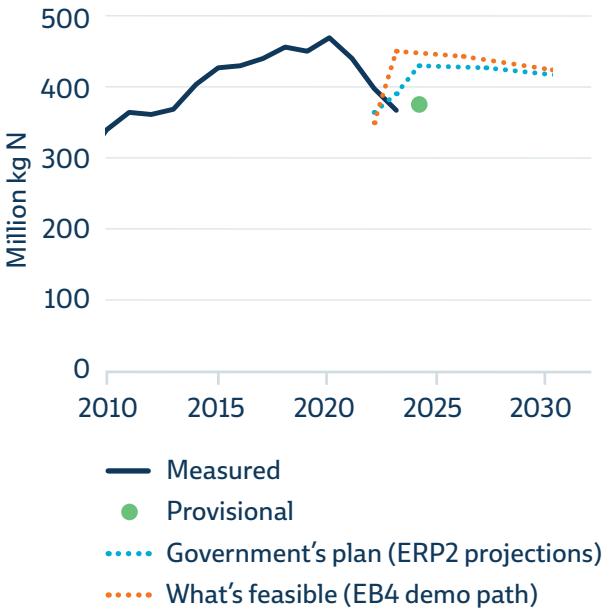
Source: Commission analysis of Stats NZ data

Figure 9.3: Total sheep and beef stock



Source: Commission analysis of Stats NZ data

Figure 9.4: Nitrogen fertiliser use



Source: Commission analysis of data from Ministry for Primary Industries, Fertiliser Association

Policy changes

This section sets out policy changes that could increase or decrease agriculture emissions.

Changes in the 12 months up to 1 April 2025

- **Emissions pricing delayed to 2030.** The Government has delayed implementing an emissions pricing system for agriculture. Agricultural emissions are now intended to be priced by 2030. In November 2024 the Government amended the Climate Change Response Act 2002 (the Act) to remove the backstop that agriculture would enter the New Zealand Emissions Trading Scheme (NZ ETS) in 2025 if an alternative pricing scheme was not yet developed.[161]
- **Streamlining regulations to access low-emissions agricultural products.** The Agricultural and Horticultural Products Regulatory Review was completed, and the recommendations accepted by the Government.[162] These include changes which may make it faster and less expensive to get greenhouse gas mitigation technology to farmers.
- **Genetic technology regulation changes.** A bill to enable the safe use of gene technology is in progress. If passed it could expand the science and technology tool kit but the effect that it would have on emissions is unclear. Grass and clover have been developed using gene technology to reduce methane emissions from ruminants.[163] This may be a significant contribution to emissions reductions for some individual farms and there are various other ways gene technology may help reduce emissions.
- **Standard on-farm emissions methodology.** The Ministry for Primary Industries (MPI) released their standard methodology in December 2024. The next update in December 2025 is likely to include the ability to model newly available emissions mitigation technology. This will allow farmers to see the impact of practices and technology to mitigate greenhouse gas emissions and could form the basis of an emissions pricing scheme.[164]
- **Methane panel report.** The Government is considering the findings of the independent review on the biogenic methane science and targets.[165] This is out of scope of this report's assessment.
- **Pastoral Sector Group established.** When He Waka Eke Noa was disbanded, it was announced that a new Pastoral Sector Group would be established to tackle biogenic methane.[166] That group met for the first time in March 2025.[167]

Changes since the start of 2022

- The Government sets a target to double the value of exports in 10 years (by 2034).
- Establishment of the Centre for Action on Agricultural Emissions and its key components, the Ag Emissions Centre and AgriZeroNZ.
- Setting up of MPI On-Farm Support services.
- Nitrogen fertiliser cap limits reported annually from the 2021/22 farming season.

Policy assessment

In this section we use policy scorecards to assess the adequacy of policy plans in the following outcome areas: reducing emissions from farming, and transition to low-emissions land uses.

Policy scorecard: Reduce emissions from farming

Overall assessment

EB2: Moderate risks **EB3: Significant risks**	The main policy tools – accelerating technology, supporting on-farm changes, and pricing emissions – are credible. However, heavy reliance on technology carries risks. While some technologies may be commercialised soon, uncertainties remain, and there is no contingency if they fail or aren't adopted. This focus may also delay action on current on-farm practices, which could be improved with expanded advisory support. Emissions pricing is planned by 2030, but its design and effectiveness remain uncertain. There is also some risk that customer market driven incentives could lead to emissions intensity reductions without the gross emissions reductions from farming needed.

Summary of analysis informing overall assessment

Main tools **Moderate**	The main tools to reduce farming emissions are accelerating the commercialisation of emissions-reducing technologies, supporting farmers to adopt changes, and pricing agricultural emissions by 2030. Technologies suited to pasture-based systems could significantly cut emissions. With support, farmers can adjust practices to boost efficiency and profitability while lowering emissions. Farmers can also be supported to incorporate emissions reduction technology into their farm systems as they emerge. Pricing emissions is a credible tool and financial incentives are critical to emissions from farming being reduced. However, there is work for Government to do to design an effective pricing system by 2030, so that it can drive the reductions targeted in the third emissions budget period. Delaying pricing until 2030 and a lack of detail means it is unclear how the planned emissions reductions will be achieved.

Funding and finance **EB2: Moderate** **EB3: Significant**	The Ag Emissions Centre is publicly funded through to 2029, while AgriZeroNZ has public funding through to 2026, alongside industry contributions. Our analysis on the ongoing development of technologies such as the methane vaccine shows that long-term funding is essential. Uncertainty around AgriZeroNZ's public funding beyond 2026 raises concerns within the second emissions budget period, with increasing reliance on private or industry investment. Market incentive payments are emerging, which is positive, although relying on customer markets to incentivise emissions intensity reductions may not lead to overall emissions reduction from farming on its own.
Other barriers & opportunities **EB2: Moderate** **EB3: Significant**	The development of mitigation technologies is partially limited by science capacity – both infrastructure and personnel – while the absence of an emissions price reduces incentives for adopting new technology. An effective regulatory pathway for approving new technologies is essential. While regulatory reviews are addressing this, there is a risk that changes to freshwater regulation could enable more emissions-intensive farming. Reframing on-farm actions to emphasise physical and financial benefits presents an opportunity, supported by scaling up education, training, and advisory services. Focusing on technologies with co-benefits for productivity or the environment is also an opportunity to aid adoption. Current agricultural education and advisory models don't meet iwi/Māori needs, and Māori remain underrepresented in agricultural science, management and professional services. Māori landowners are a significant part of this sector, so expanding targeted support for Māori-led emissions reduction efforts is a key opportunity for the whole sector.
Timeline **EB2: Moderate** **EB3: Significant**	The Centre for Climate Action on Agricultural Emissions provides a clear roadmap for commercialising new emissions reducing technology, implemented through the Ag Emissions Centre and AgriZeroNZ. However, with emissions pricing delayed until 2030 and no set timelines to support producer changes, there is a risk uptake of low-emissions technology and farm practices will be lower than it should be. This results in moderate risk for the second emissions budget period and significant risk for the third.
Change since 2024	Our overall risk assessment has reduced to moderate risks in the second emissions budget period, as this area is expected to have little impact in the second emissions reduction plan. Our overall risk assessment in the third emissions budget period is unchanged, at significant risks.

Policy scorecard: Transition to low-emissions land uses

Overall assessment

Significant risks	The NZ ETS is the main policy tool, but it does not incentivise shifts to high-value, low-emissions land uses like horticulture. Rather the NZ ETS incentivises shifts to forestry, and upcoming restrictions on forest eligibility mean it is uncertain how much effect the NZ ETS will have on land-use change. Supporting policies are credible but lack the scale to drive significant change. Key barriers include limited access to capital – especially for Māori business – high setup costs, a lack of infrastructure, advisory services, and skilled labour. Uncertainty also remains over how RMA reform and freshwater policy changes will address these challenges.

Summary of analysis informing overall assessment

Main tools **Significant**	The major land-use change driving emissions reductions for this outcome area is farmland conversion to forestry eligible to be allocated units under the NZ ETS, covered under the Forestry removals scorecard. Other policies, like Pamu Farms providing leadership in low-emissions land uses, and mātauranga Māori-based research and development (R&D), are credible but lack scale to significantly contribute to the transition to low-emissions land uses and have recently ended. Current policies do not incentivise shifts to high-value, low-emissions land uses like horticulture or those with ecological benefits. While a potential biodiversity credit market may help, current settings may not deliver the land-use changes needed to meet the second emissions reduction plan methane targets. As a result, there are significant risks that existing tools will not achieve the level of emissions reductions expected.
Funding and finance **Moderate**	The NZ ETS is the primary tool for driving land-use change and doesn't require government funding. Outside of it, funding is limited – programmes like Sustainable Food and Fibre Futures offer some support, while Māori agribusiness and tikanga-based initiatives continue, though their long-term funding is uncertain. Transitioning to high-value, low-emissions land uses like horticulture depends largely on private investment, which is challenged by high capital and production costs, labour availability, and a lack of processing or marketing infrastructure. Overall, there is moderate risk that current funding will be insufficient to support the transition.

