Te Kāwanatanga o Aotearoa
New Zealand Government

Te hau mārohi ki anamata

Towards a productive, sustainable and inclusive economy

AOTEAROA NEW ZEALAND'S
FIRST EMISSIONS REDUCTION PLAN

Te hau mārohi ki anamata is directly translated as 'strong winds into the future'.

The metaphor for this title draws on an ao Māori view of Aotearoa as a waka hourua (double-hull ship) and its journey to a bountiful future.

'Te hau mārohi' are the winds that carry resilience to their recipient, in this case, te waka Aotearoa.

'Ki anamata' conveys that these winds then propel te waka Aotearoa into a more prosperous and sustainable future (te paetawhiti).

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Message from the Prime Minister and the Minister of Climate Change

In the months leading up to the publication of this plan, we repeatedly saw the impact that the climate crisis is already having on our communities.

Multiple floods in Tairāwhiti. Severe storm damage in Westport. Droughts in Southland so acute that the Awarua–Waituna wetlands caught fire – in autumn.

At the same time, our best scientists released yet another report that detailed accelerating sea-level rise, threatening local infrastructure, homes and businesses.

Our Government was elected to take action on climate change.

This work began several years ago when we made a commitment to getting to net-zero emissions by 2050.

It continued with ending new offshore oil and gas exploration, upgrading schools and hospitals to run on clean energy and making it easier for families to buy electric cars.

But we have much more to do.

To prevent the climate crisis from getting any worse, we must rapidly cut the pollution we're putting into the atmosphere.

That challenge presents the single greatest opportunity we've had in at least a generation to develop our economy into one that is truly productive, sustainable and inclusive.

This means reducing New Zealand's exposure to global energy prices and greater energy security.

It means new clean-tech industries and well-paying jobs, especially in our regions.

It means warmer homes and lower household power bills.

It means fast, frequent and convenient buses and trains, and safe walkways and cycle lanes through our cities.

Cars and trucks that are powered by New Zealand's abundant wind and sun at a fraction of the cost of imported fossil fuels, saving New Zealanders at the pump.

It means an environmentally sustainable and globally competitive primary sector, as other markets start to demand more climate-friendly produce.

New Zealand cannot afford to be left behind, economically or morally. Our future exports, our economy, our environment and the wellbeing of our nation depend on a credible plan to bend our emissions curve down to meet our targets.

That is why the Government is now delivering New Zealand's very first emissions reduction plan, our roadmap to reduce emissions in Aotearoa for the next 15 years.

And, alongside this plan, the Government is making the most significant investment in tackling climate change in New Zealand's history.

As we do, we will restore our precious native forests, re-wet former wetlands and protect our endangered birds and other species.

We will work with and alongside tangata whenua to take advantage of the opportunities for Māori and the Māori economy.

We will create, innovate and invest in our collective future.

So let's get on with it, together.

RT HON JACINDA ARDERN
Prime Minister

HON JAMES SHAW
Minister of Climate Change

Message from the Secretary for the Environment

Aotearoa New Zealand is committed to achieving a low-emissions, climate-resilient economy.

By reducing greenhouse gas emissions while removing existing emissions from the atmosphere, we will achieve net-zero long-lived gases by 2050. Equally important, we will achieve a 24 to 47 per cent reduction in biogenic methane.

We must take bold action now to reach our goal for 2050. For the first time, the Government has set emissions budgets for the next 15 years, placing limits on the emissions that Aotearoa New Zealand can produce. This plan sets out how we will meet these budgets.

The plan updates our system settings – including emissions pricing, funding, research, science, innovation and technology – to ensure they support our climate change objectives. It also sets out detailed actions to reduce emissions in key sectors of our economy, including transport, energy and industry.

This emissions reduction plan emphasises nature-based solutions and the use of mātauranga Māori. It incorporates and reinforces the principles of Te Tiriti o Waitangi. It seeks to ensure that Aotearoa New Zealand's transition to a low-emissions, sustainable economy is equitable and benefits everyone.

An Interdepartmental Executive Board will support implementation and coordination of the plan. The Board will provide strategic advice on how we're tracking and where we need to adapt our approach. Manatū Mō Te Taiao Ministry for the Environment will lead the establishment of this Board and support coordination and delivery across the climate policy response.

Reducing emissions is vital for the future, but we're already seeing some impacts of climate change that can't be reversed, such as rising sea levels, more frequent flooding, erosion and drought. The Government recently released a draft national adaptation plan that sets out what we need to do to adapt, live and thrive in a different and changing climate.

There is a role for all of us in making this plan succeed, and the Government will work alongside our communities, businesses and the private sector, and all New Zealanders as we take action.

Together, Aotearoa New Zealand's first national adaptation and emissions reduction plans set us firmly on the path to a low-emissions, climate-resilient country with clean air, water and transport; more stable weather; warmer homes; and new, sustainable opportunities for business and employment.

This will be a transformative journey for Aotearoa New Zealand, as we work together to implement this plan, reduce emissions and slow the pace of climate change.

VICKY ROBERTSON
Secretary for the Environment

Executive summary

Towards a productive, sustainable and inclusive economy

The challenge of transitioning to net-zero emissions presents the single greatest opportunity that our country has had, in at least a generation, to develop our economy into one that is much more productive, much more sustainable and much more inclusive than the one we have today.

And that challenge is as urgent and important as it has ever been. The science tells us that limiting global warming to 1.5˚C above pre-industrial levels gives us the best chance of avoiding the worst effects. As temperatures have already risen more than 1˚C, we must act now to prevent further atmospheric warming and the catastrophes that come with it.

This document is Aotearoa New Zealand's first emissions reduction plan. It contains strategies, policies and actions for achieving our first emissions budget, as required by the Climate Change Response Act 2002.

In doing so, it also outlines how we intend to play our part in global efforts to limit warming to 1.5˚C above pre-industrial levels.

This plan responds to the recommendations of He Pou a Rangi – Climate Change Commission (the Commission) in its report, *Ināia tonu nei: a low emissions future for Aotearoa*.

It also builds on the Productivity Commission's 2018 report, *Low-emissions economy*; the cross-government response (commonly known as the Climate Action Plan 2019[1]); and the Interim Climate Change Committee's 2019 reports, *Accelerated electrification* and *Action on agricultural emissions*.

This plan also draws on a significant number of departmental strategies and work programmes, such as the Ministry of Transport's 2021 report, *Hīkina te Kohupara – Kia mauri ora ai te iwi – Transport Emissions: Pathways to Net Zero by 2050*.

1 Ministry for the Environment. August 2019. *Transitioning to a low-emissions future: The Government response to the Productivity Commission's Low Emissions Economy Report*. Retrieved from https://environment.govt.nz/assets/Publications/Files/transitioning-to-a-low-emissions-future.pdf (accessed 28 April 2022).

Over the past five years, these reports, recommendations and plans have driven the most ambitious government climate change work programme ever. This has resulted in:

- the unanimous passage of the Climate Change Response (Zero Carbon) Amendment Act in 2019
- major reforms to the New Zealand Emissions Trading Scheme (NZ ETS)
- the end of new offshore fossil fuel exploration
- the establishment of New Zealand Green Investment Finance and the Government Investment in Decarbonising Industry fund
- the Carbon Neutral Government Programme and State Sector Decarbonisation Fund
- the Clean Vehicle Discount and vehicle emission standards
- major investments in public transport and rail infrastructure
- He Waka Eke Noa partnership to reduce agricultural emissions
- mandatory climate-related risk reporting for listed companies and financial institutions
- and more.

These changes have already lowered the trajectory of Aotearoa New Zealand's future greenhouse gas emissions – but not enough to put us on a path towards net zero.

That is why this plan is so important. It is the first statutory plan, under the Climate Change Response Act, to require the Government to act to reduce emissions right across the economy and support all New Zealanders to make the most of the transition and seize the opportunity to lower the cost of living and improve living standards.

Some major actions over the next few years will include:

- increasing access to electric vehicles (EVs), beginning the process of decarbonising heavy transport and freight and helping more people to walk, cycle and take public transport
- supporting businesses to improve energy efficiency and move away from fossil fuels, such as coal, by continuing to roll out the Government Investment in Decarbonising Industry fund
- banning new low- and medium-temperature coal boilers and phasing out existing ones
- introducing an emissions pricing mechanism for agriculture
- accelerating the delivery of agricultural emissions reduction tools and technologies for farmers and farming businesses through the establishment of a new Centre for Climate Action on Agricultural Emissions
- reducing the amount of waste (including food waste) going to landfills, investing in waste infrastructure and expanding landfill gas capture
- establishing native forests at scale to develop long-term carbon sinks and improve biodiversity
- accelerating the supply of woody biomass to replace coal and other carbon intensive fuels and materials
- driving mission-led innovation in some of the most challenging parts of our economy through climate innovation platforms and the wider research, science and innovation system
- requiring refrigerants to be captured and destroyed when heating and cooling systems reach the end of their life
- and more.

This executive summary briefly outlines New Zealand's strategy for reducing emissions, the principles that guide that strategy, and the key steps we are taking to put that strategy into action over the coming years.

Our strategy for reducing emissions

Below is a map outlining Aotearoa New Zealand's emissions reductions strategy. It also points you to the chapters of the emissions reduction plan, where you can dive into as much or as little detail as you want.

The strategy, and this plan to execute it, is based on five principles:

1. Playing our part
2. Empowering Māori
3. Equitable transition
4. Working with nature
5. A productive, sustainable and inclusive economy

The following pages outline how those principles inform the design of the emissions reduction strategy and plan.

The final section of this executive summary, Making the plan happen, describes the lines of accountability and responsibility for delivering the actions in this plan.

Aotearoa New Zealand's emissions reduction plan

Ch. 1
Playing our part

Purpose: To contribute to the global effort to limit global warming to 1.5°C

Targets: Net-zero long-lived gases by 2050 and a 24–47% reduction in biogenic methane by 2050

2046–50 Sixth emissions budget (set 2035) and emissions reduction plan (set 2044)	NDC 5 (2046–50)
2041–45 Fifth emissions budget (set 2030) and emissions reduction plan (set 2039)	NDC 4 (2041–45)
2036–40 Fourth emissions budget (set 2025) and emissions reduction plan (set 2034)	NDC 3 (2036–40)
2031–35 Third emissions budget (set 2022) and emissions reduction plan (set 2029)	NDC 2 (2031–35)
2026–30 Second emissions budget (set 2022) and emissions reduction plan (set 2024)	Nationally Determined Contribution 1 (2021–30)
2022–25 First emissions budget (set 2022) and emissions reduction plan (set 2022)	

Ch. 2
Empowering Māori

Ch. 3
Equitable transition

Ch. 4
Working with nature

A productive, sustainable and inclusive economy

System settings

- Ch. 5 **Emissions pricing**
- Ch. 6 **Funding and finance**
- Ch. 7 **Planning and infrastructure**
- Ch. 8 **Research, science, innovation and technology**
- Ch. 9 **Circular economy and bioeconomy**

Sector plans

- Ch. 10 **Transport**
- Ch. 11 **Energy and industry**
- Ch. 12 **Building and construction**
- Ch. 13 **Agriculture**
- Ch. 14 **Forestry**
- Ch. 15 **Waste**
- Ch. 16 **Fluorinated gases**

1. Playing our part

The climate crisis is the greatest challenge of our time. The science tells us that limiting global warming to 1.5˚C above pre-industrial levels gives us the best chance of avoiding the worst effects.

Therefore, the purpose of the strategy, also required under the Climate Change Response Act 2002, is for Aotearoa to contribute to the global effort to limit temperature rise to 1.5˚C.

Delivering on that purpose means setting long-term emissions reduction targets to 2050.

Those long-term emissions reduction targets will be met through a series of 'stepping stone' emissions budgets and emissions reduction plans that include the policies and strategies for achieving those budgets.

Our emissions budgets for the next 14 years will be (Mt CO_2-e):

	FIRST EMISSIONS BUDGET (2022–25)	SECOND EMISSIONS BUDGET (2026–30)	THIRD EMISSIONS BUDGET (2031–35)
All gases, net (AR5)	290	305	240
Annual average	72.5	61.0	48.0

A new emissions reduction plan will be published before the start of each emissions budget period.

Each emissions reduction plan will be informed by advice provided by the Commission, which will take new data and information into account. The second and third emissions budgets may be revised if the criteria in the Climate Change Response Act are satisfied and a revision is recommended by the Commission.

Alongside our domestic emissions budgets are our nationally determined contributions to the global effort to reduce emissions under the Paris Agreement.

The emissions reduction plan focuses on how we will reduce emissions, but we also need to adapt to climate impacts that are already locked in. This will primarily be addressed through the national adaptation plan. Each sector chapter has identified areas where action can be taken to improve resilience to climate change while reducing emissions.

Read more in chapter 1: Playing our part.

2. Empowering Māori

CH. 2 EMPOWERING MĀORI
ESTABLISH A PLATFORM FOR MĀORI CLIMATE ACTION
DEVELOP A MĀORI CLIMATE STRATEGY AND ACTION PLAN

Climate change, and our response to it, has the potential to affect all aspects of Māori life.

Tangata whenua are especially vulnerable to the effects of climate change and there are particular risks and opportunities for the Māori economy in the transition.

Māori are kaitiaki of their whenua, leaders in their communities, decision makers about resources and infrastructure, land and business owners. Mātauranga Māori helps us to learn and better inform our decision making.

We need to ensure an equitable transition for Māori, led by Māori, to uphold their rights and interests under Te Tiriti o Waitangi. That will require building Crown–Māori relationships and capability to work together as equal partners on our climate response.

The Government will work with Māori to:

- embed partnership and representation – to uphold Te Tiriti principles, processes and mechanisms will be resourced and designed alongside Māori to help tangata whenua to actively participate in the climate response
- support Māori-led strategy and alignment – to elevate te ao Māori within the climate response, Māori will be supported to define, measure and implement a Māori climate strategy and action plan
- activate kaupapa Māori, tangata Māori solutions – to enable community action, kaupapa Māori, tangata Māori actions and solutions for the climate emergency will be funded.

Read more in chapter 2: Empowering Māori.

3. Equitable transition

CH. 3 EQUITABLE TRANSITION
DEVELOP AN EQUITABLE TRANSITIONS STRATEGY
ADVANCE THE JUST TRANSITIONS PARTNERSHIP PROGRAMME

This transition is an opportunity to work together to improve wellbeing, become more productive, increase resilience and reduce inequality.

All New Zealanders can benefit from the changes we need to make the transition to a low-emissions economy.

This is our chance to create new jobs through low-emissions industries, lower the cost of living and raise our living standards.

We need to make sure those opportunities work for everyone so that our transition is just, fair and inclusive for all New Zealanders.

The Government's approach to supporting New Zealanders through this transition is built around five objectives:

1. seize the opportunities of the transition
2. support proactive transition planning
3. enable an affordable and inclusive transition
4. build the evidence base and tools to monitor and assess impacts
5. encourage informed public participation.

Read more in chapter 3: Equitable transition.

4. Working with nature

CH. 4 WORKING WITH NATURE

PRIORITISE NATURE-BASED SOLUTIONS IN PLANNING AND REGULATORY SYSTEMS

ESTABLISH AN INTEGRATED WORK PROGRAMME TO DELIVER CLIMATE, BIODIVERSITY AND WIDER ENVIRONMENTAL OUTCOMES

The climate crisis is caused in part by the destruction of the world's remaining wilderness over the past century. Both the biodiversity crisis and the climate crisis have the same root cause.

Our efforts to reduce the impacts of climate change align with our biodiversity objectives.

Our native ecosystems remove and store carbon, increase our resilience to climate change impacts and support thriving biodiversity and wellbeing.

There is also a real opportunity to use nature-based solutions to tackle the climate emergency and to design our response to the climate crisis in a way that protects, enhances and restores nature where possible.

The climate and biodiversity crises are inextricably linked. Aligning work on climate change and biodiversity is an opportunity to take strong action in both areas. This approach will ensure our response to the climate crisis also improves the resilience of our native ecosystems and does not further their destruction.

To tackle the climate and biodiversity crises together, the Government will:

- prioritise nature-based solutions in our planning and regulatory system
- report on biodiversity as part of emissions reduction plan reporting
- establish an integrated work programme that delivers climate, biodiversity and wider environmental outcomes
- encourage global efforts to use nature-based solutions.

Read more in chapter 4: Working with nature.

5. A productive, sustainable and inclusive economy

The outcome of this emissions reduction plan is an economy that is more productive, more sustainable and more inclusive than the one we have today.

Climate action can and should be an investment in higher paying jobs and more productive businesses, rather than a cost we must bear along the way.

Aotearoa is well placed to innovate the way we currently do business, seize opportunities for new technology and build our clean green brand for a world increasingly seeking low-emissions products and solutions. This requires action across the whole economy.

Getting the settings right across the whole economy

SETTINGS – KEY ACTIONS			
Ch. 5 Emissions pricing	Implement emissions pricing for agriculture	Align the New Zealand Emissions Trading Scheme unit and price controls with climate goals	Adjust the New Zealand Emissions Trading Scheme to drive a balance of gross and net emissions reductions
Ch. 6 Funding and finance	Establish the Climate Emergency Response Fund (with initial down payment of NZ$4.5 billion)	Support climate objectives by issuing Sovereign Green Bonds	Improve transparency and management of climate risks through mandatory climate reporting
Ch. 7 Planning and infrastructure	Reform the resource management system to promote lower emissions and climate resilience	Enable low-emissions and resilient housing and urban development	Address funding and financing challenges for infrastructure to support low-emissions urban environments
Ch. 8 Research, science, innovation and technology	Develop a portfolio of climate innovation platforms	Support the development, assessment and deployment of low-emissions technology	Scale up and reorient existing initiatives towards accelerating our transition to a low-emissions economy
Ch. 9 Circular economy and bioeconomy	Accelerate the supply and uptake of bioenergy	Support businesses moving to circular practices	Develop a circular economy and bioeconomy strategy

The Government has a particular role in ensuring that our economic system settings support industries to take up the opportunities afforded by the transition. That means finding the right balance of emissions pricing through the NZ ETS, regulation, and supporting policies such as innovation, equitable transition measures, behaviour change and finance. Five main actions support this goal.

1. Use emissions pricing to provide the right incentives for businesses (including in agriculture) to cut pollution and invest in clean tech alternatives.
2. Develop the sustainable finance sector to provide capital and investment in every part of the economy.
3. Get New Zealand's planning and infrastructure systems and processes into shape to accelerate the transition in our cities, towns and industries.
4. Reshape the research, science and innovation system and encourage technology with mission-led Climate Innovation Platforms that drive transformative change in some of our most challenging parts of the economy.
5. Invest in circular economy and bioeconomy strategies to make greater use of our existing resources and replace non-renewable resources with renewables everywhere possible.

The system settings diagram provides a short overview of the key actions we're taking on system settings across the whole economy. You can read more about our approach to system-wide settings in chapters 5 to 9 of the emissions reduction plan.

Working with key sectors and industries

Getting our economic system settings right will support climate action in every part of the economy.

But we still need to work with our key emissions-intensive industries and sectors to support them to both cut emissions and find new opportunities. This includes:

- increasing access to electric vehicles (EVs), starting to decarbonise heavy transport and freight, and supporting people to walk, cycle and take public transport
- phasing out fossil fuels and massively ramping up renewables in transport, electricity generation and industry
- lifting the quality of home and commercial construction with the use of sustainable and low-carbon, renewable materials
- accelerating the delivery of agricultural emissions reduction tools and technologies to farmers and agricultural businesses
- accelerating the supply of woody biomass to replace coal and other high-carbon fuels and materials, and encouraging native forests as long-term carbon sinks
- cutting the amount of waste going to landfills, including food waste, and investing in waste infrastructure and landfill gas capture
- requiring refrigerants to be captured and destroyed when heating and cooling systems reach the end of their life.

The sector plans diagram shows the key actions we're taking to work with some of our most important industries and sectors. You can read more about our industry-specific plans in chapters 10 to 16 of the emissions reduction plan.

SECTOR PLANS: KEY ACTIONS

Ch. 10 Transport

Increase support for walking and cycling, including initiatives to increase the use of e-bikes	Improve the reach, frequency and quality of public transport, and make it more affordable for low-income New Zealanders	Provide funding to support the freight sector to purchase zero- and low-emissions trucks
Support the uptake of low-carbon liquid fuels by implementing a sustainable aviation fuel mandate and a sustainable biofuels obligation	Continue to incentivise the uptake of low- and zero-emissions vehicles through the Clean Car package and consider the future of the road user charge exemption for light vehicles beyond 2024	Improve electric vehicle charging infrastructure across Aotearoa to ensure that all New Zealanders can charge when they need to
Increase access to low- and zero-emissions vehicles for low-income households by supporting social leasing schemes and trialling an equity-oriented vehicle scrap-and-replace scheme		

Ch. 11 Energy and industry

Improve business and consumer energy efficiency through targeted programmes	Investigate the need for electricity market measures to support the transition to a highly renewable electricity system	Help low-income New Zealanders have warmer, drier homes through Warmer Kiwi Homes
Reduce our reliance on fossil fuels and exposure to volatile global fuel markets	Ban new low- and medium-temperature coal boilers and phase out existing ones by 2037	Develop an energy strategy to support a sustainable, affordable and secure energy system
Support industry to improve energy efficiency, reduce costs and switch from fossil fuels to low-emissions alternatives		

Ch. 12 Building and construction

Reduce the embodied carbon of construction materials by supporting innovation and regulating to promote the use of low-emissions building design and materials	Establish foundations for future emissions reduction by improving data, building relationships with Māori, and progressing behaviour change and workforce transition programmes
Improve building energy efficiency by amending the Building Code	Shift energy use from fossil fuels by developing a gas transition plan
Accelerate the shift to low-emissions buildings by promoting good examples, providing incentives and supporting the use of low-emissions practices	

SECTOR PLANS: KEY ACTIONS		
Ch. 13 Agriculture	Fund tikanga-based climate programmes to support the needs and aspirations of Māori	Support for early adoption of mitigation technology and farm practice
	Develop food and fibre science and mātauranga accelerators to support lower-emissions land use and food production	Establish a new Centre for Climate Action on Agricultural Emissions to drive a step change in mitigation technology innovation and uptake on farm
	Introduce climate-focused extension and advisory services	Introduce a price mechanism for agricultural emissions by 2025
Ch. 14 Forestry	Grow the forestry and wood processing industry to deliver more value from low-carbon products, while delivering jobs for communities	Provide advisory services to land users, councils, Māori and other stakeholders to support choices for sustainable afforestation
	Support landowners and others to undertake afforestation, particularly for erodible land	Encourage native forests as long-term carbon sinks through reducing costs and improving incentives
	Maintain existing forests by exploring options to reduce deforestation and encourage forest management practices that increase carbon stocks in pre-1990 forests	Consider amendments to the New Zealand Emissions Trading Scheme and resource management settings to achieve the right type and scale of forests, in the right place
Ch. 15 Waste	Enable households and businesses to reduce organic waste	Increase the amount of organic waste diverted from landfill
	Reduce and divert construction and demolition waste to beneficial uses	Explore bans or limits to divert more organic waste from landfill
	Increase the capture of gas from municipal landfills	Improve waste data and prioritise a national waste licensing system
Ch. 16 Fluorinated gases	Build the capability to shift to low-global-warming-potential (GWP) F-gases	Control imports of pre-charged equipment containing high-GWP F-gases
	Regulated product stewardship for refrigerants	Investigate prohibiting the sale and use of F-gases where low-GWP alternatives are available

Making the plan happen

This is an all-of-government plan involving many agencies, departments and ministries, and their ministers. Making it work requires new ways of coordinating effort across government, as well as between government and Māori, local government, the business community and civil society.

To that end, the Government has established dedicated programme governance and management for the emissions reduction plan, led by the Prime Minister.

The **Minister of Climate Change** is responsible for achieving successive emissions budgets and the long-term 2050 target. However, success depends on individual Ministers and government agencies developing and implementing policies and monitoring progress.

The **Climate Change Chief Executives Board (CE Board)** is responsible to the Prime Minister and is made up of the chief executives who are responsible for delivering the policies and strategies in the plan. The Government will formalise the CE Board as an Interdepartmental Executive Board under the Public Service Act 2020.

The **Climate Response Ministerial Group** was established in 2020 and is chaired by the Prime Minister. This group meets regularly to progress and direct the climate change work programme, including the emissions budgets and sector sub-targets.

Monitoring and reporting will allow us to stay on track and manage unexpected impacts

The Commission and central government agencies will be responsible for monitoring and regularly reporting on progress towards the sub-sector targets and emissions budgets, as well as the success and implementation of the emissions reduction plan.

Regular reporting will allow risks and uncertainties to be proactively managed. The CE Board will play a key role in advising on how policies can be adjusted so that we stay on track to meeting our emissions budgets and achieving the 2050 target. The CE Board will also advise on how any unexpected impacts can be managed, including for groups such as workers, businesses, households and different communities.

More information is on the Ministry for the Environment's website

A table of actions provides more detail about how the Government will deliver emissions reductions, particularly over the first emissions budget period. This is available on the Ministry for the Environment's website.

Supporting information can also be found on the Ministry for the Environment's website. This includes:

- the Government's response to the Climate Change Commission's recommendations. This table sets out how the actions in this plan correspond with – and respond to – the Commission's recommendations
- a technical information annex. This includes detailed analysis that shows how those actions will drive emissions reductions in line with the emissions budgets.