Other barriers & opportunities **Significant**	Key barriers to transitioning to low-emissions land uses include limited access to capital – especially for Māori business – high setup costs, a lack of infrastructure, advisory services, and skilled labour. Enablers include streamlined consenting, improved supply chains, market access, processing facilities, and partnerships across value chains. Transitioning to high-value, low-emissions land uses is consistent with the Government's goal to double the value of exports, but it is unclear what specific policies would achieve this. RMA reform aims to reduce regulation in the sector, but it may not sufficiently address barriers to alternative land uses. Uncertainty around the replacement of the National Policy Statement for Freshwater Management (NPS-FM) and changes to freshwater standards may allow expansion of high-emissions land uses. The second emissions reduction plan includes plans to investigate removals from retiring peat land, expanding wetlands and on-farm vegetation. Plans for a biodiversity credit market have also recently been announced. These may incentivise retiring some farmland for nature, but details are yet to be developed.
Timeline **Significant**	The NZ ETS is in place and ongoing, although expected changes to forestry eligibility in the scheme aimed at restricting whole-farm conversions to forestry creates uncertainty about the extent of emissions reductions through conversions from livestock farming to forests. These restrictions are expected to be legislated by October 2025 and to apply retrospectively from December 2024. While Sustainable Food and Fibre Futures and Māori landowner support programmes are expected to continue, their impact is likely to be limited. Currently, there is no clear plan or roadmap to guide the transition to lower-emissions land uses.
Change since 2024	Our overall risk assessment for this area has not changed from significant risks in our 2024 assessment

Areas for attention

Addressing the risk of over-reliance on technological solutions

The second emissions reduction plan is heavily weighted towards technological solutions to farm (mainly ruminant) emissions. Should this approach fail, there is no back-up plan and the future impact of emissions reductions may be more severe. More focus on transition to high-value, low-emissions land uses could address this risk.

As we identified in our 2024 emissions reduction monitoring report, the national adaptation plan includes action on improving water availability and security.[168] This could help to enable increased land-use diversification and increase emissions reduction as well as aid climate change adaptation efforts. Recent work modelling land-use options at catchment level has shown opportunities to significantly reduce emissions (alongside improved freshwater quality), and increase economic output, particularly with additional access to irrigation.[169]

Supporting extension and advisory services for farmers

Well-designed extension and advisory services can support producers to understand where the emissions are generated in their systems and which mitigations will help reduce them. We assess that there is a still a gap in extension and advisory services that support farmers in these ways and increasing misinformation about climate change and climate action risks undermining positive action in the agricultural sector.[170] The MPI Science for Farmers initiative is making some progress reconnecting farmers and scientists,[171] but its reach may be limited. Developing localised farmer support groups and increasing support for early adopters offers an opportunity to demonstrate emissions reduction methods working on-farm and accelerate collective action.[172]

In our 2024 emissions reduction monitoring report, we highlighted that support for farmer catchment groups could result in further improvements in land management practices that could reduce on-farm emissions.

Incentivising earlier uptake of new farming practices and technology

There is little incentive currently for producers to act on agricultural emissions; however, the Government intends to implement agricultural emissions pricing by 2030. We have assessed that there is work for the Government to do to prepare farmers for that emissions pricing. Facilitating earlier uptake of new technology and farm practice in ways best suited to the agricultural sectors or individual farms could also help to realise the full benefit of the Government's research and development investment, and to maximise the country's competitive advantages.

Support for Māori farm businesses

There are complexities around Māori collective land ownership structures and governance that can limit the ability of these landowners to raise capital that would enable on-farm practice changes, implementing on-farm emission reductions, or changing land use. Greater support for Māori farm businesses and Māori solutions would help them, and the wider sector, to reduce on-farm emissions and transition to low-emissions land uses.

Biodiversity credits and non-forestry removals

The Government's second emissions reduction plan includes investigation of emissions removals from retirement of peat lands and the expansion of wetlands and on-farm vegetation. In April 2025 the Government announced it would seek to scale up a New Zealand biodiversity credit market to incentivise the protection and restoration of native wildlife,[173] which may enable expansions of wetlands and native vegetation on farms.

These actions may provide an alternative revenue stream that facilities retiring marginal farmland with corresponding gross emissions reductions and benefits for adaptation (see *Chapter 11: Removals* for more information).

New opportunities

New technology is on the cusp of commercial availability to farmers

These include a methane-reducing bolus from Ruminant Biotech,[174] Ecopond[175] and low-methane dairy genetics.[176] There is progress in work to develop proxy measurements for methane from markers in milk, which if successful will enable a rapid upscaling of low-methane breeding in dairy cattle.[177] Sheep breeders already have access to low-methane genetics due to the successful Cool Sheep Programme;[178] however, there is currently little economic incentive to make breeding decisions based on the methane breeding index. There is a further opportunity to highlight co-benefits of technology to productivity and the environment. For example, there is some evidence that sheep bred with low-methane genetics have a higher lean meat yield which is economically favourable;[179] and indications that use of Ecopond may be beneficial to the freshwater environment.[180]

New market incentives are emerging

The Fonterra Co-operative Difference scheme has been upgraded to offer additional payments and services to farms with the lowest emissions footprint for their milk.[181] Novel incentives such as these, which are funded by Fonterra's customers with scope 3 targets, may drive uptake of new technology if the incentives are great enough. As discussed in *Chapter 3: Enabling systems*, there is opportunity for government to partner with the private sector to provide greater incentive to farmers who act on emissions.

Additional emissions reductions are feasible

Our modelling shows that an additional 8.2 $MtCO_2e$ of emissions reductions can be achieved from agriculture in the third emissions budget, over what is planned in the second emissions reduction plan. This can be achieved by reducing emissions from agriculture, for example through greater adoption of lower emissions farming practices and technology, and through transitioning to lower-emissions land uses. This analysis is based on the Commission's 2024 advice for the fourth emissions budget.

Chapter 10

Waste and fluorinated gases

This chapter looks at greenhouse gas emissions across three areas: reducing organic waste to landfill, landfill gas capture and fluorinated gases.[xxxiv]

Emissions reductions from the waste and fluorinated gases sectors make up 15% of the net emissions reduction the Government is seeking in the second emissions budget period.

Waste sector emissions in 2023 were 3.8% of gross emissions (2.9 $MtCO_2e$). The waste sector produces 7.3% of gross methane emissions in Aotearoa New Zealand.

Most waste emissions (77.4%) come from organic waste decomposing within landfills, which creates methane and carbon dioxide. The remainder come from the biological treatment of solid waste (2.8%), burning of waste (6.1%), and from wastewater treatment and discharge (13.8%). Landfill emissions can be reduced by reducing organic waste to landfill and landfill gas (LFG) capture. While capturing LFG is a proven mitigation method that can offer co-benefits like energy generation, the most effective way to reduce emissions is to prevent the generation of landfill emissions in the first place.

Fluorinated gases (f-gases) are highly potent greenhouse gases containing fluorine, used in refrigeration, air conditioning and heating systems. Emissions from f-gases in 2023 (1.2 $MtCO_2e$) were 1.5% of the country's gross emissions. Types of f-gases used include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).

Most refrigerant emissions come from leaks in improperly installed or maintained equipment, and from disposal of equipment. Emissions from f-gases can be reduced using existing technology and practices: reducing usage, gas destruction, reducing bulk imports, reducing f-gases imported in products, and reducing leakage from products.

Key points

- *Waste:* There was a 0.7% or 0.02 $MtCO_2e$ decrease in waste emissions between 2022 and 2023, which may be due to increased waste diversion or fluctuation in LFG capture levels.

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xxxiv Waste and f-gases are reported in New Zealand's Greenhouse Gas Inventory within different sectors. F-gases exists as a subcategory under the industrial processes and product use (IPPU) sector. IPPU emissions are distinct from waste emissions from disposal.

- While choices made by individuals can reduce waste emissions by diverting organic waste away from landfill, these choices are constrained by the availability of access to infrastructure and services that support such diversion. Policy actions that support the low-emissions diversion of organic waste are necessary to realise the full potential emissions reduction from waste.
- Over the last 12 months, Government changes that could affect reduction in waste emissions include removing timebound targets, reducing funding, and removing policies including mandatory food waste collection in urban areas.
- Our assessment finds there are significant risks of not achieving planned waste emissions reductions. The risk assessment reflects reduced momentum on organic waste reduction and diversion away from landfill. It also reflects a lack of clarity about how the anticipated 1.9 $MtCO_2e$ reduction through organic waste management and LFG capture will be achieved by 2035.
- *F-gases:* There was a 22.9% or 0.3 $MtCO_2e$ decrease in f-gas emissions between 2022 and 2023.
- The Government is drafting regulations to introduce a regulated product stewardship scheme for synthetic refrigerants. This is expected to reduce emissions by 1.1 $MtCO_2e$ over the second and third emissions budget periods.
- Our assessment finds no significant risks relating to reducing emissions from f-gases.
- *The key areas for attention for waste and f-gases emissions are:*
  - missed policy opportunities for waste avoidance and reduction are putting increased pressure on reducing methane emissions from agriculture
  - there is need to build a transparent path to achieve the assumed improvements in LFG capture
  - a strategic resource recovery infrastructure plan and addressing the associated funding deficit could increase confidence to invest in resource recovery
  - it will be important to address the risk that thermal waste energy facilities using non-renewable feedstock may undermine emissions reduction efforts
  - there is a need for training and accreditation for f-gases handling to reduce leakage and an opportunity to increase the uptake of f-gas alternatives with lower Global Warming Potential (GWP).
- Opportunity: additional action to reduce organic waste sent to landfill could result in a further 1.1 $MtCO_2e$ of emissions reductions in the third budget period.