CHAPTER 1:

Playing our part

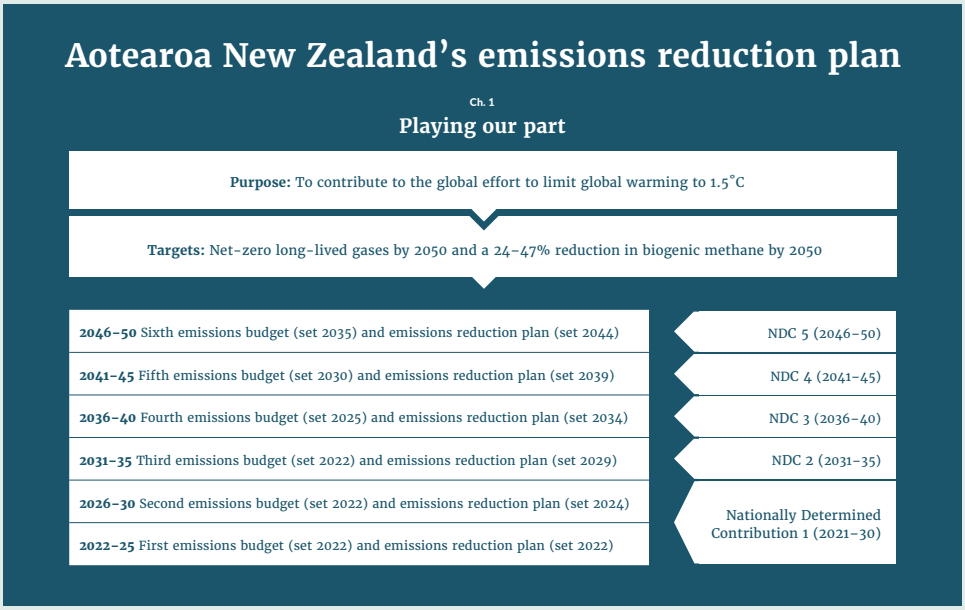
Playing our part

This chapter sets out the strategic framework for how we will reduce emissions across Aotearoa New Zealand, while improving sectors' ability to adapt to the effects of climate change.

This chapter outlines:

- the purpose of the strategy
- Aotearoa New Zealand's long-term emissions reduction targets
- our emissions budgets and sub-targets for key economic sectors
- the approach we are taking to meet these emissions budgets and improve climate resilience.

Figure 1.1. Playing our part in Aotearoa New Zealand's emissions reduction strategy



Purpose

The purpose of this emissions reduction plan is to contribute to global efforts to limit temperature rise to 1.5˚C above pre-industrial levels.

The science (and increasingly our own experience of severe floods, droughts, fires and storms) tells us that taking action on climate change is of paramount urgency and utmost importance.

Aotearoa was one of the first countries in the world to refer to the goal of limiting global warming to 1.5˚C in primary legislation. This temperature goal drives our long-term targets, which are in turn broken down into a series of successive emissions budgets, or stepping stones, along the way.

The Climate Change Response Act 2002 also requires Aotearoa to prepare for, and adapt to, the effects of climate change. The actions we take to reduce emissions can also help us build resilience to climate risk. Ensuring these actions do not increase our exposure to climate change means we are able to transition to a low-emissions and resilient economy.

Why do we need to help limit temperature rise to 1.5˚C?

It is critical that the world limits warming to 1.5˚C above pre-industrial levels.

Additional warming will increase the impacts of climate change. For example, increasing the severity and frequency of extreme heat events, the intensity of rainfall and the risk of drought.

As flooding, water scarcity and extreme weather events worsen, they will affect where we live, how we grow our food, and sustain our economy. Exceeding 1.5˚C increases the risk of long-lasting or irreversible impacts such as the loss of some ecosystems.

Limiting temperature rise to 1.5˚C will make it easier for ecosystems, food and health systems to adapt, and is likely to reduce the costs of adaptation. Globally, it is also likely to significantly reduce the number of people exposed to risks associated with sea-level rise and those exposed to water stress caused by climate change.[1]

1 Compared with 2°C, limiting warming to 1.5°C is projected to protect up to 10 million people from risks associated with sea-level rise. Limiting warming to 1.5°C could reduce the proportion of the world population exposed to water stress induced by climate change by up to 50 per cent. See: Intergovernmental Panel on Climate Change. 2021. Climate change 2021: The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Retrieved from https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/ (21 April 2022).

Targets

To drive our contribution to the global effort of limiting warming to 1.5˚C, Aotearoa adopted a series of domestic emissions reduction targets in legislation for the first time. The Climate Change Response Act 2002 requires:

- all greenhouse gases, other than biogenic methane, to reach net zero by 2050
- a minimum 10 per cent reduction in biogenic methane emissions by 2030, and a 24 to 47 per cent reduction by 2050 (compared with 2017 levels).

The separate components reflect the different warming effects that greenhouse gases have on the atmosphere. This approach also acknowledges our emissions profile and will help to drive change across every sector of the economy.

Emissions budgets

Our long-term targets will be met through a series of interim targets, called emissions budgets. Emissions budgets specify the amount of greenhouse gas emissions that is permitted over a five-year period, or four years in the case of the first emissions budget. Emissions budgets will get smaller over time, helping Aotearoa to step progressively towards our 2050 target.

Aotearoa New Zealand's first three emissions budgets

The first three emissions budgets for Aotearoa have been set by the Minister of Climate Change. These are considered both ambitious and achievable, given our starting point.

Table 1.1. Aotearoa New Zealand's first three emissions budgets (Mt CO_2-e)

	FIRST EMISSIONS BUDGET (2022–25)	SECOND EMISSIONS BUDGET (2026–30)	THIRD EMISSIONS BUDGET (2031–35)
All gases, net (AR5)	290	305	240
Annual average	72.5	61.0	48.0

The first emissions budget is the same as that recommended by He Pou a Rangi – Climate Change Commission (the Commission).

The emissions budgets for 2026–30 and 2031–35 are lower than the emissions budgets recommended by the Commission (a reduction of 7 Mt CO_2-e for the second emissions budget period and a reduction of 13 Mt CO_2-e for the third emissions budget period).

Between the Commission providing its advice in May 2021 and the Minister of Climate Change setting the emissions budgets, new information became available that changed our forestry projections. Our adopted emissions budgets reflect the impact of the afforestation component of the new forestry projections.

Sector sub-targets

Sub-targets[2] will help to track progress across key sectors over each emissions budget period, to make sure we are on track across the economy as a whole.

While sub-targets are a useful tool for checking progress, they are not intended to lock Aotearoa into a single pathway to meeting emissions budgets.

We know that technological developments and economic changes will occur as we move through each emissions budget period. The Government needs to be able to respond to these changes and seize any opportunities to reduce emissions faster or change focus, if required.

The Government will take an adaptive management approach, responding to these changes and seizing any opportunities to reduce emissions faster or change focus if required.

The Climate Change Chief Executives Board will be responsible for monitoring and reporting on overall progress towards the emissions budgets, including sector sub-targets. This will involve advising on how to adjust policy settings to manage variances within – and between – sector sub-targets to support meeting the overall emissions budgets.

2 Unlike emissions budgets, the sector sub-targets are not legislated.

Table 1.2. Sector sub-targets (Mt CO_2-e)[3]

SECTOR	FIRST EMISSIONS BUDGET (2022–25)	SECOND EMISSIONS BUDGET (2026–30)	THIRD EMISSIONS BUDGET (2031–35)	RELEVANT AGENCY OR AGENCIES	RESPONSIBLE MINISTER
Transport	65.9	76.0	56.8	Ministry of Transport	Minister of Transport
Energy and industry	70.1	72.8	63.3	Ministry of Business, Innovation and Employment	Minister of Energy and Resources
Agriculture	159.4	191.0	183.0	Ministry for Primary Industries	Minister of Agriculture
Waste	13.7	14.9	12.7	Ministry for the Environment	Minister for the Environment
Fluorinated gases	6.8	7.5	5.9	Ministry for the Environment	Minister for the Environment
Forestry	– 26.4	– 57.2	– 81.6	Ministry for Primary Industries	Minister of Forestry
Total	**290.0**	**305.0**	**240.0**	**Climate Change Chief Executives Board**	**Prime Minister**[4]

Note: The sum of sector sub-target values differs from total emissions budgets due to rounding

3 These sub-targets include all greenhouse gases, reflect net (AR5), and are expressed in metric tons of carbon dioxide equivalent (Mt CO_2-e). AR5 is the Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change, completed in 2014. Retrieved from https://www.ipcc.ch/assessment-report/ar5/ (21 April 2022).

4 The Prime Minister will oversee Ministerial progress against the sectors' sub-targets. However, the Minister of Climate Change is responsible for meeting the emissions budgets under the Climate Change Response Act 2002.

Our first emissions budget

Emissions reductions plans set out the policies and strategies for how we will meet our emissions budgets and – ultimately – our 2050 target.

These policies and strategies form a coherent, strategic package with a mutually supportive and balanced mix of emissions pricing, well-targeted regulation, tailored sectoral policies, direct investment (public and private), innovation and mechanisms that help nature thrive.

The mix of policy tools will change over time, responding and adapting to changing circumstances. No one policy tool is able to achieve the necessary reductions in a fair and equitable way. Different tools are needed as we build the foundations for meaningful change and emphasis shifts over time. For example, emissions pricing for agriculture is likely to increase as the industry builds the capability and technologies needed to reduce emissions.

This plan also sets out how we can use the transition to address long-standing issues, such as inequality and poor productivity, reduce living costs, and seize the economic opportunities of the transition.

The role of local government in our transition

Local government is fundamental to meeting our 2050 targets, mitigating the impacts of climate change and helping communities to adapt to climate change.

Local government makes decisions in many sectors that will need to transition. Councils provide local infrastructure and public services, such as roading and transport, three waters, kerbside collections and waste management, building consenting and compliance, and flood and coastal hazard management. They also have planning and decision-making powers in relation to land use and urban form.

Many councils are already working on initiatives to address the impacts of climate change and support an equitable transition. Councils play an important role in engaging with their communities to help with the significant behavioural shifts required to meet our climate goals.

Some councils have well-developed targets and emissions reductions plans in place and options for funding and financing. However, many do not have the capacity, capability or funding to effectively plan for and implement the action required.

Local government will need support and guidance from central government to build capacity and capability, understand their roles and responsibilities for emissions reduction and ensure they have the tools and resources needed for change, particularly in the first two emission budget periods.

Central and local government will work in partnership, alongside Māori, to align policies and deliver actions to meet our 2050 targets.

Meeting our first emissions budget

The first emissions budget requires Aotearoa to make sustained cuts in our gross emissions, as well as storing carbon through forestry. Making emissions cuts early will mean lower costs in the long run, lower cumulative emissions and less need for carbon offsets. It means taking responsibility now and leaving a better legacy for future generations.

Meeting the first emissions budget of 290 Mt CO_2-e for 2022–25 is currently estimated to require an additional reduction of 11.5 Mt CO_2-e, compared with how emissions are tracking. Baseline projected emissions are already tracking down under current policy settings.[5] The additional emissions reductions needed to meet the first emissions budget amount to around a further 4 per cent reduction.

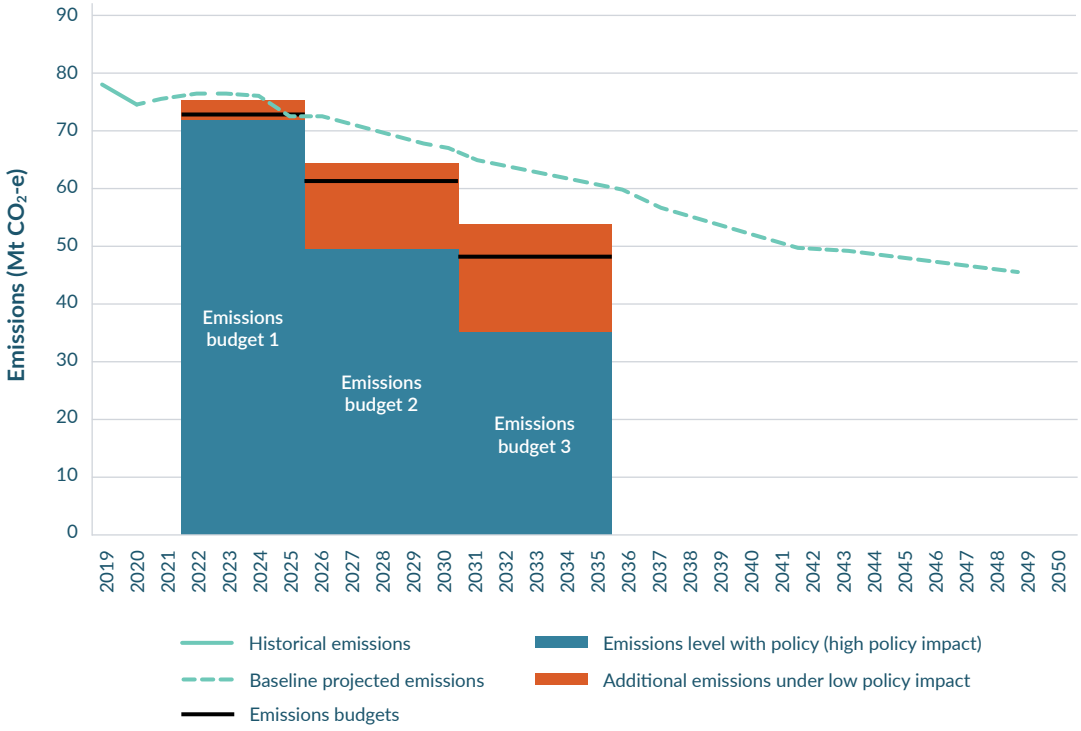
5 This figure is based on the difference between the emissions budget and projected greenhouse gas emissions if we assume that the Tiwai Point Aluminium Smelter remains open. It is based on existing climate change policies and does not include the new actions included in the emissions reduction plan.