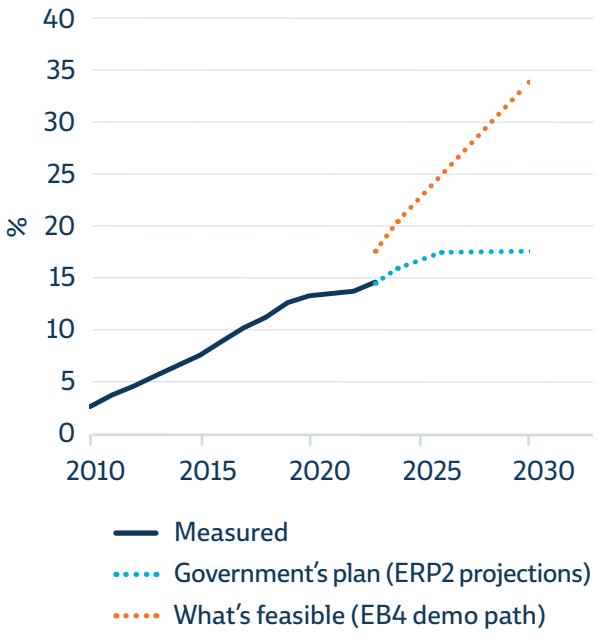
Progress to date

Emissions reduction

This section sets out the key shifts in waste and f-gas emissions. More detailed analysis and figures are available in the Technical Annex published on our website.

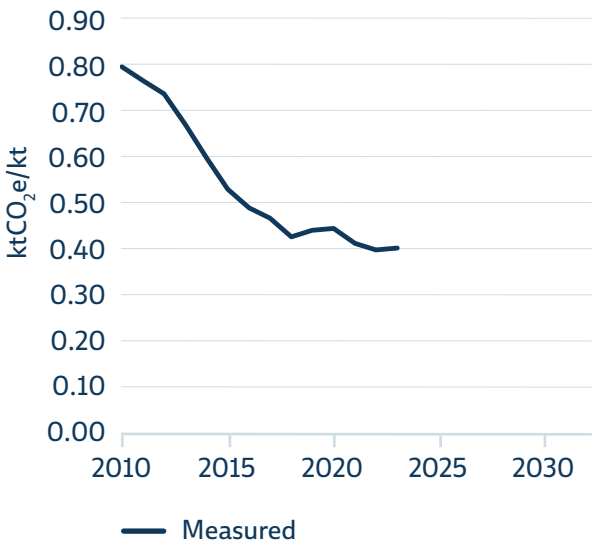
- The total amount of waste sent to landfill continues to rise. It increased by 33% between 2013 and 2023 including 2% in the latest year.
- There was a 0.7% or 0.02 $MtCO_2e$ decrease in waste emissions between 2022 and 2023. This emissions reduction may be due to the 4% increase in the proportion of garden, food and paper waste diverted away from landfill in 2023[xxxv] (**Figure 10.1**). Fluctuations in LFG capture levels may also have contributed to this reduction.
- The amount of methane emissions produced by municipal landfills appears to be steady at 0.4 $ktCO_2e$ per kilotonne of municipal waste disposed to landfill. This suggests that levels of LFG capture efficiency may have plateaued over the last 5–10 years (**Figure 10.2**).

Figure 10.1: Diversion of organic waste away from landfill



Source: Commission analysis

Figure 10.2: Methane production relative to waste tonnage



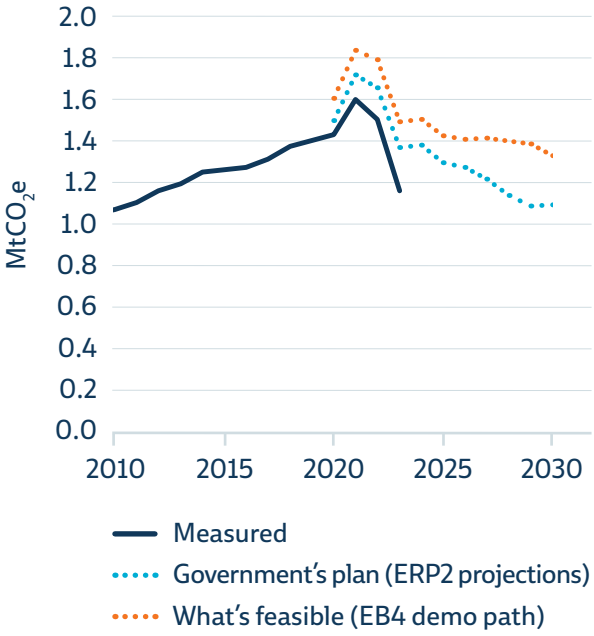
Source: Commission analysis

xxxv In addition to waste composition, variations in temperatures and moisture content can also impact emissions levels, along with the types of landfill cover used as part of landfill management.

The key trends for emissions related to f-gases include:

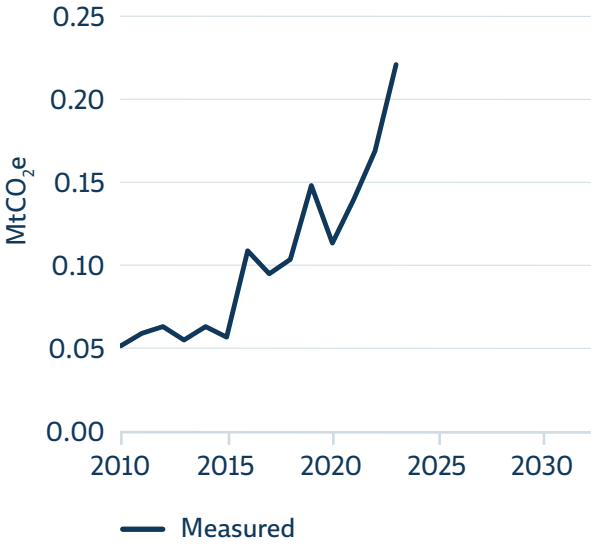
- A decrease in the total amount of f-gas emissions of 0.35 $MtCO_2e$ since 2022. This 23% reduction may be influenced by the slowing of heat pump sales in 2023, with disposal emissions from retired equipment decreasing as a result (**Figure 10.3**).
- A continued increase in the recovery of HFCs, and the export of HFCs and PFCs for destruction[xxxvi] – the level of HFC recovery in 2023 was 30% higher than 2022 (**Figure 10.4**).
- Imports of HFCs and PFCs in pre-charged equipment continue a falling trend, having decreased by 53% since 2016. This is likely due to the increased use of low GWP gases being used in products manufactured overseas.

Figure 10.3: Total emissions from f-gases



Source: Commission analysis

Figure 10.4: Recovery of HFCs



Source: Commission analysis

xxxvi As the construction of the anticipated refrigerant waste destruction facility in Kawerau is not yet complete, on-shore f-gas destruction has not yet commenced. Facility commissioning is currently scheduled for the end of 2025.

Policy changes

This section sets out policy changes that could increase or decrease waste or f-gas emissions.

Changes in the 12 months up to 1 April 2025

Over the last 12 months, Government actions have significantly reduced the momentum on organic waste reduction and diversion away from landfill.

- The New Zealand waste strategy 2023 was superseded by the New Zealand waste and resource efficiency strategy 2025. This removed timebound targets for waste generation, diversion and specific emissions reductions for waste.
- Waste levy funding was cut by NZ$177 million over four years from 2024/25 to 2027/28, with the potential use of the Waste Minimisation Fund now broadened to fund functions that had not typically been levy funded.
- Policy support ceased for: the separation and diversion of food waste away from landfill for households and businesses; recycling requirements for all urban areas; food waste diversion requirements for councils; and data reporting for private household recycling providers.
- Development ceased on a national resource recovery network and a consumer and business behaviour change campaign to avoid organic waste.
- The Government approved drafting regulations to introduce regulated product stewardship for synthetic refrigerants.[182] This is expected to reduce emissions by 0.4 $MtCO_2e$ in the second emissions budget period and 0.7 $MtCO_2e$ in the third budget.

Changes since the start of 2022

- Development stopped on a resource recovery and waste minimisation infrastructure plan to guide investment over a 10-year period.
- Decisions were put on hold on prohibiting the import of products containing high-GWP f-gases, on regulatory proposals to prohibit the sale and use of high-GWP f-gases where alternatives are available, and on developing provisions for ensuring worker safety.

Policy assessment

We use policy scorecards to assess the adequacy of policy plans in these outcome areas: reducing emissions from landfill, and reducing f-gas emissions.

see next page

Policy scorecard: Reducing organic waste to landfill

Overall assessment	
Significant risks	There are significant risks that the policy package will not deliver the level of emissions reductions necessary without a broader suite of policy action to support the appropriate resource recovery diversion facilities and services being established and used effectively.