In the first emissions budget period, it is likely that the most significant emissions reductions will be in the energy and industry sector and the transport sector. However, every sector will have a role to play and – in many cases – actions taken now will ensure success in future budget periods.

The policies and strategies that will lead to these reductions in the transport, energy and industry, building and construction, agriculture, forestry, waste and fluorinated gases sectors are detailed in the dedicated chapters below.

Figure 1.2 shows the cumulative impact of emissions reduction plan policies relative to the first three emissions budgets and current baseline projected emissions.

Figure 1.2. Expected impact of the first emissions reduction plan on emissions[6] over the first three emissions budgets



6 Target accounting has been used to calculate net emissions in this figure.

Improving sectors' ability to adapt to climate change

Adapting to the effects of climate change is integral to achieving a low-emissions and climate-resilient economy. The impacts of climate change are already being felt by New Zealanders. We need to adapt to climate impacts already locked in, while proactively building resilience and adapting to future risk. To ensure a joined-up climate response, it is essential that, in transitioning to a low-emissions future, we also build resilience and decrease our exposure to climate risk.

The first national adaptation plan will be published in 2022. It is a government-led plan that will address climate risks over the next six years and is the first step in a long-term adaptation strategy and process.

The long-term adaptation strategy and process is built on three goals. These align with the global goal established under the Paris Agreement, which aims to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change.

The draft national adaptation plan has three focus areas. These focus areas may be subject to refinement as the national adaptation plan is finalised.

- Focus area one: Reform institutions to be fit for a changing climate.
- Focus area two: Provide data, information and guidance to enable everyone to assess and reduce their own climate risks.
- Focus area three: Embed climate resilience across government strategies and policies.

These focus areas will set the foundation for adaptation action. Focus areas two and three will also help improve the ability of sectors to adapt by enabling them to assess and reduce their own climate risks, and by embedding consideration of risk in all government strategies and proposals.

Each sector chapter has identified areas where action can be taken that aligns with the global adaptation goal. Here are two examples.

- Chapter 14: Forestry sets out how the forestry sector supports adaptation objectives. Examples include requiring fire management plans for exotic plantation forests of at least one hectare in size and implementing measures to protect the vulnerable ecosystems we rely on for our long-term native carbon sinks.
- Chapter 11: Energy and industry identifies the need to develop an energy strategy that considers how to ensure the electricity system is ready to meet future needs. This will link to adaptation actions, particularly for ensuring that the electricity system is secure and reliable.

Some system settings chapters span multiple sectors and identify actions that have both mitigation and adaptation co-benefits.

For example, chapter 7: Planning and infrastructure outlines how resource management reform can support long-term strategic planning of urban and rural areas with a lower emissions profile and reduced significant risks from natural hazards.

We are contributing to the global effort

Under the Paris Agreement, Aotearoa New Zealand has set a Nationally Determined Contribution (NDC) of reducing net emissions by 50 per cent below gross 2005 levels for the period 2021–30. This represents our highest possible ambition for contributing to the global effort.

To meet our NDC, Aotearoa will prioritise domestic action by reducing gross emissions and increasing removals from forestry. The measures outlined in this emissions reduction plan will be complemented by cooperation to reduce emissions in other countries.

Working with partners will help us achieve our NDC and enable emissions reductions in other countries. By enabling us to look beyond the emissions reductions that we can achieve within Aotearoa, working with others allows us to make a more significant contribution to global efforts to limit temperature rise to 1.5˚C.

Emissions reductions we support in other countries will have strong standards of environmental integrity, respect human rights and the rights of indigenous peoples.

Aotearoa will report on the implementation and achievement of our NDC through the Paris Agreements' Enhanced Transparency Framework. Our next NDC – for the period 2031–35 – will be communicated in 2025.

Aotearoa will support developing countries to reduce emissions and build resilience

Aotearoa has responsibilities under the Paris Agreement to support developing countries' mitigation and adaptation efforts. Support includes climate finance, capacity building and technology transfer.

Aotearoa has pledged NZ$1.3 billion in climate finance over 2022–25. Of this finance, at least half will go to the Pacific and at least half will be spent on adaptation action. A climate finance strategy is being developed to guide decisions on how finance will be delivered from 2022–25.

International engagement will help us transition

International cooperation allows us to access – and share – innovation, investment, ideas, technologies and products that will help us transition to a low-emissions future. Our advanced and open economy creates opportunities to cooperate with others (public and private) to accelerate solutions and seize opportunities.

We currently achieve this cooperation in a number of ways, including through the United Nations, World Trade Organization and other multilateral negotiation bodies, as well as through plurilateral and bilateral initiatives. This includes participating in global research initiatives (including the Global Research Alliance on Agricultural Greenhouse Gases) and holding dialogue with partners on policy, best practice and technology.

Aotearoa also seeks mutually beneficial trade and climate outcomes by cooperating with other countries through trade policy and agreements, in line with the Ministry of Foreign Affairs and Trade's Trade For All Agenda. For example, Aotearoa is looking to conclude the Agreement on Climate Change, Trade and Sustainability (ACCTS).[7] This will be a plurilateral trade agreement that brings together trade, climate change and sustainability agendas.[8] We also advocate for the reform of environmentally harmful subsidies (for example, fossil fuel subsidies).

7 The ACCTS will initially be made between Costa Rica, Fiji, Iceland, New Zealand, Norway and Switzerland. Once concluded, other countries may join.

8 For example, by removing tariffs on environmental goods, establishing new and binding commitments for environmental services, establishing disciplines to eliminate harmful fossil fuel subsidies, and establishing guidelines to inform the development and implementation of voluntary eco-labelling programmes and associated mechanisms to encourage their promotion and application.

CHAPTER 2:

Empowering Māori

Empowering Māori

Lead

MINISTER OF
CLIMATE CHANGE
HON JAMES SHAW

SECRETARY FOR
THE ENVIRONMENT
VICKY ROBERTSON

Supporting

- Minister for Māori Crown Relations: Te Arawhiti
- Minister for Māori Development
- Te Tumu Whakarae mō Te Puni Kōkiri
- Chief Executive of the Ministry of Business, Innovation and Employment
- Chief Executive of Te Arawhiti

All Ministers are responsible for upholding Te Tiriti o Waitangi.

Role of Māori and equitable transition for Māori

Climate change, and our response to it, has the potential to affect all aspects of Māori life. Tangata whenua are especially vulnerable to the effects of climate change and there are particular risks and opportunities for the Māori economy in the transition.

Māori are kaitiaki of their whenua, leaders in their communities, decision makers about resources and infrastructure, landowners and business owners. Māori will help lead the transition in each of these roles. Mātauranga Māori will help us learn and better inform our decision making.

We need to ensure an equitable transition for Māori, led by Māori, to uphold their rights and interests under Te Tiriti o Waitangi. That will require building Crown–Māori relationships and capability to work together as equal partners on our climate response.

Empowering Māori

Key actions

- Establish a platform for Māori climate action that will:
  - **embed partnership and representation** – to uphold Te Tiriti principles, processes and mechanisms will be resourced and designed alongside Māori to help tangata whenua to actively participate in the climate response
  - **support Māori-led strategy and alignment** – to elevate te ao Māori within the climate response, Māori will be supported to define, measure and implement a Māori climate strategy and action plan
  - **activate kaupapa Māori, tangata Māori solutions** – to enable community action, kaupapa Māori, tangata Māori actions and solutions for the climate emergency will be funded.

The transition will enable partnership, participation, protection and equity for Māori

Māori and He Pou a Rangi – Climate Change Commission (the Commission) have signalled that it is important to use kaitiakitanga as a guiding principle for our transition. The Government has also heard that our transition will be more successful, and more equitable for Māori, if it:

- **upholds** Te Tiriti o Waitangi, with the Government and tangata whenua working together in partnership to meet the challenges of climate change in a way that respects kāwanatanga and tino rangatiratanga
- **elevates** te ao Māori and kaitiakitanga in planning, problem-solving and decision-making
- **dismantles** existing barriers for the Māori economy to benefit from our low-emissions transition while avoiding creating new disadvantages
- **enables** whānau, hapū and iwi to determine and deliver their own climate education, action and resilience at a local level.

Prioritising this guidance will help deliver a transition that embodies Te Tiriti principles of partnership, participation, protection and equity for Māori.

To achieve this, the Government is establishing a platform for Māori climate action. The platform for Māori climate action will be a space to build relationships and capacity on both sides of the Crown–Māori relationship, to provide more equal partnership and improve knowledge and data to help Māori plan for transitional and climate change impacts.

The platform will build on the three focus areas of: partnership and representation, strategy and alignment, and community activation. It will support the expertise and leadership of Māori, empower Māori and elevate te ao Māori in the context of the transition. It will serve as one vehicle to support an equitable transition for Māori, led by Māori.

Māori have an important role in our transition

Māori are already demonstrating leadership and expertise that will help our transition to a low-emissions and climate-resilient society. We can learn from that expertise.

At a governance level, Māori are challenging 'business as usual' thinking and seeking ways to reduce emissions while growing productivity and capital. Navigating the need for high productivity and associated social and environmental impacts is familiar to Māori, who are well practised at balancing kaitiakitanga obligations with development aspirations and the competing priorities of their people.

Māori play an important role as kaitiaki of their whenua, leaders in their communities, decision-makers about resources and infrastructure, landowners changing their practices, business owners supporting a low-emissions economy and as communities helping to change behaviour.

Māori will play a key role in partnering with the Crown to develop an equitable transition strategy, a circular economy and bioeconomy strategy and an energy strategy. For more information, please see the chapters on these topics.

Figure 2.1. Role of Māori in our transition

Iwi and hapū

Iwi and hapū are kaitiaki, leaders and decision-makers. Iwi and hapū can help build resilience in their communities and play a strategic role in developing our low-emissions pathway.

- Care for water, native forests and biodiversity as taonga
- Help to create a freight and supply chain strategy, to provide a climate-resilient infrastructure network for Aotearoa
- Help to decarbonise regional transport, energy, and building and construction by making decisions about land use and place-making in our planning system
- Engage in waste and circular economy programmes that better reflect te ao Māori, including the development of a circular economy and bioeconomy strategy
- Ensure their rohe is climate resilient, and their asset base is able to navigate climate risks successfully

Whānau Māori

Whānau, especially community whānau, such as urban marae, kapa haka and whānau kōhanga and kura, are at the centre of community-based initiatives for transitioning to our low-emissions future.

- Create low-emissions community-based transport projects
- Create community waste projects to help people reduce, reuse and recycle
- Demonstrate leadership by practising kaitiakitanga at home, on the papakāinga and marae
- Develop skills for our low-emission future

Māori landowners

Māori own and manage significant land holdings as agricultural, forestry and development land. They can make a contribution to our emission reduction targets while supporting the Māori and Aotearoa New Zealand economies through export earnings.

- Manage forestry to store carbon and provide biomass as an alternative to fossil fuels
- Manage agricultural land to capture value from low-emissions, sustainable food production
- Contribute to our low-emissions energy needs

Māori enterprises

Māori enterprises are vital to the Māori economy and for ensuring the economic rangatiratanga and wellbeing of whānau Māori. Māori small-to-medium enterprises are an increasingly visible part of the broader national economy.

- Work with government and private sector networks to help deliver a successful transition to a low-emission economy
- Create new low-emissions, sustainable services and products, or improve existing ones

CASE STUDY

PAPATŪĀNUKU KŌKIRI MARAE

Papatūānuku Kōkiri Marae in Māngere, Tāmaki Makaurau (Auckland) is a hub of community education, tikanga and practice that embodies the vision of Oranga Whenua Oranga Tangata, which the marae has had for the past 30 years.

Supported through funding from local and central government, Papatūānuku Kōkiri Marae are champions of waste minimisation and Māori food sovereignty through their commitment to Hua Parakore – a framework for growing kai that connects the kaupapa of whakapapa, wairua, mana, māramatanga, mauri and te ao tūroa.

The marae māra is replenished by compost created from the kitchen's scraps, eliminating use of synthetic fertiliser, organic material going to landfill, and the associated emissions.

Another initiative – Kai Ika – ensures no part of a fish is wasted – by rescuing what is left after filleting by commercial and recreational fishers. The offal is used on the māra, while the frames and heads are redistributed to whānau throughout the city.

An important element of Māori food sovereignty is self-sufficiency, reducing the need for fossil-fuelled supply chains by producing and distributing kai locally. Papatūānuku Kōkiri Marae grows food for their marae kitchen, their community, farmers markets and restaurants, and teaches others how to do the same, ensuring that the whenua of Tāmaki Makaurau sustains the people of Tāmaki Makaurau.

Mātauranga Māori in our climate response

Mātauranga Māori is the indigenous knowledge of Aotearoa

Climate change demonstrates the profound interconnectedness of our world. The principle of interconnectedness is at the heart of te ao Māori, or the Māori worldview.