Summary of analysis informing overall assessment	
Main tools **Significant**	The waste sector policy package creates significant risks for the achievement of anticipated emissions reductions as there is no transparent plan guiding use of the Waste Minimisation Fund, and there is a lack of broader policy action to support sustained organic waste reduction at a systems level.
Funding and finance **Significant**	Use of Waste Minimisation Fund funding may be limited in its ability to achieve the level of diversion required without additional funding and a broader suite of policy support. The waste management and resource recovery infrastructure and service funding deficit is estimated at $4 billion.[183] The absence of policy signals around restricting organic waste disposal in future may also undermine private sector investment required.
Other barriers & opportunities **Significant**	Entrenched waste disposal practices within society, a lack of transparent strategic national-level planning for waste minimisation infrastructure funding investment, and a lack of access to organic waste diversion facilities and services within communities, create barriers for the achieving of emission reductions. Opportunities in this area include broadening policy action to include a timebound and targets-based pathway for: • planning and establishing transparent network resource recovery facilities and services. • providing regulatory and policy support to ensure the effective use of those resource recovery facilities and services.
Timeline **Significant**	Significant timeline risks may occur as a consequence of: • potential delays in resource recovery infrastructure development • possible lack of private sector investment • inaccessible diversion infrastructure and services • lack of policy support necessary to shift away from entrenched disposal-based practices.
Change since 2024	The risk level has increased from moderate to significant risks due to policy changes in the last year which are likely to increase waste emissions.

Policy scorecard: Landfill gas (LFG) capture

Overall assessment

Significant risks	There are significant risks to achieving the emissions reductions in this area due to the lack of a transparent path to achieve the assumed improvements in LFG capture.

Summary of analysis informing overall assessment

Main tools **Significant**	The main tools are LFG capture regulations and the NZ ETS. The Government proposed to review LFG capture regulations and related ETS policy settings; however, there are significant risks that the proposed emissions reductions will not result because: • the means to achieve an average increase LFG capture efficiency by 5% is unclear • the expansion of LFG capture to all Class 1 (municipal) landfills by 2050 may result in negligible emissions reductions due to long time-horizon[xxxvii] • there remains uncertainty as to whether the review will result in the expansion of LFG capture systems to Class 2 landfills or other landfills • it is unclear how, or if, the policy settings will be improved to promote the installation of optimal LFG capture systems.
Funding and finance **Moderate**	As the current LFG capture related policy is review-based and has no definitive actions, cost implications cannot be determined. However, there are risks due to the lack of effective regulatory requirements or incentives to stimulate the investment in more efficient LFG capture systems.
Other barriers & opportunities **Moderate**	Barriers include the lack of requirements to install LFG capture infrastructure at non-municipal landfill sites and closed municipal landfills, and high-performance LFG capture not being effectively incentivised through policy mechanisms.[xxxviii] The LFG-related policy review action provides a valuable opportunity to address these issues. Public transparency relating to the review work would be beneficial.
Timeline **Insufficient**	Due to the high-level scope of policy action, and lack of detail around decision-making pathways, there is a high level of uncertainty around timelines.
Change since 2024	The first emissions reduction plan had clear, defined timeframes for LFG gas capture policy. The assessed risk has increased from moderate to significant risks because of the increased ambiguity around the pathway and timelines.

xxxvii We also note an inconsistency between the 2050 policy timeline, and modelling assumptions that consider the emissions reduction benefits from LFG installation will be realised by 2030.

xxxviii The current policy package does not efficiently incentivise or promote the installation of optimal LFG capture systems because, in effect, NZ ETS costs are passed on to landfill users. See: www.climatecommission.govt.nz/ERP2

Policy scorecard: Reducing emissions from f-gases

Overall assessment	
No significant risks	We consider there are no significant risks for the achievement in f-gas reductions in the second and third emissions budgets.

Summary of analysis informing overall assessment	
Main tools **No significant risks**	The main tools are legislative restrictions on hydrofluorocarbons (HFCs), NZ ETS pricing, training and accreditation for handling alternative gases, and a regulated product stewardship scheme for synthetic refrigerants. These are credible tools to achieve emissions reductions in this sector.
Funding and finance **No significant risks**	Overall, NZ ETS pricing is proving effective in stimulating action to achieve f-gas destruction. The Government's funding and finance pathway to achieve f-gas reduction is therefore considered credible.
Other barriers & opportunities **No significant risks**	There remain several unrealised opportunities to address barriers limiting f-gas reduction; however, these do not pose significant risks to the reduction in f-gas emissions within the second and third emissions budgets.
Timeline **No significant risks**	While there is ambiguity around f-gas data, and constraints limiting the prohibitions on the imports of pre-charged equipment containing high-GWP f-gases, at this stage we do not consider these risks to be significant given the work underway to implement mandatory product stewardship for refrigerants.
Change since 2024	The overall assessment has lowered from moderate risks in 2024 to no significant risks, as risks around timelines have reduced.

Areas for attention

Missed opportunities for waste avoidance and reduction put increased pressure on reducing methane emissions from agriculture

Aotearoa New Zealand's split gas approach means there are different goals for biogenic methane emissions and other types of emissions. Waste is a significant source of methane, so if opportunities to reduce waste emissions fall short, then the other major source of methane, the agricultural sector, will need to do more to reduce emissions.

Clear and targeted policy support for waste avoidance and diversion could deliver emissions reductions in waste. Specific opportunities include:

- establishing a timebound and targets-based pathway for planning and a policy package would enable the effective use of resource recovery facilities and services
- implementing wider policy support for organic waste diversion to help stimulate private sector investment in organic waste diversion and bioeconomy infrastructure
- reducing LFG emissions from Class 2 landfills: the total level of biodegradable materials at Class 2 landfills (by weight) ranges from 40% to 70%[184]
- addressing current inequities that limit the ability of iwi/Māori groups to apply and effectively compete for waste minimisation funding by establishing a proportion of contestable funding for initiatives led by iwi/Māori.

There is need to build a transparent path to achieve the assumed improvements in LFG capture

It is unclear how a 5% average increase in LFG capture rates for Class 1 landfills (with existing LFG capture) will be achieved by 2030. It is also unclear if the LFG policy review will address the shortcomings of policy mechanisms to incentivise higher-performance LFG capture.[xxxix] Further, the lack of detailed policy action within the second emissions reduction plan detailing how the Government will achieve a reduction of 1.9 $MtCO_2e$ of emissions by 2035 through LFG capture, creates ambiguity and increases risks of the country's emissions budgets not being achieved.

A strategic resource recovery infrastructure plan could increase confidence to invest in resource recovery

A clear long-term resource recovery infrastructure plan would provide strategic direction to investors and would make more apparent the need to strengthen resource recovery infrastructure within each region. Such a plan would promote transparency and confidence for territorial authorities, businesses, and iwi/Māori who may be interested in investing in resource recovery. Aotearoa New Zealand's waste management and resource recovery infrastructure funding deficit also requires attention.

xxxix See our advice to the Government on the second emissions reduction plan for more information: https://www.climatecommission.govt.nz/public/Advice-to-govt-docs/ERP2/final-erp2/ERP2-Final-Advice-for-web.pdf

It will be important to address the risk that thermal waste-to-energy facilities using non-renewable feedstock may undermine emissions reduction efforts

Establishing thermal waste-to-energy facilities can lock in the supply of waste as feedstock. Using non-renewable feedstock has the potential to undermine waste reduction and recycling efforts and displace the use and advancement of renewable and more sustainable electricity generation options. A precautionary approach would be beneficial. This is discussed further in our advice to the Government on the second emissions reduction plan.[185]

Need for training and accreditation for f-gases handling to reduce leakage

There is ongoing need for standards for training and accreditation for handling f-gases for reducing f-gas leakage. This was highlighted as a new opportunity in the 2024 emissions monitoring report. F-gas labelling and tracking should be considered as part of the development of regulatory tools to support f-gas reduction. There is an opportunity to address this through the introduction of regulated product stewardship for synthetic refrigerants.

There are benefits of increasing the uptake of f-gas alternatives with lower GWP

Increasing the awareness and knowledge to enable further uptake of alternatives with lower GWP could help achieve further f-gas emissions reductions. Uptake could also be improved by addressing the potential cost barriers to switching to refrigerants with lower GWP for some businesses and consumers.

New opportunities

Additional action to reduce organic waste sent to landfill could result in a further 1.1 $MtCO_2e$ of emissions reductions in the third budget period beyond what is anticipated through the second emissions reduction plan.

Chapter 11

Removals

This chapter looks at greenhouse gas emissions removals through carbon dioxide (CO_2) absorption by forests. Non-forest removals are also considered.

Greenhouse gas 'removals' are the flip side of emissions: instead of releasing carbon into the air, carbon dioxide removal (CDR) activities absorb CO_2 from the atmosphere. Planting new forests and improving management of existing ones are currently the only types of removals counted in emissions budgets and the 2050 target in Aotearoa New Zealand. Net emissions are calculated as the difference between gross emissions and removals. Other types of removals, such as restoring wetlands and peatlands, are under consideration for further development and future inclusion.

Forestry both contributes to removals and creates emissions. Removals can be increased by increasing afforestation, reducing deforestation, improving forest management practices, and increasing long-lived harvested wood products.

Forestry removals in 2023 were –5.3 $MtCO_2e$. Removals through forestry make up 33% of the net emissions reduction the Government is seeking in the second emissions budget period.