Te ao Māori

Te ao Māori is a holistic world where all life is connected. The spiritual realm is complemented by the physical realm, and both are interdependent. In this sense, a whakapapa (genealogy) relationship links the physical and spiritual worlds. Pūrākau (stories) express this connection and are powerful frameworks for relating to the natural environment as living tūpuna (ancestors), to be revered and cared for. This whakapapa relationship also links the wellbeing of Māori people to the wellbeing of the natural environment.

Te ao Māori values can be represented in many forms that may be specific to a group, for example, in taonga species, waterways or ancestral sites of significance. Values can also be practised in te reo and other social systems that shape our relationships with each other and the environment. Tikanga Māori supports this by providing the guidelines and procedures by which we conduct ourselves and make decisions. Values or principles that protect and uphold te ao Māori, such as kaitiakitanga (guardianship), manaakitanga (hospitality) and whanaungatanga (family connection), are common to all iwi, hapū and marae, however, they may be practised in varying ways.

When Māori practise kaitiakitanga, manaakitanga and whanaungatanga, they can use mātauranga Māori to observe and interpret the health of the connections between living systems, and make changes to their practices where necessary to restore balance. Signs of unease in Aotearoa New Zealand's climate, taonga and in people indicate imbalance in te ao Māori, and require us to correct this by modifying our goals, practices and behaviour.

Mātauranga Māori is grounded in te ao Māori. It is defined here as Māori knowledge, Māori methods of knowledge creation and Māori ways of knowing and engaging with the world. It encapsulates both traditional and oral knowledge as well as knowledge produced by Māori in response to new kinds of problems, experiences and technology.[1] Like other knowledge systems, mātauranga Māori is a systematically organised body of wisdom with its own traditions, philosophical base, methodologies and criteria. Mātauranga Māori is a taonga to Māori and its use must be led by Māori.

Our transition will recognise the value of mātauranga Māori

Our transition to a climate-resilient society will depend on a diverse range of approaches, beyond Western knowledge systems.

The United Nations recognises that indigenous peoples' contribution to climate change mitigation and adaptation is key to the international climate change response.[2] Indigenous knowledge can guide sustainable development and complements other research and policy by placing them in local contexts. Traditional knowledge passed down through generations also helps scientists to better understand historical trends of ecosystem health, biodiversity and climate adaptation.[3]

Mātauranga Māori will play a role in Aotearoa New Zealand's climate response by:

- providing information about our land, water and biodiversity across different temporal scales, spatial scales and social contexts that improves our evidence base for selecting transition and adaptation options
- supporting iwi, hapū, and Māori organisations and kaupapa Māori researchers to better help Māori whānau and businesses reduce emissions
- supporting Māori-led problem solving, evidence and outcomes that respond to the Māori worldview and the experiences of Māori
- improving our education, economic and science systems by challenging assumptions and contributing to the diversity of knowledge.

1 Rauika Māngai. 2020. A Guide to Vision Mātauranga: Lessons from Māori Voices in the New Zealand Science Sector. Retrieved from http://www.maramatanga.co.nz/sites/default/files/Rauika%20Ma%CC%84ngai_A%20Guide%20to%20Vision%20Ma%CC%84tauranga_FINAL.pdf (accessed 21 April 2022).

2 United Nations. Department of Economic and Social Affairs. 19 April 2021. UN/DESA Policy Brief #101: Challenges and Opportunities for Indigenous Peoples' Sustainability. Retrieved from https://www.un.org/development/desa/dpad/publication/un-desa-policy-brief-101-challenges-and-opportunities-for-indigenous-peoples-sustainability/ (accessed 21 April 2022).

3 United Nations. 2019. Independent Group of Scientists appointed by the Secretary-General, Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development. New York. Retrieved from https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf (accessed 21 April 2022).

Recognising the importance of mātauranga Māori in the climate response is one way the Government will uphold Te Tiriti. This will involve protecting the relationship of Māori with taonga and providing support and access to the same resources, tools, institutions and developments as other knowledge systems.

Te Tiriti, mātauranga Māori, and Māori aspirations will be embedded and supported in our research, science and innovation system through the Ministry of Business, Innovation and Employment's Vision Mātauranga policy. The work of Te Puni Kōkiri on Te Pae Tawhiti – the whole-of-government response to Wai 262 – will help to establish an overarching framework to safeguard and safely innovate mātauranga Māori and taonga (see the chapter about research, science, innovation and technology).

Māori will be uniquely affected by climate change

The United Nations recognises that the impact of climate change tends to affect indigenous communities before others, due to their dependence on, and relationship with, the natural environment. Climate change also compounds the economic, political and social vulnerability of indigenous peoples in many countries.[4]

In Aotearoa, higher land and ocean temperatures, sea-level rise, variations to seasonal patterns and extreme weather events are already affecting tangata whenua livelihoods, homes and taonga species. Climate change will affect the availability of mahinga kai (food-gathering areas) and food production on Māori land. Some coastal areas will become unliveable. Impacts on the Māori and wider economy could limit whānau access to food, electricity, housing and health services, which will compound existing inequalities of wealth and wellbeing. Links to tūrangawaewae, mahinga kai and other sites of significance may be broken, affecting cultural and physical wellbeing.[5]

4 United Nations Permanent Forum on Indigenous Issues. 2007. Climate change and indigenous peoples backgrounder. Bonn. Retrieved from https://www.un.org/esa/socdev/unpfii/documents/backgrounder%20climate%20change_FINAL.pdf (accessed 21 April 2022).

5 Ministry for the Environment. 2020. National Climate Change Risk Assessment for Aotearoa New Zealand: Main report – Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa: Pūrongo whakatōpū. Retrieved from https://environment.govt.nz/assets/Publications/Files/national-climate-change-risk-assessment-main-report.pdf (accessed 21 April 2022); Manaaki Whenua Landcare Research. 2021. He huringa āhuarangi, he huringa ao: A changing climate, a changing world. Report prepared for Ngā Pae o te Māramatanga. Retrieved from http://www.maramatanga.co.nz/sites/default/files/project-reports/LC3948_Huringa.Oranga.Final_.Whiringaanuku_0.pdf (accessed 21 April 2022).

Reducing emissions will help reduce the impacts of climate change on Māori and therefore is fundamental to achieving an equitable transition for Māori. However, Māori are also especially vulnerable to the costs of meeting emissions reductions, particularly because they are disproportionately represented amongst low-income earners.

Impacts may be amplified for tāngata whaikaha Māori (Māori disabled people and their whānau) – the equitable transition strategy will need to consider this. Māori enterprises, particularly small- and medium-sized enterprises, are concentrated in the emissions-intensive industries of agriculture, construction, transport, postal and warehousing, and manufacturing. They may face regulatory change as well as higher costs related to increasing emissions prices (see the chapter about an equitable transition).

The transition will impact Māori, but it will also present new opportunities. Māori need to build capacity and capability to prepare for climate change impacts and identify opportunities in the transition for Māori businesses and investments. An equitable transition strategy will be developed by Māori, in partnership with the Crown, to manage the impacts, build capability and seize the opportunities of the transition.

Actions to support partnership, participation, protection and equity for Māori

The Commission recommended that the Government take action in partnership with Māori to build enduring and authentic relationships with Māori, embed the principles of Te Tiriti in emissions reduction plans and advance a Māori-led approach to an equitable transition for Māori and the Māori economy.

Māori have advised that they:

- support the pace of change required for the climate emergency, but change will require partnership with, and representation of, Māori over both the immediate and longer term
- want a clear climate action pathway and deliverables that build on existing kaupapa, with proven outcomes for whānau and the environment
- need funding and resources to bolster kaupapa Māori solutions in our communities and economy, and to improve information and access for Māori (including emissions data gaps).

The platform for Māori climate action is the key mechanism through which the Government is looking to build a climate response partnership with Māori and address these recommendations. The platform would build on three focus areas to:

- **embed partnership and representation** – to uphold Te Tiriti principles, processes and mechanisms will be resourced and designed alongside Māori to help tangata whenua to actively participate in the climate response
- **support Māori-led strategy and alignment** – to elevate te ao Māori within the climate response, Māori will be supported to define, measure and implement a Māori climate strategy and action plan
- **activate kaupapa Māori, tangata Māori solutions** – to enable community action, kaupapa Māori, tangata Māori actions and solutions for the climate emergency will be funded.

Actions that support an equitable transition for Māori are noted here, and are described in more detail in each of the relevant chapters. Actions across the emissions reduction plan might sometimes interact with Te Tiriti settlement commitments. The Government will engage with the relevant iwi/hapū if this happens, and ensure those commitments are upheld.

Action 2.1: Establish a platform for Māori climate action

To build Te Tiriti partnership and greater recognition of Māori rights and interests, including Treaty settlement commitments, into the climate response, the Government will:

- establish an interim ministerial advisory committee to:
  - support immediate strategic advice and expertise across climate response policy and work programmes that impact Māori
  - advise on a more enduring representative platform to help advance an equitable transition for Māori.
- transition the platform to a more enduring form, developed with Māori, to provide a governance presence and strategic advice in emissions reduction plans and the national adaptation plan over the longer term.

Action 2.2: Embed partnership and representation

To ensure diverse Māori input into climate policy and action, the Government will:

- establish mechanisms for effective engagement with iwi, hapū and other Māori community representatives about their climate priorities, accountabilities to Te Tiriti, and preferred partnership processes for action at the national and local levels.

Action 2.3: Support development of a Māori climate strategy

To elevate te ao Māori within the climate response, the Government is developing proposals to:

- support Māori to develop a Māori climate strategy and action plan that prioritises mātauranga Māori, adaptation and mitigation aspirations, barriers for the Māori economy and local iwi and hapū objectives.

The Government will also investigate creating community-facing climate planning and education tools to support:

- the implementation of a Māori climate strategy and action plan
- resource sharing and best practice for climate planning, action and evaluation
- Māori-led climate education and awareness.

Action 2.4: Activate kaupapa Māori, tangata Māori solutions

To bolster kaupapa Māori, tangata Māori solutions and their impact, the Government will provide a dedicated fund to:

- support Māori initiatives and mātauranga for low-emissions and climate-resilient ways of living, travelling and working, including for existing environmental and social initiatives and technological innovation
- invest in Māori capacity and capability to shape climate policy, education and action and to prepare for climate change impacts on the ground as whānau
- develop Māori data and improve accessibility to support kaitiakitanga, whānau resilience and build understanding of impacts and opportunities for Māori businesses.

Other actions to support an equitable transition for Māori

The emissions reduction plan integrates actions that contribute to an equitable transition for Māori across many chapters. These include actions to:

- provide more sustainable homes and reduce car dependency, which can help reduce financial and health costs for whānau (see chapter 10: Transport and chapter 12: Building and construction)
- create job opportunities for Māori in the regions, to help whānau stay connected to their whenua, for example, through the food and fibre sector's transition to low-emissions, regenerative systems (see chapter 3: Equitable transition, chapter 13: Agriculture and chapter 14: Forestry)
- provide learning and training for Māori to develop the skills and capabilities for our low-emissions future (see chapter 3: Equitable transition)
- assist low-income whānau, for example, by assessing if income support is keeping pace with transition policy impacts to household costs, and making public transport affordable (see chapter 3: Equitable transition)
- address inequalities in educational outcomes for Māori and grow Māori medium and kaupapa Māori education pathways (see chapter 3: Equitable transition)
- identify opportunities to diversify the Māori economy, including through the transition to a circular economy and bioeconomy (see chapter 9: Circular economy and bioeconomy and chapter 15: Waste)
- work with Māori landowners and agribusiness to ensure the transition responds to their specific needs (see chapter 13: Agriculture)
- identify opportunities to build the value of Māori agribusinesses (see chapter 13: Agriculture)
- reduce the opportunity costs of practising kaitiakitanga, for example, by investigating the carbon storage potential of native ecosystems and options to recognise additional carbon stored in pre-1990 native forests (see chapter 4: Working with nature and chapter 14: Forestry)
- explore targeted support for Māori small- and medium-sized enterprises (see chapter 3: Equitable transition)
- work with Māori developers and housing networks to address barriers to low-emissions urban development and building construction (see chapter 7: Planning and infrastructure and chapter 12: Building and construction).

CHAPTER 3:

Equitable transition

Equitable transition

Lead

MINISTER FOR
SOCIAL DEVELOPMENT
AND EMPLOYMENT

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MINISTER FOR
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CHIEF EXECUTIVE
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SOCIAL DEVELOPMENT

DEBBIE POWER

Supporting

- Minister of Education
- Minister of Climate Change
- Secretary for the Environment
- Secretary to the Treasury
- Secretary for Education

Contribution to our long-term vision

This transition is an opportunity to work together to improve wellbeing, become more productive, increase resilience and reduce inequality. All New Zealanders can benefit from the changes we need to make to transition to a low-emissions economy. This is our chance to create new jobs through low-emissions industries, lower the cost of living and raise our living standards.

Equitable transition

Why equitable transition is important

Our transition will require us to change the way we do things over the next 30 years. Those changes will bring us opportunities, build our low-emissions economy and lead to higher-wage jobs. It will mean new ways of getting around, and changes to how and where we live – changes that can improve our wellbeing and increase access to jobs and learning opportunities. We need to make sure those opportunities work for everyone so that our transition is just, fair and inclusive for all New Zealanders. Workers, whānau and households, business and industry, Māori, Pasifika, regional communities and economies, disabled people and wider communities need to be supported through this period of change.

Key actions

- The Government's approach to supporting New Zealanders through the transition is built around five objectives:
  1. seize the opportunities of the transition
  2. support proactive transition planning
  3. enable an affordable and inclusive transition
  4. build the evidence base and tools to monitor and assess impacts
  5. encourage informed public participation.
- Actions to achieve those objectives include:
  - an equitable transition strategy to help us proactively identify and develop initiatives that are tailored to make the most of the opportunities the transition brings and address the challenges that different groups may face
  - initiatives to boost transition-aligned growth in the economy, providing jobs in low-emissions industries
  - support for regions and communities to help them plan for a just, equitable and fair transition
  - reforms to the education and training system to ensure it supports people to develop the skills needed for a low-emissions economy
  - employment support, including retraining and skill-enhancement opportunities and access to income assistance to support workers and households
  - tools, advice and support to enable businesses to transition
  - transport, energy and waste initiatives to help mitigate impacts on households and whānau
  - work to monitor and assess impacts to enable the Government to better respond to impacts of the transition
  - public information and education and support for grassroots participation in policy making.

An equitable transition is important for all of us

Our transition to a productive, sustainable and inclusive economy will transform many aspects of our society. Reducing emissions will help our economy prosper, leading to higher wages and more productive and resilient businesses. A careful and well-managed transition that includes everyone can ensure that we reduce our emissions while improving wellbeing for all.

To ensure that this transition is equitable, fair and inclusive, we will need to:

- uphold Te Tiriti o Waitangi, work in partnership with Māori to maximise opportunities and avoid disproportionately affecting Māori or locking in existing inequities
- work collaboratively and inclusively with affected groups to understand their needs
- take opportunities to reduce inequalities and support communities and regions to transition in line with local objectives and aspirations
- prioritise support to those most affected and least able to adjust, particularly lower income households
- establish clear and stable policy settings that provide predictability for communities and businesses, allowing time to plan, respond and seize opportunities
- support workers to transition to quality jobs that align with Aotearoa New Zealand's climate aspirations
- ensure that the pace of the transition balances the need to avoid abrupt and disruptive changes with the need for strong, early action that avoids placing the burden of change on future generations.

The Government has heard that there should be no delay in acting on climate change, but we need to proactively manage the transition to ensure that it is an equitable one.

Aotearoa has committed to a just transition

Under the Paris Agreement, the Government has agreed to 'take into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs…'. The Government also signed the 'Supporting the Conditions for a Just Transition Internationally' declaration at the 26th UN Climate Change Conference of the Parties, which includes commitments to:

- supporting communities, regions, affected workers and vulnerable groups to transition away from carbon intensive activities
- implementing skills development and labour market policies that allow workers to shift to decent jobs in low-emissions sectors
- supporting and promoting social dialogue and stakeholder engagement on just transition planning, including with unions
- supporting developing countries and emerging economies to transition and promoting decent work throughout global supply chains.

Five key objectives will help us achieve an equitable transition

The Climate Change Response Act 2002 requires the emissions reduction plan to include 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.

The Government's strategy to mitigate the impacts for these groups is built around the following objectives.

- **Seize the opportunities of the transition**, including new business and job opportunities.
- **Support proactive transition planning** with industries, workers, iwi and Māori, regions, small- and medium-businesses, and communities.
- **Enable an affordable and inclusive transition,** particularly for those least able to respond.
- **Build the evidence base and tools** to monitor and assess impacts to enable timely and well-evidenced policy responses.
- **Encourage informed public participation**, to support an active, engaged and informed public willing to advocate for and take up actions consistent with a low-emissions society.

Specific policies and actions to mitigate the impacts of the transition, and lay the foundations for an equitable transition, are addressed under these five objectives. These include new programmes and initiatives that will be rolled out across the early years of this emissions budget period as well as established measures that are already being implemented. An equitable transition for Māori is addressed in chapter 2: Empowering Māori.

The Government has established the Climate Emergency Response Fund (CERF) with an initial NZ$4.5 billion down payment, funded by proceeds from the New Zealand Emissions Trading Scheme (NZ ETS). In addition to funding initiatives to directly reduce emissions, the fund was also established to support initiatives to manage the impacts of policies to reduce emissions. As an enduring, multi-year fund, the CERF provides flexibility to allocate funding to address the distributional impacts of the transition as they emerge.

Objective 1: Seize the opportunities of the transition

Our transition will drive new jobs and business opportunities. There will be new opportunities for low-emissions business and employment. New jobs and industries are already emerging in areas such as the circular economy and bioeconomy and the development of renewable energy technologies. For example, support the development of new clean energy technologies and work with businesses to commercialise their innovations and create high-paying local jobs.

Some businesses, including small- and medium-sized businesses, communities and workers will need support to seize new opportunities to develop a more productive, higher wage and inclusive economy. Many Māori businesses are already using cultural values to guide investment in low-emissions industries and to improve environmental aspects of existing businesses, which will help those businesses to transition.

Industry leaders and businesses are motivated to reduce emissions, but some need information, tools and resources to support their transition. The Government will look at ways to:

- support the adoption of low-emissions business models, and the transition of workers to low-emissions job opportunities, through guidance, advisory support and training programmes
- provide tailored support to Māori small and medium-sized enterprises, to accelerate the transition to low-emissions ways of working, adapt to climate change and take advantage of opportunities presented by the transition.

The Government plans to help New Zealanders seize the opportunities of the transition by:

- providing an education and training system that equips all learners to seize the opportunities of the transition, responds flexibly to the skills and needs of a low-emissions economy and enables access to lifelong learning. This includes growing Māori medium and kaupapa Māori education pathways from early learning through to tertiary education, which aligns with He Pou a Rangi – Climate Change Commission's (the Commission)'s advice on the need for education pathways by Māori, for Māori (actions 3.1.1 and 3.1.2)
- boosting productivity and driving economic growth, including supporting new markets and export opportunities, such as hydrogen, biofuels and new clean tech
- providing tools and resources to support businesses, including small businesses, to transition to a low-emissions economy.

Action 3.1.1: Equip all children and young people for the transition

The early learning and schooling system is being strengthened to equip children and young people to be part of an equitable transition and positively contribute to our transition to a low-emissions society regardless of their life and career journeys.

Key initiatives

- changes to the national curriculum and National Certificates of Educational Achievement (NCEA), including:
  - a focus across the curriculum on growing our young people as kaitiaki and embedding an understanding of the collective nature of our wellbeing and learning, which supports social cohesion
  - a focus on curiosity, critical thinking and citizenship, so our young people develop the skills, knowledge and capabilities to work together to solve problems and take action
  - integrating climate change-related learning along with learning that is important for te mana o te taiao across the national curriculum
  - mana ōrite mō te mātauranga Māori, with kaiako and teachers working with Māori to connect learning to local knowledge and action
  - the introduction of a new Environments and Societies subject for NCEA, as well as themes of environmental sustainability and environmental concepts as part of a number of other subjects
- providing teaching and learning resources that support kaiako and teachers to connect learning purposefully to climate change contexts, careers, local action and the shifts needed for an equitable transition and a low-emissions economy
- a focus on wellbeing, which recognises the impact learning about climate change can have on our young people's mental health. New curriculum leads are working regionally with teachers and kaiako to strengthen the focus on wellbeing in their local curriculum, and marau ā-kura and resources are being developed to support mental health education
- providing guidance on incorporating emissions reduction activities into local curriculum and marau ā-kura. This sits alongside guidance on comprehensive evidence-based strategies to enhance energy efficiency and reduce carbon emissions in schools.

Action 3.1.2: Create an accessible, responsive and flexible tertiary education and training system

- The Reform of Vocational Education will provide education and skills relevant to work today and in the future, including by establishing:
  - industry-led Workforce Development Councils to set industry skills standards so that education and training programmes deliver the skills industry needs
  - Regional Skills Leadership Groups, which enable better planning for regional labour markets and ensure that our workforce, education and immigration systems are working together to meet skills and labour market needs
  - Te Pūkenga as a single vocational education institution responsible for workplace and provider-based learning, with a focus on meeting the needs of regions, learners and communities
  - Centres of Vocational Excellence to enhance education system responsiveness, bringing together industry stakeholders, external providers, workforce development councils, Te Pūkenga, regional leadership groups and leading researchers to share and collaborate on high-quality curriculum and programme design.

Alongside these initiatives, the Government is committed to ensuring that tertiary education is accessible, including for those who would like to retrain so they can pursue new careers in emerging industries. The Government has already introduced fees free tertiary education for students or trainees in their first years of study.

As the transition progresses, the Government will continue to monitor trends in the demand for education and remove barriers to participation in lifelong learning. Options include introducing incentives to support specific types of skills, such as the recent Apprenticeship Boost initiative and the Targeted Training and Apprenticeship fund initiative. These initiatives were introduced to support apprentices to keep earning and training towards their qualifications as the economy recovers from the impacts of the COVID-19 pandemic.

Actions that boost productivity and drive economic growth

This plan sets out a range of initiatives that will boost transition-aligned growth in the economy, including:

- NZ$400 million invested in New Zealand Green Investment Finance to accelerate investment that supports Aotearoa New Zealand's decarbonisation
- actions to accelerate the bioeconomy and bioenergy market in Aotearoa. This includes investigating options to stimulate private sector investment to build the supply of bioenergy in Aotearoa. This will help transform forestry and wood processing to a high-value, high-wage sector (see chapter 9: Circular economy and bioeconomy and chapter 14: Forestry)
- leveraging and building on the investment of approximately NZ$800 million in funding through the research, science and innovation system to ensure that Aotearoa New Zealand's research community and innovative businesses have the science capability, people, infrastructure, culture and experience needed to seize new opportunities (see chapter 8: Research, science, investment and technology)
- NZ$30 million in initial funding has been allocated to the New Zealand Battery Project to investigate options to provide dry-year electricity storage. Some options, such as a pumped hydro scheme, could create significant employment opportunities, including 3,500 to 4,500 skilled and semi-skilled workers and thousands in indirect jobs (see chapter 11: Energy and Industry).

Other tools and resources to support businesses to transition

The plan sets out a range of tools, advice and access to funding and investment to help businesses transition. Key initiatives include:

- the Government Investment in Decarbonising Industry fund, which provides grants to accelerate emissions reductions in industry through energy efficiency and switching from fossil fuels to low-emissions fuels (see chapter 11: Energy and Industry)
- the development of sector decarbonisation plans to support smaller businesses in emissions-intensive sectors to reduce emissions (see chapter 11: Energy and industry)
- business support programmes (delivered by the Energy Efficiency and Conservation Authority) including energy audits, feasibility studies and co-investments to support technology demonstration projects (see chapter 11: Energy and Industry)
- proposed investment in resource recovery for construction and demolition waste materials, development of a national resource recovery network and consumer and business behaviour change campaigns to avoid organic waste (see chapter 15: Waste and chapter 12: Building and construction)
- climate-focused extension and advisory services to support landowners to boost productivity on their land and improve environmental outcomes (see chapter 13: Agriculture)
- the introduction of the Integrated Farm Planning project, including guidance for farmers and producers on their emissions profiles and how to reduce emissions (see chapter 13: Agriculture)
- policies to support Māori agribusinesses to develop innovative land-use solutions to improve productivity (see chapter 13: Agriculture)
- the Climate Action Toolbox, available through Business.govt.nz, which helps businesses to identify and complete actions to reduce their carbon emissions.

Objective 2: Support proactive transition planning

The transition will bring change across industries, jobs, land use and communities. Changes will play out in different ways for different regions, industries and groups in society, creating both challenges and opportunities.

Proactively preparing for change and developing plans will help affected groups identify and act on the opportunities that the transition will bring.

For that reason, the Commission recommended that the Government develop an equitable transition strategy to enable an inclusive transition that maximises opportunities and minimises disruption and inequities.

The Government is also committed to a range of existing initiatives to support regions and industries to manage the transition, including the Just Transition Partnership Programme.

Action 3.2.1: Develop an equitable transition strategy

To enable a fair, equitable and inclusive transition, the Government proposes to:

- develop an equitable transition strategy in collaboration with people and communities who will be most affected by the transition.

The strategy will develop tangible initiatives to address challenges and leverage opportunities that are targeted toward those groups in most need of support, drawing on a diverse range of perspectives and experiences. Initiatives will build on and align with the actions already set out in this plan.

The proposed objectives, participation framework and timeframes for the equitable transition strategy are set out in the following box.

Equitable transition strategy: Objectives, participation and timeframes

Drawing on the objectives identified by the Commission and feedback from public consultation, the Government proposes that the equitable transition strategy focuses on six initial objectives.