Key points

- Forestry removals decreased in 2023, down 1.5% to –5.3 $MtCO_2e$ from 2022 removals of –5.4 $MtCO_2e$.
- This is less than half of the annual removals estimated from 2008 to 2019. The amount of net removals has been declining since 2020 largely due to planted forests maturing into harvest cycles.
- Native afforestation continued at similar levels to recent years (5,529 hectares in 2023). This can be attributed to legacy funding programmes and incentives.
- Exotic afforestation remained high in 2023 (77,893 hectares), near the 2022 peak of 79,555 hectares.

continues next page

- The Government has introduced several policy changes, notably restrictions on New Zealand Emissions Trading Scheme (NZ ETS) registrations of whole-farm conversion to forest based on land-use capability class.
- Amendments to the first emissions reduction plan discontinued several programmes, creating funding gaps in key areas such as native afforestation, biodiversity and biosecurity. Legacy programmes are either closed or winding up in 2028.
- Removals through forests in the first emissions budget are on track, primarily due to past afforestation. Moderate risks for removals in the second emissions budget stem from a lack of funding, plans and policy, and the ongoing possibility of deforestation. These issues continue into the third emissions budget, with significant risks from increased uncertainties and gaps.
- Key areas for attention in removals are:
  - prioritising reducing gross emissions across all sectors to limit reliance on removals in meeting emissions budgets
  - continuing to rebuild confidence in the NZ ETS by ensuring decisions on the scheme are well considered and clearly signalled to support stabilising afforestation and deforestation trends
  - careful consideration and public consultation on the proposal for forest planting on Crown-owned land as well as further investigation of its potential contribution to removals and appropriate implementation
  - ensuring effective incentives for indigenous afforestation and enduring carbon sinks, while addressing wider environmental, social and economic considerations to promote improved sustainability and social licence.

Progress to date

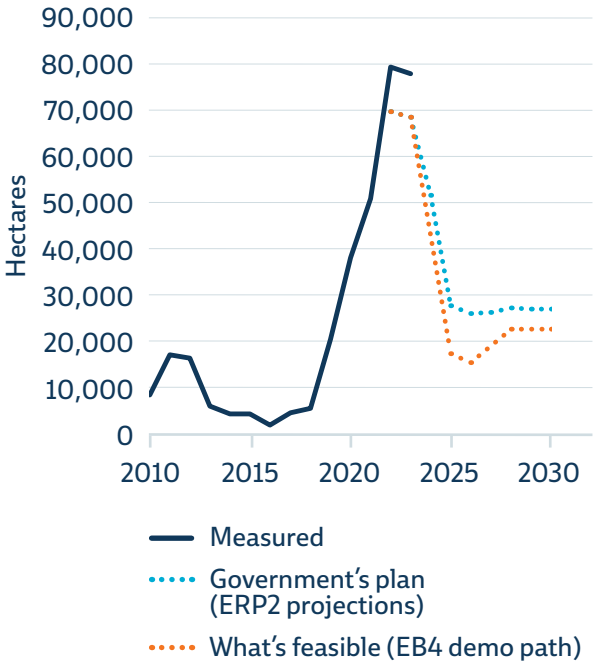
Forestry removals

This section sets out the key shifts in forestry removals. More detailed analysis and figures are available in the Technical Annex published on our website.

- Overall, net forestry removals under target accounting were –5.3 $MtCO_2e$ in 2023. This continues a declining trend begun in 2020.
- Exotic afforestation peaked at 79,555 hectares in 2022 and remained high at 77,893 hectares in 2023 (**Figure 11.1**).[xl]
- Indigenous afforestation decreased by 19%, from 6,829 hectares in 2022 to 5,529 hectares in 2023 (**Figure 11.2**).[xli]
- Total deforestation is estimated to be declining since 2020 (**Figure 11.3**). Estimated deforestation since 2000 was higher (by 25,000 hectares) than previously reported in the most recent GHG Inventory.
- The highest amount of deforestation occurs in post-1989 exotic forests, and the least amount occurs in post-1989 native forests. Deforestation figures are provisional pending confirmation.

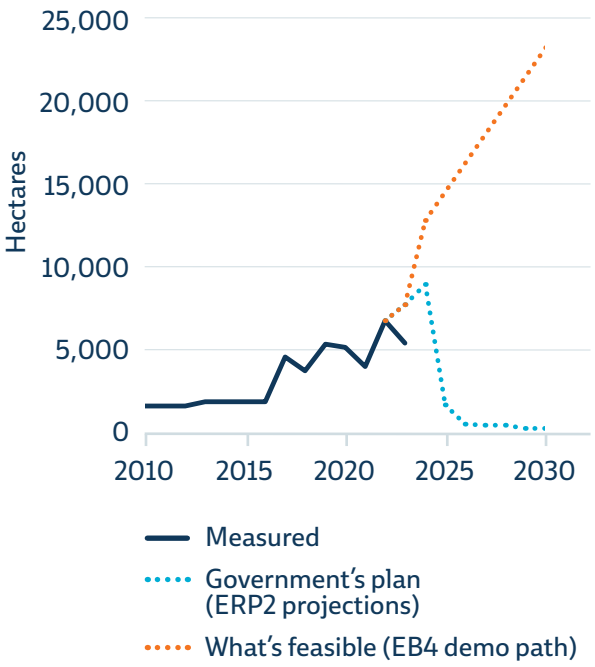
xl The Afforestation and Deforestation Intentions Survey 2024 was not available at time of writing.
xli The Afforestation and Deforestation Intentions Survey 2024 was not available at time of writing.

Figure 11.1: Exotic afforestation



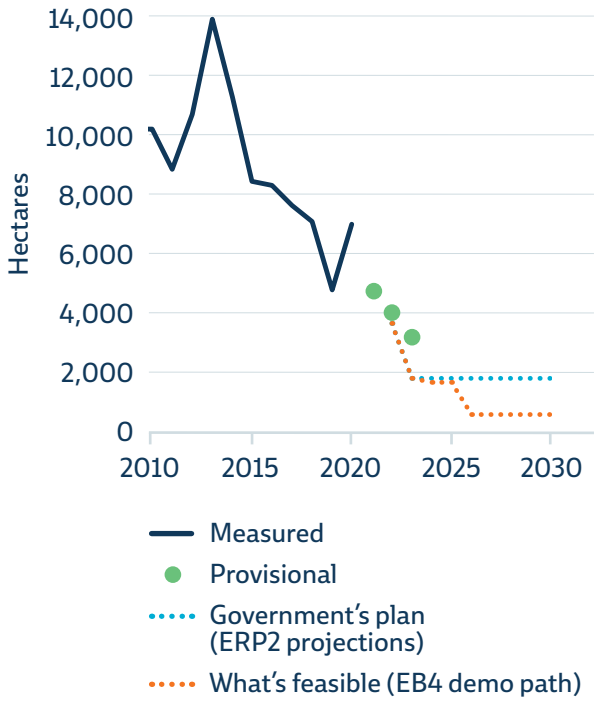
Source: Commission analysis of GHG Inventory data

Figure 11.2: Indigenous afforestation



Source: Commission analysis of Stats NZ data

Figure 11.3: Total deforestation



Source: Commission analysis of Stats NZ data

Policy changes

This section sets out policy changes that could increase or decrease the amount of carbon dioxide absorbed by forests.

Changes in the 12 months up to 1 April 2025

- Changes to the NZ ETS registry, reduction of NZ ETS charges, and restrictions on registering farm conversions to exotic forests on land-use capability (LUC) classes 1–6.
- Removal of the first emissions reduction plan actions: 'right tree, right place' and 'prioritise nature-based solutions'.[186]
- Proposal for 'planting trees on low-value Crown-owned land', with a Request for Information conducted early 2025; further information is expected later in the year.[187]
- The first detailed plan for Forest Management Accounting in the First Biennial Transparency Report was published in December 2024. In addition to providing further detail about the averaging approach adopted for post-1989 forests via the 'Long Term Average' (LTA), it published the first estimate of the 'Forest Reference Level' (FRL) for pre-1990 forests that allows the introduction of the Forest Management category to target accounting.[188]
- The Government is proposing options for providing units under the NZ ETS for wood processors based on the embedded carbon captured in longer-life timber products.

Changes since the start of 2022

- The Forestry and Wood Processing Industry Transformation Plan (Forestry ITP) was discontinued, which included future planning and improving integration across the sectors.
- Following Cyclone Gabrielle, the Ministerial Inquiry into Land Uses in Tairāwhiti-Gisborne and Wairoa[189] made recommendations for forestry management of woody debris (including forestry debris) and associated sediment. This was part of recommendations on an integrated approach to storm recovery, land-use management, environmental, economic, and community considerations, and leadership and governance. Follow-on efforts have included reducing risk, such as clearing woody debris; improving forest management, including informing the reviews on national environmental standards for plantation forestry; and building community partnerships.
- The National Environmental Standards for Commercial Forestry (NES-CF) amended the National Environmental Standards for Plantation Forestry 2017 (NES-PF) in November 2023. This change provided nationally broad-scale regulations to manage associated environmental impacts.

Policy assessment

In this section we use a policy scorecard to assess the adequacy of policy plans for forest removals.