- Objective 1 – Undertake proactive transition planning that is developed in collaboration with Māori and other groups, with particular regard to those most affected by the transition.
- Objective 2 – Support strong and equitable learning pathways in the education system (including pathways by Māori, for Māori) that provide the skills needed for a low-emissions future. This includes identifying measures to support workers to transition from high-emissions sectors to low-emissions sectors and preventative interventions to avoid job loss.
- Objective 3 – Identify measures to support workers to transition from high-emissions sectors to low-emissions sectors and preventative interventions to avoid job loss.
- Objective 4 – Ensure climate strategies and policies are designed to maximise opportunities and minimise negative impacts, and develop monitoring of impacts and analysis of the opportunities and risks that the transition will bring for different groups.
- Objective 5 – Identify actions to support households and communities to benefit from the transition and seize opportunities to address existing inequity, for example, measures to improve fairness, accessibility and equity in the transport sector.
- Objective 6 – Identify measures to support continued business viability while also reducing emissions, including for small businesses.

Across these objectives, the actions and policies that are developed will be tailored to the different challenges and opportunities that exist for different groups. This will be achieved through meaningful engagement across a broad range of interests, including unions, workers, business, women, education providers, regional and rural communities, local government, disabled people, Māori, Pasifika, and representatives for groups such as low-income and beneficiary households.

The strategy will build on lessons learned through Just Transition Partnerships and, where appropriate, will draw on existing government partnerships, including, for example, the Future of Work Tripartite Forum (see case study).

The robust development of the equitable transition strategy will take time. To deliver tangible actions to address urgent challenges, this process will rapidly identify:

- priority workstreams where there is broad agreement and actions can be developed at pace
- specific challenges for which solutions will take more time to agree and develop.

CASE STUDY

FUTURE OF WORK TRIPARTITE FORUM

The Future of Work Tripartite Forum (the Forum) is a partnership between the Government, BusinessNZ and the New Zealand Council of Trade Unions that supports businesses and workers to meet the challenges and opportunities presented in a rapidly changing world of work. The Forum is working to address the challenges and opportunities associated with a transition to a low-emissions economy and has a dedicated workstream on just transitions. The Government intends to seek the Forum's input across relevant parts of the future climate change work programme, including the equitable transition strategy (action 3.2.1).

Action 3.2.2: Support regions and industries to manage the transition

The equitable transition strategy will complement a range of existing initiatives to support regions and industries to plan for – and successfully manage – the transition.

Key initiatives

- The NZ$200 million Regional Strategic Partnership Fund that, guided by regional priorities, supports the development of more productive, resilient, sustainable, inclusive and Māori-enabling regional economies.
- A Regional System Leadership Framework supporting strengthened regional public service leadership, working collectively with regional leaders, partners and communities to improve community wellbeing.
- Developing Regional Workforce Plans with local communities to ensure the skills needed in the regions are developed and readily available.
- The development of industry transformation plans (ITPs), which bring together relevant parties in a sector to:
  - agree on a long-term vision
  - understand opportunities and challenges, including decarbonisation, improving environmental outcomes and productivity
  - identify actions that can be taken by industry, the Government and others to support transformation of the sector towards the vision.
- ITPs are progressing in eight sectors: agritech, advanced manufacturing, construction, digital technologies, fisheries, food and beverage, forestry and wood processing and tourism. For example:
  - the forestry and wood processing ITP aims to lift productivity, increase value-add processing and catalyse the production of new low-emissions products and energy to support Aotearoa New Zealand's transition.

Action 3.2.3: Implement the Just Transition Partnerships programme

The Just Transition Partnerships programme supports regional communities to understand, plan and successfully manage their transitions. The process empowers communities to lead transition planning so that all parts of the community are included in shaping their future, any proposals leverage the community's strengths, knowledge and capabilities, and actions are tailored to the community's specific needs and aspirations.

Just Transition Partnerships enable the Government to work in direct partnership with a region to:

- better understand the impacts and opportunities posed by the transition
- support the entire community to come together in partnership to lead change
- imagine a compelling strategic vision and the pathways needed to achieve that future
- identify what income, labour and economic development support is required
- accelerate locally led solutions
- support the region to adjust its approach to transition over time.

The Government will:

- continue to implement the Just Transition Partnerships programme. The programme is currently focused on supporting the people of Taranaki to craft a vision and roadmap for the future of their region and working with Southlanders to develop a Just Transition Work Plan. However, the Just Transition approach can be applied with varying levels of support across other regions facing different transition challenges
- develop publicly available guidance in 2022–23, for those who wish to undertake a just transition process, in light of the Commission's advice about the importance of localised transition planning and learning from the experience in Taranaki and Southland. This can be used to support regional partners, such as local government and Māori, in their transition thinking and planning.

Objective 3: An affordable and inclusive transition to support all New Zealanders

The Government is committed to ensuring the transition leaves no community, no family and no person behind. This means supporting low-income whānau, households and other vulnerable groups who may face transition impacts and require access to resources and technologies to help them reduce emissions.

In many cases, reducing emissions can also help reduce the cost of living. For example, better access to public transport or safe walkways can help reduce fuel costs and reduce the cost of living. Using clean energy produced in Aotearoa and reducing our use of fossil fuel will also lower our exposure to volatile global markets.

The Government will also support businesses, including small businesses, to reduce emissions and leverage new opportunities presented by the transition, which will help retain existing jobs. However, some workers will need to transition toward work in lower-emissions industries. At-risk or displaced workers will need employment support, including retraining and skill-enhancement opportunities, and access to income assistance to support them through the transition.

The Government recognises the need for a resilient welfare system that lessens the impacts of Aotearoa New Zealand's transition to a low-emissions economy. The Government's vision is of a welfare system that ensures people have an adequate income and standard of living, are treated – and can live – with dignity and are able to participate meaningfully in their communities. The Government has already made significant progress on this vision. Workers and households will be supported by existing welfare and employment support systems and changes that have already been implemented, including:

- main benefit increases and indexing of main benefits to wage growth
- improvements that have been made to Working for Families through the Families Package
- changes to eligibility for the In-Work Tax Credit
- increased support for families in greatest need as part of the review of Working for Families.

Action 3.3.1: Develop an income insurance scheme

To better protect workers, whānau and households and the economy, the Government, alongside BusinessNZ and the New Zealand Council of Trade Unions, is consulting on:

- the proposed design of a New Zealand Income Insurance scheme, which will support workers with 80 per cent of their income for up to seven months if they lose their job through no fault of their own.

Workers would have the financial security to find a job that matches their skills, needs and aspirations. Businesses would be able to better match workers to jobs. The impact of a large employer closing or resizing in a small town or region would be cushioned by this policy.

If a decision is made to introduce the proposed scheme, the Government would introduce legislation in 2022 and the scheme could start operating in 2023. Introducing an income insurance scheme would be an important step change that lets us manage the challenges and harness the opportunities that lie ahead for New Zealand.

Action 3.3.2: Improve welfare system income adequacy

To ensure that the welfare system continues to adequately support workers and households, the Government will:

- monitor whether the level of support provided through income support payments (including main benefits, Working for Families tax credits, Winter Energy Payment and various other supports) are adequate should emissions abatement policies result in higher costs for households.

Action 3.3.3: Strengthen employment support services

The Government is committed to a strengthened, proactive employment support service, tailored to respond to different needs and priorities. This will enable New Zealanders to prepare for, find and retain suitable employment.

Key initiatives

Current employment supports include:

- the Redeployment Support Service, which focuses on early intervention to support workers at risk to transition to new employment
- job placement and brokerage
- redundancy services
- the training incentive allowance, which supports sole parents, carers and disabled people on eligible benefits to gain qualifications at levels 1–7 on the New Zealand Qualifications Framework
- industry-based upskilling, including through Mana in Mahi and Skills for Industry
- short-term self-service training options
- wage subsidies, including the flexi-wage programme, to incentivise employers to hire displaced or unemployed workers as they upskill or retrain on the job.

Work is also underway to:

- review the mix of active labour market programmes needed to support those at risk of displacement – or becoming unemployed – through the transition to a low-emissions economy.

Other actions to mitigate impacts on individuals, whānau and households

Alongside actions 3.3.1 to 3.3.3, this plan identifies a range of initiatives to support an affordable and inclusive transition for individuals, whānau and households.

Transport, energy and waste are key areas where targeted policies will help mitigate the impacts of the transition. These policies include:

- working with local government to make public transport more affordable, with a particular focus on low-income users (see chapter 10: Transport)
- working with local government to deliver public transport, walking and cycling improvements in low socio-economic areas and for transport disadvantaged groups (see chapter 10: Transport)
- increasing access to low- and zero-emissions vehicles for low-income households by supporting social leasing schemes and trialling an equity-oriented vehicle scrap and replace scheme (see chapter 10: Transport)
- helping households reduce their energy bills and keep their homes healthy, warm and dry, with funding for heating and insulation upgrades through Warmer Kiwi Homes (see chapter 11: Energy and industry)
- introducing Healthy Homes Standards, to raise the quality of rental homes
- supporting community renewable energy projects for Māori and public housing, such as solar panels and batteries (see chapter 11: Energy and industry)
- delivering the Support for Energy Education in Communities Programme to provide community level education to assist people to achieve warmer homes and lower energy bills (see chapter 11: Energy and industry)
- supporting waste minimisation initiatives, including waste avoidance programmes for urban and rural households, funded by revenue raised through the waste disposal levy (see chapter 15: Waste)
- supporting Māori communities to manage waste, such as the Para Kore programme, which operates in marae, kōhanga reo, kura and other Māori community organisations to provide education and training in waste management (see chapter 15: Waste)
- addressing affordability and hardship for electricity consumers through an ongoing work programme that responds to the Electricity Price Review 2019 (see chapter 11: Energy and industry). Broader initiatives include the Winter Energy Payment, which helps households with their power bills.

Objective 4: Build the evidence base and tools to monitor and assess impacts

This plan focuses on actions to reduce emissions over the next three to five years, while also setting the foundation for transitioning to a high-wage, low-emissions economy over the next 30 years. To ensure this transition is fair, equitable and inclusive, we will need to be agile, monitor and assess the impact of the transition, build the evidence base for further action and respond where needed with further measures to support an equitable transition.

Action 3.4: Build the evidence base and monitor and assess impacts

To build the evidence base and tools to monitor and assess impacts of the transition, the Government will:

- track a range of existing measures to assess the impact of the transition, including the Consumers Price Index, to help understand the impact of emissions pricing on household costs and labour market measures to help understand the impacts on employment
- develop modelling and research to improve our understanding of how the transition will affect different groups in society (also known as distributional impact analysis)
- support better policy design to mitigate potential inequitable outcomes and enable timely and effective policy responses to unexpected impacts
- ensure the Equitable Transition Strategy:
  - promotes engagement, social dialogue and a more in-depth understanding of the likely impacts of emissions reduction policies and the best ways to support those affected
  - identifies opportunities to improve modelling, analysis and real-time monitoring of distributional impacts over time.

The Government will also look to:

- improve the collection, use and availability of data and statistics to better monitor and forecast the impacts of the transition, particularly on vulnerable New Zealanders.

Objective 5: Informed public participation

Our society's transition to a low-emissions and climate-resilient future requires a combination of system-wide change and actions from individuals, households and communities. An equitable transition requires all New Zealanders to be empowered to make low-emissions choices and have a voice in the development of climate change policies and programmes.

This first emissions reduction plan has been informed by public consultation and engagement with the Government and the Commission. Ongoing public participation is needed to support the policies and programmes the Government will put in place to transition to a climate-resilient and low-emissions future.

Making our transition needs an active and engaged public who is willing to not only advocate for, but also take up, actions consistent with a zero-emissions society.

The Government will support New Zealanders to understand, propose and adopt low-emissions solutions and is investigating ways to:

- provide trusted information to inform low-emissions choices
- ensure New Zealanders have a say in how we respond to our climate challenges
- support ideas and solutions from our diverse communities.

Action 3.5.1: Inform low-emissions choices through a Climate Information Centre

New Zealanders largely understand and support measures to address climate change, but many do not know how to make a meaningful contribution. The Government also recognises its role in combatting misinformation and disinformation that can undermine climate messages, actions and the reality of climate change and its impacts on our society.

To inform low-emissions choices, the Government is investigating the benefits of establishing a climate information centre to provide a trusted source of information to promote and socialise the wise-scale behaviour changes needed.

Action 3.5.2: Enable inclusive and participatory climate responses

Lasting solutions are built with the involvement of all sections of society.

The Government is investigating ways to increase public participation in climate policy and prioritising actions.

Action 3.5.3: Support localised and community-based solutions

The low-emissions behaviour we need to adopt will be as varied as our people and places.

The Government is looking to empower communities and Māori to champion local actions specific to their situation and to share ideas that work to encourage adoption of low-emissions behaviours. For example, local 'ride and drive' events are an effective way to reduce misconceptions and concerns about electric bikes and vehicles.