Policy scorecard: Forestry removals

Overall assessment

EB2: Moderate risks	Moderate risks were identified for the second emissions budget period. While carbon removals are largely locked in by existing forests, there are outstanding risks if more afforestation and/or deforestation occurs than anticipated, with insufficient policy mechanisms to prevent this.
EB3: Significant risks	For the third emissions budget period, risk increases due to uncertainty around the impact of restrictions on registering exotic forests in the NZ ETS and a lack of information on the proposal to afforest Crown-owned land. There is also a lack of broader policy support, particularly for indigenous afforestation. Current actions are insufficient to support the level and type of forest planting and forestry management practices needed to ensure sustained long-term forest carbon sinks.

Summary of analysis informing overall assessment

Main tools	The Government has chosen the NZ ETS as the main policy tool to deliver increased long-term forest carbon sinks, which focuses on market dynamics. Funding programmes to support planting are another tool; most have closed to new applications.
EB2: Moderate	Forest removals are largely locked in for the second emissions budget period. However, there are moderate risks around deforestation.
EB3: Significant	For the third emissions budget period, risks are significant due to market uncertainty around the NZ ETS; unknown effects of measures to restrict and limit registration of exotic afforestation in the NZ ETS for certain LUC classes; lack of clarity around the proposal to plant trees on Crown-owned land; and the lack of broader policies to support forest planting, particularly for indigenous forests. Regarding the proposed afforestation on Crown-owned land policy, there are many uncertainties, including the carbon removal that may be realised and potential risks in a number of areas.

Funding and finance **EB2: Moderate** **EB3: Significant**	The NZ ETS provides the primary incentive to deliver forest removals. However, emissions prices in the NZ ETS are not guaranteed and depend on government policy decisions. The lack of regulatory predictability around future NZ ETS settings and how medium-term challenges for the scheme will be addressed can undermine investor confidence, limiting the planting needed now to achieve net emissions reductions in the third emissions budget period and beyond. Support and incentives for indigenous afforestation are lacking with previous funding projects now largely ended. The Wood Processing Growth Fund has been signalled as an important part of support; however, it is unclear that this will affect a transformational shift in the sector.
Other barriers & opportunities **EB2: Moderate** **EB3: Significant**	Several Māori entities identified ongoing issues around accessing capital; eligibility for funding due to small and fragmented parcels of land; and a reluctance to burden future generations with NZ ETS-associated land management costs and limited options for alternative land uses. The capacity to respond to policy changes and access to information are also challenges. There are few incentives for planting indigenous species over exotics in the NZ ETS. There is limited evidence of steps taken to address wider barriers and opportunities for forest removals beyond the NZ ETS and restricting farm conversions. The discontinuation of the 'right tree, right place' action has removed further opportunities to address barriers and social licence.
Timeline **EB2: Moderate** **EB3: Significant**	There are moderate risks for the second emissions budget period due to recent historically high rates of planting and ongoing emissions from those land-use transitions as well as the ongoing possibility of deforestation, from which there is no time to recover during the second emissions budget period. For the third emissions budget period, there are significant risks due to a lack of policy planning, including changes needed for the NZ ETS to sufficiently support afforestation and disincentivise deforestation; effects of the proposed afforestation on Crown-owned land policy; and support for permanent indigenous forests. The risk of carbon loss from deforestation also exists in the third emissions budget period.
Change since 2024	The third emissions budget score increased to significant risks due to increased reliance on forest removals and uncertainty about the implications of proposals for NZ ETS restrictions and Crown-owned land afforestation on both afforestation rates and carbon sequestered. Amendments to the first emissions reduction plan discontinued two programmes that would have supported forestry as a long-term carbon sink.

Areas for attention

Risk of over-reliance on forest removals

Under the second emissions reduction plan, forest removals are expected to comprise 33% of net emissions reductions sought in the second emissions budget and 46% in the third emissions budget. The Government's ERP2 path employs an additional 800,000 hectares of exotic forests through 2070 compared to the Commission's EB4 demonstration path, which focuses on reducing gross emissions.[xlii] This results in 700,000 fewer hectares of sheep and beef land and 100,000 fewer hectares of dairy land by 2070 under the ERP2 scenario.

This heavy reliance on forests would require higher levels of planting past 2050 to counterbalance ongoing greenhouse gas emissions and impose a commitment to maintain the forests to ensure that emissions remain net zero in perpetuity. The effects of climate change (such as altered growing conditions, wildfire and drought) and human activity pose risks to the permanence of carbon storage in forests.[190]

The Commission's previous reports showed how reducing emissions at source across all sectors would reduce the reliance on removals through the forests sector. This approach would reserve forest removals for emissions that are more difficult to address, provide greater resilience to emissions reduction efforts, and improve confidence in sufficiency of actions to meet emissions budgets. Reducing gross emissions often provides broader benefits to society than would be achieved by only increasing forest removals – such as improved air quality, warmer and drier homes, health benefits from active transport, and jobs in new and innovative sectors.

A considered, well-signalled evolution of the NZ ETS to support market confidence and investment

There is a need to begin now to consider how the NZ ETS needs to evolve to address the challenges of the 2030s and beyond. Afforestation and deforestation trends are highly responsive to fluctuations in New Zealand Unit (NZU) prices. Making decisions in a considered, well-signalled way, ahead of issues becoming imminent, will help participants have the confidence in the market necessary to support investment in afforestation and to deter deforestation (see *Chapter 4: Emissions pricing*).

Ecologically and culturally appropriate land management on Crown-owned land

The second emissions reduction plan highlights partnering with the private sector to afforest Crown-owned land as one of its forest removals initiatives.[xliii] The proposal's three objectives are to contribute additional removals, grow the forestry and wood processing sector, and utilise Crown land deemed as "low value".[191] There is insufficient information available to assess this proposed policy, which is under development. The Government has not yet made timelines publicly available.

The Government identified 325,000 hectares of Crown-owned land that could potentially be used for planting exotic and indigenous trees.[192] The scenario's objective was to 'gap fill' 5 $MtCO_2e$ at 2050, which determined the amount and type of planting and the carbon yield tables used; as such, the scenario may overestimate the potential carbon removals that can be achieved or the land available. The proposal anticipates making a suite of legislative changes, including to environmental and overseas investment acts, to allow for the policy and its implementation.

xlii Under the Commission's EB4 demonstration path there would be 2.5 million hectares of exotic forest in 2050 increasing to 2.6 million hectares in 2070. Under the ERP2 path there would be 2.9 million hectares of exotic forest in 2050 increasing to 3.4 million hectares in 2070.

xliii Contrary to what is stated in the second emissions reduction plan (p.13), this is not an emissions reduction policy.

Public concerns have been raised about the suitability of the land included in the proposal and trade-offs for indigenous ecosystems.[193] It is unclear how the intended partnerships and outcomes may be delivered. It is important that a large-scale afforestation programme on Crown-owned land be guided by ecologically and culturally appropriate land management and subject to open public consultation.

Benefits of indigenous afforestation and permanent forests

Planting permanent forests and indigenous afforestation considerably lags exotic monoculture production forests. Currently, the NZ ETS and limited funding programmes are the main tools to encourage increases in indigenous afforestation.

Further incentivising indigenous afforestation, particularly as enduring carbon sinks, would likely be beneficial across social, economic and environmental considerations.[194] For example, recent research showed sediment retention improved by planting indigenous trees on highly erodible land used for pasture. Moreover, the results showed indigenous trees sequestered more carbon than currently included in the carbon yield tables.[195] There are opportunities to prioritise information improvements such as updating carbon yield tables to support decision-making and encourage indigenous afforestation.

New opportunities

Research continues into key areas for afforestation and forestry management, including maximising carbon sequestration potential, improving native afforestation methods, and investigating associated cost savings.[196] Public dissemination of the insights gained from this forest research can improve systems and address barriers.[197]

One option for expanding permanent indigenous afforestation and developing nature-based non-forestry removals (see below) could be to make them the focus of a Crown-owned land policy focused on ecologically appropriate, restorative carbon sequestration.

Refer to the 2024 emissions reduction monitoring report for previously identified opportunities.

11.1 Non-forest carbon removals

The Government's second emissions reduction plan highlighted non-forestry removals as a means to expand the portfolio of carbon dioxide removal (CDR) to be recognised in the country's target accounting for the purpose of meeting domestic and international climate targets. The Government intends to develop a framework for non-forest removal recognition, including assessing readiness and gaps, but did not include any specific actions, policies, plans, or timelines. As such, we did not carry out a targeted policy assessment or develop specific outcome areas for non-forest carbon removals.

CDR activities include both biological means – that is, CO_2 absorption by non-forest ecosystems, such as wetlands, peatlands riparian corridors, coastal vegetation and mangroves – and technology-driven geological or chemical processes, such as enhanced rock weathering, ocean fertilisation or direct air capture (DAC).

CDR activities are important for the contribution they make to climate change mitigation. Internationally, removing carbon, rather than offsetting or avoiding emissions, is considered essential for reducing global greenhouse gas emissions to net zero and limiting global temperature increase to the 1.5°C threshold,[198] in parallel to (not as a substitute for) gross emissions reduction. It is important to distinguish the function of CDR activities: they are not emissions reductions in and of themselves but rather remove atmospheric CO_2 concentrations through capture and storage. This also differentiates CDR activities from other carbon capture technologies that separate or capture emissions at source and store or use them, and so are avoided emissions (emissions reductions) rather than removals (see *Chapter 7: Energy, industry and buildings*).

The second emissions reduction plan acknowledges using non-forestry removals to count towards targets would require changes to national accounting. Expanding target accounting beyond the scope used to set the existing 2050 target would be cause for a review to ensure its integrity and prevent undermining the ambition of climate commitments.[199] Whether introducing new CDR raises the country's level of ambition deserves scrutiny.[200] While CDR can generate accounting debits (emissions) as well as credits (removals), the inherent purpose of including non-forestry removals is to take advantage of their carbon sequestration potential.

In the second emissions reduction plan, the key action for non-forestry removals focuses on developing a framework for recognition, meaning inclusion in the NZ ETS or another mechanism. An essential precursor to incentives is to bring the non-forestry CDR categories into target accounting. Emissions budgets and the 2050 target also need to be set in a way that has environmental integrity and meets international standards (e.g. additionality, permanence, and scientific credibility).[201] Just as not all the forests counted as removals in target accounting are registered in the NZ ETS, including non-forestry removals in targets and budgets requires their existence but not necessarily a market or recognition scheme.

Bringing new categories of removals into the NZ ETS without first including them in target accounting would undermine its ability to support meeting emissions targets and make targets harder and more costly to meet. Doing so could also bring forward the date when the NZ ETS emissions cap reaches zero (projected to be the mid-late 2030s).[202] Notably, such issues are recognised by the Crown-owned land afforestation proposal, which aims for as little as possible of any new forestry to register in the NZ ETS with the express intent of minimising the impact of the scheme on the NZ ETS.[203]

Technical glossary

Note there is a reo Māori glossary provided at the end of *Chapter 5: Whakahekenga rehukino*, which provides English contextual translation of kupu Māori used in that chapter.

2050 target	The target set out in the Climate Change Response Act 2002, for Aotearoa New Zealand to: • reduce emissions of greenhouse gases, other than biogenic methane, to net zero by 2050 and beyond – this relates to emissions of carbon dioxide, nitrous oxide, non-biogenic methane and fluorinated-gases (hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride). • reduce biogenic methane emissions by at least 10% by 2030 and 24–47% by 2050 and beyond, compared to 2017 levels. The target does not currently include international shipping and aviation emissions.
additionality	What an action or intervention has accomplished, compared to doing nothing. Emissions reductions or removals are considered additional if they would not have occurred under business-as-usual conditions and without the policy or activity in question.
afforestation	The conversion of land from another use, such as pasture for grazing, to forest.
alternative fuels	Liquid fuels derived from sources other than fossil fuels like petroleum or diesel.
average global temperatures	An estimate of Earth's mean surface air temperature, averaged globally.
bioeconomy	The parts of the economy that use renewable biological resources to produce food, products, and energy.
bioenergy	Energy from biological materials such as wood or food waste.
biofuels	Renewable fuels, such as ethanol and biodiesel, made from biomass and renewable hydrocarbons.
biogenic methane	All methane emitted in the agriculture and waste sectors, mainly from ruminant animals and decomposing waste (as reported in New Zealand's Greenhouse Gas Inventory).
biomass	Organic material from living sources – such as wood and wood waste, crops or animal manure – that can be used as an energy source.

'black pellet' fuel	A type of biomass pellet that can be used as an alternative to coal.
bolus	A slow-release capsule administered to ruminant animals via the mouth to deliver a methane-inhibiting compound to the rumen over an extended period.
carbon capture and storage (CCS)	Refers to a suite of technologies that capture carbon dioxide emissions from an industrial or energy-related point source (such as a factory chimney) for permanent storage in a biological or geological reservoir.
carbon dioxide removal (CDR) techniques	Over 99% of current CDR is from conventional methods including afforestation. Novel methods (non-conventional) include techniques such as biochar, bioenergy with carbon capture and storage, and direct air capture with carbon capture and storage.
carbon yield tables (look-up tables)	Shows the amount of carbon stored in a forest as it grows (usually in tonnes of carbon per hectare by age and forest characteristics). Distinct tables can be developed by species, forest type, or location.
circular economy	Refers to an economic system based on designing out waste and pollution, reusing products and materials. This system promotes the circularity of resources and energy within production systems by establishing a restorative cycle and regenerating natural systems.
Climate Change Response Act 2002	The Act that establishes the Climate Change Commission and contains the framework for the 2050 emissions reduction target and emissions budgets. It also provides a legal framework to enable Aotearoa New Zealand to meet its international obligations under the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement; and provides for the implementation of the New Zealand Emissions Trading Scheme (NZ ETS) and the synthetic greenhouse gas levy.
climate mitigation	Human actions to reduce emissions by sources or enhance removals by sinks of greenhouse gases. Examples of reducing emissions by sources include walking instead of driving a fossil-fuel powered vehicle, or replacing a coal boiler with a renewable electric powered one. Examples of enhancing removals by sinks include growing new trees to absorb carbon, or industrial carbon capture and storage activities.
co-benefit	A positive effect that a policy or measure aimed at one objective has on another objective, thereby increasing the total benefit to society or the environment.

CO_2e	Carbon dioxide equivalent. This is a way to describe different greenhouse gases on a common scale. One of the most frequently used approaches is to relate the warming effect of emissions of a particular gas to that of carbon dioxide, over a specified period of time. Under the rules set out by the United Nations Framework Convention on Climate Change, it is calculated by multiplying the quantity of that greenhouse gas by the relevant Global Warming Potential (GWP). The current values used are the 100-year GWPs (GWP_{100}) from the Intergovernmental Panel on Climate Change (IPCC) 5th assessment report (AR5).
decarbonise	To reduce the levels of carbon emissions (such as carbon dioxide) caused by or involved in something, such as an activity or process.
deforestation	The conversion of forest land to another use such as grazing or urban development. In greenhouse gas emissions accounting and policy relevant to Aotearoa New Zealand, deforestation is defined as clearing forest and not replanting within four years. It does not include harvesting where a forest is replanted.
demonstration path	A pathway for how Aotearoa New Zealand could meet emissions budgets and the 2050 target. It is a set of measures and actions within sectors that could deliver recommended emissions budgets.
direct air capture (DAC)	A technology that removes carbon dioxide from the atmosphere using electricity and stores it underground or uses it for other purposes. Can also be referred to as direct air carbon capture and storage (DACCS) when combined with permanent storage.
dispatchable generation	Electricity generation that is available to turn on as needed to match electricity demand.
distributed flexibility resource	These are controllable energy resources, located in the electricity distribution network (e.g. power lines and sub-stations) or within consumer premises. They include battery energy storage systems, electric vehicles, solar photovoltaics, and other demand response technologies. A distributed flexibility resource (DFR) provides energy services to its owner/operator and to the energy system. Electricity lines companies can use DFR as non-network solutions – an alternative to investing in greater distribution network capacity.
distributed generation	A variety of technologies that generate electricity at or near the point of use. These can be household-scale systems like rooftop solar and batteries, or larger-scale systems like solar farms, wind turbines, grid-scale batteries and micro-hydro schemes. They are connected directly to local networks rather than to the national grid.

dry year	In Aotearoa New Zealand, hydro lakes only hold enough water for a few weeks of winter energy demand if inflows (rain and snow melt) are very low. When inflows are low for long periods of time, hydro generation is reduced and the system relies on other forms of generation, including natural gas and coal. These periods of time are often colloquially referred to as 'dry years'.
electric vehicle (EV)	A vehicle that has an electric motor powered by a battery, which is charged by an external source of electricity. There are two main types of EVs: (1) Battery electric vehicles (BEVs) – these are powered by a battery only. (2) Plug-in hybrid electric vehicles (PHEVs) – these have a motor powered by a battery that is charged externally, and an internal combustion engine powered by petrol or diesel. Conventional forms of petrol hybrids aren't considered EVs as they aren't charged by 'plugging in'. Their batteries are only charged by re-capturing energy when braking or from electricity generated by the engine.
electrification	The shift from fossil fuels to electricity as an energy source.
embodied emissions	The sum of emissions involved in making a product, sometimes termed the 'carbon footprint'.
emissions	Greenhouse gases released into the atmosphere. The Climate Change Response Act 2002 covers the following greenhouse gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.
emissions budget	The cumulative amount of greenhouse gases that can be emitted over a certain period. In the Climate Change Response Act 2002, emissions budgets are the total amount of all greenhouse gases (expressed as a net amount of carbon dioxide equivalent) that can be released over a five-year period (or four years in the case of 2022–2025).
emissions intensity	The ratio of greenhouse gas emissions to a unit of activity or output. This could be emissions per unit of economic output, such as GDP, to give a measure across an entire economy, or relative to other variables such as per kilometres travelled for modes of transport, or per unit of revenue or of a good produced in firms' production processes, such as per litre of milk solids. Measures of emissions intensity allow comparison of emissions performance across different activities and tracking of progress over time, where changes in economic activity can obscure some types of progress such as efficiency improvements.
emissions leakage	Would occur if efforts to reduce emissions in one location caused an increase in emissions somewhere else so that global emissions overall do not reduce. Emissions leakage risk is created by the uneven implementation of climate policies around the world.
emissions reduction plan	A plan setting out the policies and strategies for meeting an emissions budget, as required by the Climate Change Response Act 2002.

energy – in terms of electricity supply	When considering the security of electricity supply, energy refers to the availability of generation and transmission capacity to meet expected national demand over a longer period of time.
energy efficiency	Using less energy to provide the same amount of useful output from a service, such as heating water or lighting.
energy security	The uninterrupted availability of energy sources at an affordable price.
external factors	Variables outside of the Government's direct control including economic activity, weather (affecting hydro lake inflows) and international developments such as oil prices.
farebox (rules)	Policies that require public transport to recover a portion of operating costs through fares.
f-gases	Fluorinated gases, such as hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.
Global Warming Potential (GWP)	A factor relating the warming effect of a tonne of emissions of a particular greenhouse gas to those of a tonne of carbon dioxide emissions over a specified period of time. See also 'CO_2e'.
greenhouse gases	Atmospheric gases that trap heat and contribute to climate change. The gases covered by the Climate Change Response Act 2002 are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.
gross emissions	Total greenhouse gas emissions from agriculture, energy, industrial processes and product use (IPPU) and waste. Greenhouse gas emissions and removals from land use, land-use change and forestry (LULUCF) are excluded. See also 'net emissions'.
heavy vehicle	A vehicle over 3.5 gross tonnes. These are typically trucks and buses.
hydroelectricity generation	Generation of electricity from hydroelectric dams that control the flow of water stored in a pool or reservoir, like a lake or river.
indicator	A sign or signal that shows something exists and its level of progress.
industrial allocation	The provision of free New Zealand Units (NZUs) to firms undertaking activities considered emissions intensive and trade exposed (EITE). This reduces the cost of the NZ ETS for these firms and is intended to reduce the risk of emissions leakage.
Intergovernmental Panel on Climate Change (IPCC)	Intergovernmental panel under the United Nations, which prepares comprehensive Assessment Reports about the state of scientific, technical and socio-economic knowledge on climate change, its impacts and future risks, and options for reducing the rate at which climate change is taking place.

internal combustion engine (ICE)	The engine, typically associated with transport, found in petrol and diesel vehicles.
land-use capability (LUC) classes	An assessment and categorisation of land's capability for use, based on its physical attributes or limitations and its versatility for sustained production. There are eight classes, ranging from LUC class 1 (most versatile) to LUC class 8 (severe to extreme limitations to all productive use).
light vehicle/ light passenger vehicle	A vehicle under 3.5 gross tonnes. These are typically cars, sport utility vehicles (SUVs), utes, vans and motorbikes.
low-carbon liquid fuels	These fuels provide much lower greenhouse gas emissions than fossil fuels. They include biofuels (made from plants, algae and waste), advanced biofuels (from things like crop residues and wood) and synthetic fuels (made using renewable energy and captured carbon). Some of these fuels, like biofuels, still release carbon dioxide when burned – but because the carbon comes from plants or the atmosphere, they add far less new carbon overall. Others, like hydrogen-based fuels, may not release any carbon dioxide at all when used. This means low-carbon fuels can help cut emissions across their full lifecycle.
market access	Ability to enter a foreign market by selling goods and services.
methane inhibitors and vaccines	Chemical compounds that reduce the production of methane in animals' rumen (stomachs). They typically do this by targeting enzymes that play a key role in the generation of methane. See also 'bolus'.
mode shift	Changing to travel by public transport and cycling and walking, rather than by private motor vehicle.
model/ modelled	Representation of an idea, object, process, or system to describe or explain phenomena that cannot be experienced directly, to discover features of and ascertain facts about a system and its behaviour.
$MtCH_4$	Megatonnes (million tonnes) of methane.
$MtCO_2e$	Megatonnes (million tonnes) of carbon dioxide equivalent.
nationally determined contribution (NDC)	Each country that is party to the Paris Agreement must define its contribution to achieving the long-term temperature goal set out in the Paris Agreement. The first NDC adopted by Aotearoa New Zealand is a target to reduce greenhouse gas emissions by 50% below 2005 levels by 2030. Aotearoa New Zealand's second NDC is to reduce greenhouse gas emissions by 51–55% below 2005 levels by 2035.

net emissions	These differ from gross emissions in that they also include emissions from the land use, land-use change and forestry (LULUCF) sector as well as removals of carbon dioxide from the atmosphere, for example through absorption by forests as trees grow.
net negative emissions	Net negative emissions is achieved when, as result of human activities, more greenhouse gases are removed from the atmosphere than are emitted into it.
New Zealand Emissions Trading Scheme (NZ ETS)	Aotearoa New Zealand's main emissions pricing policy. It creates a market for emissions by requiring certain businesses to acquire and surrender one New Zealand Unit (NZU) for every tonne of CO_2e emitted.
New Zealand's Greenhouse Gas Inventory (GHG Inventory)	Official annual report of all human-induced emissions and removals of greenhouse gases in Aotearoa New Zealand. It is the key source of evidence on Aotearoa New Zealand's greenhouse gas emissions trends. Emissions from fuel sold for use in international transport (e.g. international bunker fuels) are reported separately as a memo item, as required.
offsetting	Emission reductions or absorption counted toward the efforts of an entity that did not directly reduce or absorb them.
organic waste	Waste containing organic matter that decays to create greenhouse gases. If the decay happens in the presence of oxygen, carbon dioxide is created. If it happens without oxygen, methane is created.
Paris Agreement	An international treaty aimed at post-2020 climate change action that was adopted by Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015. See also United Nations Framework Convention on Climate Change.
permanence	When relating to removals of carbon dioxide through forestry: the expected duration of the carbon storage.
plug-in hybrid electric vehicles (PHEV)	See 'electric vehicle'.
post-1989 forests	New forests established after 31 December 1989 on land that was not forest at that date.
pre-1990 forests	Forests or shrub land established before 1 January 1990.
projections/ projected	Estimated value of a future quantity (such as emissions levels) based on a prescribed set of assumptions.
range anxiety	Concern that an electric vehicle will run out of battery charge before reaching a charging station or finishing the trip.

removals	The removal of carbon dioxide from the atmosphere, also called sequestration. In Aotearoa New Zealand, this usually refers to absorption of carbon by forests as trees grow.
renewable freight certificates	These would be part of a potential market-led mechanism to decarbonise freight transport. Certificates would be generated by companies for their low-carbon freight vehicles (such as low or zero emissions trucks), which could then be sold to people who need to move goods, certifying they have used low-carbon options. They would be similar to the renewable Electricity Certificate system already in use in this country.
renewable sources of energy	Aotearoa New Zealand's renewable energy sources are used for electricity generation and direct use. Renewable sources for electricity generation are geothermal, hydro, solar and wind. Renewable energy sources for direct use includes geothermal energy used as heat for industrial applications.
risk assessment	The scientific estimation of risks, which may be either quantitative or qualitative.
scenarios (for emissions modelling)	A plausible set of assumptions about economic and social development, and technological and behavioural changes.
scope 3 (emissions)	Indirect emissions from an organisation's value chain, such as the extraction and production of purchased materials and the use of sold products or services.
seasonal firming	The mechanisms used to ensure a reliable supply of power throughout the year despite seasonal variations in renewable electricity generation (primarily hydro).
social licence	The perceptions of people that a policy, a project, a company, or an industry that operates in a given area or region is socially acceptable or legitimate.
spot price	The current market price of a security, currency, or commodity (such as electricity) available to be bought/sold for immediate settlement. In other words, it is the price at which the sellers and buyers value an asset right now.
sustainable aviation fuel (SAF)	There are multiple types of sustainable aviation fuel. Some of the more common ones include bio-based aviation fuels – produced from renewable feedstocks like animal fats, waste, and crops or forests without major environmental or land-use impacts, and e-fuels (also called power-to-liquid fuels) – which are created by using renewable electricity and water to produce green hydrogen, and then combining that green hydrogen with carbon dioxide from the air.
sustainable finance taxonomy	A classification system that defines which economic activities are aligned to a sustainable, low-emissions future, with a goal of directing investment to the activities required for the transition.

target accounting	The accounting system used to measure progress towards Aotearoa New Zealand's emissions reduction goals. Target accounting emissions include all gross emissions, but only a subset of emissions and removals from land use and forestry – namely emissions and removals that are the result of recent and future forestry activities. Target accounting is designed to incentivise emissions reductions and to avoid relying on actions that occurred before 1990 (such as forest planting in the 1970s and 1980s) that continue to result in emissions and removals today. It also applies an averaging approach to production forests to smooth out emissions and removals over harvest cycles.
Te Tiriti o Waitangi/ The Treaty of Waitangi	Aotearoa New Zealand's founding document, signed between Māori and representatives of the British Crown in a series of signing events beginning 6 February 1840.
United Nations Framework Convention on Climate Change (UNFCCC)	The United Nations Framework Convention on Climate Change is the major foundation global treaty focused on climate change. It was signed in 1992 at the Earth Summit in Rio de Janeiro.
vehicle-kilometres-travelled (VKT)	The number of kilometres travelled across a number of vehicles. For example, 4 people in one car travelling 1 kilometre is 1 VKT.
vintaged	Emissions units that expire after a given date.
zero emissions vehicle	A vehicle with zero tailpipe emissions.

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