CHAPTER 4:

Working with nature

Working with nature

Lead

MINISTER OF CONSERVATION
HON KIRI ALLAN

MINISTER OF CLIMATE CHANGE
HON JAMES SHAW

DIRECTOR-GENERAL OF THE DEPARTMENT OF CONSERVATION
PENNY NELSON

SECRETARY FOR THE ENVIRONMENT
VICKY ROBERTSON

Contribution to our long-term vision

Our efforts to reduce the impacts of climate change are aligned with our biodiversity objectives. Our native ecosystems remove and store carbon, increase our resilience to climate change impacts and support thriving biodiversity and wellbeing.

Working with nature

Why working with nature is important

The climate and biodiversity crises are inextricably linked. Aligning work on climate change and biodiversity is an opportunity to take strong action in both areas. This approach will ensure our response to the climate crisis also improves the resilience of our native ecosystems and does not further their destruction.

Key actions

- Prioritise nature-based solutions in our planning and regulatory system.
- Establish an integrated work programme that delivers climate, biodiversity and wider environmental outcomes.
- Report on biodiversity as part of emissions reduction plan reporting.
- Encourage global efforts to use nature-based solutions.

Working with nature to address the climate and biodiversity crises together

This emissions reduction plan is an opportunity to use nature-based solutions to tackle the climate emergency and to design our response to the climate crisis in a way that protects, enhances and restores nature where possible.

Through engagement with tangata whenua, the Government has heard the call for a kaupapa Māori approach to climate change. A kaupapa Māori approach requires a holistic view, in which our efforts to reduce emissions and promote climate resilience support wider outcomes for te taiao and people at the same time.

In Aotearoa New Zealand and around the world, biodiversity is rapidly declining and has reached a crisis point.

Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 sets out the national vision for biodiversity for the next 30 years. The Biodiversity Strategy recognises that, for our native wildlife to thrive, we need to address the climate and biodiversity crises at the same time. Key outcomes and objectives of the strategy are that:

- thriving biodiversity plays a central role in our approach to mitigating climate change
- biodiversity provides nature-based solutions to climate change and is resilient to its effects.

Nature-based solutions can reduce emissions and build resilience

Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 defines nature-based solutions as "solutions that are inspired and supported by nature, cost-effective and simultaneously provide environmental, social and economic benefits and help build resilience."[1]

1 Internationally, the Fifth Session of the United Nations Environment Assembly formally adopted (in its UNEA-5 resolution) the definition of nature-based solutions as "actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits". The UNEA recognises that nature-based solutions "respect social and environmental safeguards, including those for local communities and Indigenous Peoples". The website of the Fifth Session of the UNEA has more information. Retrieved from https://www.unep.org/environmentassembly/unea5 (accessed 21 April 2022).

Nature-based solutions offer a practical approach for integrating climate and biodiversity policy for all sectors. They can remove carbon from the atmosphere, store it and build resilience to the impacts of climate change at the same time as supporting biodiversity and wider environmental outcomes. They can also create employment opportunities that support an equitable transition, especially in rural areas.

Examples of nature-based solutions that remove carbon and support biodiversity include:

- restoring wetlands and coastal ecosystems (eg, peatlands, saltmarshes and mangrove swamps) to sequester carbon and provide natural defences against flooding, drought and sea-level rise, while supporting abundant biodiversity
- restoring and planting native forests in upper catchments to sequester carbon, reduce flooding and sediment flow into downstream rivers and estuaries and improve habitats.

Some nature-based solutions can also reduce emissions indirectly, for example:

- using water-sensitive urban design, which mimics natural processes and uses soil and vegetation to manage stormwater and reduce the need for carbon-intensive concrete pipes
- integrating green spaces and natural features into urban areas to help with temperature and flood control, improve air quality and create wildlife corridors. This can also make active transport more appealing, provide recreational opportunities and improve health and wellbeing.

Expertise from te ao Māori and mātauranga Māori will play a vital role in designing and providing nature-based solutions in the unique context of Aotearoa. The Government will need to work closely with tangata whenua in developing policies that help promote nature-based solutions.

CASE STUDY

NGĀTI WHĀTUA ŌRĀKEI

Ngāti Whātua Ōrākei is an urban-based hapū, with rohe located on the central Auckland (Tāmaki Makaurau) isthmus. Ngāti Whātua Ōrākei acknowledge their obligation as kaitiaki to protect the health and mauri of te taiao and the natural world and to recognise and respect their deep connections between the environment and people. Ngāti Whātua Ōrākei takes a holistic approach to climate change. Their actions address climate change while also protecting biodiversity in urban spaces and improving wider environmental, social, cultural and economic outcomes.

Organic urban forests and farms remove emissions and create wider benefits

Within 5 kilometres of the Tamaki Makaurau CBD, the hapū has 85 hectares of reserve land. This is a mix of open space, regenerating native bush, a native plants nursery and a māra kai (food gardens). The first restoration project in 1999, Whenua Rangatira native forest, was a beacon of inspiration for whānau. The nursery has created employment opportunities for whānau and the māra kai project is working towards circular waste systems and maintaining food sovereignty.

Collaborative restoration research

Collaborative rangahau (research) is a key part of Ngāti Whātua Ōrākei's practice as they observe and learn from their taiao and whānau to better understand and respond to challenges and opportunities.

At Pourewa, Ngāti Whātua Ōrākei have partnered with the Auckland University of Technology Living Laboratories Programme to investigate how to effectively restore old-growth native forest on existing farmland. Around 9,500 trees on 2 hectares of land are intensively monitored to understand the wider ecosystem impacts of native forest restoration including impacts on carbon sequestration, biodiversity, soil health and water quality.

This work will help to fill the gap in data and research on the role of native habitats and mātauranga Māori-led habitat restoration that delivers carbon sequestration as well as cultural and biodiversity outcomes.

Native forests contribute to climate change mitigation and support biodiversity

Since human arrival in Aotearoa, deforestation to make space for settlements, farms and other land uses has decreased native forest cover from around 80 per cent to 23 per cent. That deforestation has released an estimated 12 Gt CO_2 into the atmosphere. Today, native forests cover around 7.8 million hectares and store approximately 1.8 Gt CO_2.[2]

Looking after these forests is one of the most important contributions Aotearoa can make to combatting global climate change. We also have a significant opportunity to develop native forests that both act as long-term carbon sinks and support biodiversity, which aligns with the goals of the Biodiversity Strategy (see chapter 14: Forestry for initiatives to promote native forest carbon sinks).

2 Parliamentary Commissioner for the Environment. 2020. *Farms, forests and fossil fuels: The next great landscape transformation*, Retrieved from https://www.pce.parliament.nz/media/196523/report-farms-forests-and-fossil-fuels.pdf (accessed 21 April 2022).

Non-forest ecosystems have untapped potential

Non-forest ecosystems, such as wetlands, peatlands and marine ecosystems, also provide an opportunity to remove and store carbon, alongside a range of wider benefits.

Wetlands are home to a diversity of native plant and animal species. They can improve water quality, provide flood and drought protection and are natural stores of carbon. They also hold cultural, spiritual, historic and economic value for Māori.[3] Peatlands and coastal wetlands that are drained to provide land for agriculture or housing become long-term sources of carbon dioxide emissions.[4] Estimates of current emissions from drained wetlands are around 1.9 Mt CO_2-e per year.[5]

Wetlands are protected by the National Policy Statement for Freshwater Management 2020 (NPS-FM) and National Environmental Standards for Freshwater (NES-F), which seek to prevent further loss of natural inland wetlands. Proposed amendments to the NPS-FM and NES-F are designed to provide clearer direction on offsetting wetland losses and make it easier to restore and maintain wetland areas.

The contribution that blue carbon – the carbon stored in ecosystems such as mangroves, salt marshes and sea grass meadows – could make to climate change mitigation is also increasingly recognised. Managing and restoring marine ecosystems or creating new habitats could protect existing carbon stores and enhance natural carbon uptake. These actions can also help build resilience to climate change impacts such as sea-level rise, improve water quality, and protect the habitats of birds, fish and other species.

3 Manaaki Whenua Landcare Research. 2017. Te Reo o Te Repo – The voice of the wetland: Connections, understandings and learnings for the restoration of our wetlands. Retrieved from https://www.landcareresearch.co.nz/uploads/public/Publications/Te-reo-o-te-repo/Te_Reo_o_Te_Repo_Voice_of_the_Wetland_complete_book.pdf (accessed 21 April 2022).

4 Climate Change Commission. 2021. Supporting Evidence for the Draft Advice for Consultation. Chapter 9: Removing carbon from our atmosphere. Retrieved from https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Evidence-21/Evidence-CH-9-removing-carbon-our-atmosphere.pdf (accessed 21 April 2022). Access the full draft report from the Draft Advice and Reports webpage at https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/inaia-tonu-nei-a-low-emissions-future-for-aotearoa/draft-advice-report-and-documents/ (accessed 21 April 2022).

5 This estimate is for drained organic soils only and does not include mineral wetlands. The figure has been derived from emissions estimates associated with the drainage of organic soils for conversion to pasture and crop and on forest land and settlements, presented in the Common Reporting Format tables of the New Zealand Greenhouse Gas Inventory. Ministry for the Environment. 2021. New Zealand's Greenhouse Gas Inventory 1990–2019. Retrieved from https://environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-1990-2019/ (accessed 21 April 2022).

CASE STUDY

BLUE CARBON SINKS IN TE TAUIHU

Core and Restore is a community-based initiative with ambitious plans to measure, protect and restore coastal blue carbon habitats across Te Tauihu (the top of the South Island). The project is led by the Tasman Environmental Trust (TET) and co-designed and delivered in partnership with the Cawthron Institute, Beca, Ngāti Apa ki te Rā Tō, Nelson City Council and Onetahua Restoration.

By harnessing local expertise and enthusiasm, weaving in the unique knowledge and kaitiaki role of Māori, and collaborating with national and international experts, 'Core and Restore' is helping the community see coastal ecosystems in a new light.

Launched in November 2021, the project is currently in its pilot phase. The project team is trialling different methods to determine the most practical and cost-effective ways to measure the region's coastal blue carbon. This includes taking sediment core samples to measure how much carbon is stored in saltmarsh habitats in the Waimeha/Waimea Inlet and in seagrass habitats at Onetahua/Farewell Spit. Alongside sediment coring and analysis, the team is also involving the community in a citizen science experiment to determine whether local seagrass, saltmarsh and mud habitats are sequestering or releasing carbon.

Following the pilot, TET plans to hold whole-community hui to build on what has been learned and co-design the next steps for expanding this mahi across Te Tauihu.

Further research at a local level is needed to understand the role that non-forest ecosystems can play in future climate change policy, such as their inclusion in the NZ ETS and emissions accounting. Research projects underway across Aotearoa to build an evidence base include:

- improving organic soil emissions accounting (Manaaki Whenua – Landcare Research and the University of Waikato)
- researching coastal wetland sequestration (National Institute of Water and Atmospheric Research)
- researching kelp contribution to carbon sequestration in marine sediments (Blue Carbon Services Limited)
- assessing present and future carbon storage capacity of the Fiordland seabed (University of Otago)
- Sustainable Seas' work on seaweed and blue carbon.

The Government will investigate how blue carbon research results will be used to inform policy development and initiatives to protect and restore coastal ecosystems in Aotearoa. Tangata whenua are kaitiaki of marine and estuary environments. In developing further actions to protect and enhance blue carbon in these environments, the Government will work with its Te Tiriti partners.

Actions to tackle the climate and biodiversity crises together

A guiding principle of this plan is that climate policy, planning and regulation should protect, enhance and restore nature, and any impacts on nature should be mitigated as much as possible.

All of us – from government and Māori to primary producers and businesses, communities and non-governmental organisations – have a role to play in using nature-based solutions to address the climate emergency.

Action 4.1: Prioritise nature-based solutions

To address the climate and biodiversity crises together, the Government will:

- prioritise the use of nature-based solutions within our planning and regulatory systems, where possible, for both carbon removals and climate change adaptation
- investigate how to best ensure that a biodiversity lens is applied to climate change policy development and planning in order to prioritise nature-based solutions.

Action 4.2: Establish an integrated work programme to deliver climate, biodiversity and wider environmental outcomes

The Government will establish an integrated work programme to address climate change and biodiversity loss together. This will address key barriers to native ecosystem restoration – such as the higher costs of investing in native ecosystems and the lack of Aotearoa-specific evidence on non-forest carbon sequestration – and create better incentives for restoring native ecosystems. It will also investigate how private and public money intended for offsetting hard-to-reduce emissions could support both climate and biodiversity outcomes.

The programme will focus on:

- **supporting restoration and protection of indigenous forests**. Chapter 14: Forestry contains a range of initiatives that are part of this work programme, including:
  - reducing the costs of native plants
  - establishing a long-term work programme, to support native afforestation and restoration.
- **improving knowledge about nature-friendly carbon removals.** The Government is supporting research into the carbon removal and storage potential of native ecosystems. This includes research to scope:
  - improving Aotearoa-specific estimates of organic soil emissions (undertaken by Manaaki Whenua – Landcare Research and the University of Waikato)
  - the impacts of management interventions on carbon removal and storage.[6]
- **supporting native afforestation and restoration through the Carbon Neutral Government Programme.** By 2025, emissions that cannot be reduced under the Carbon Neutral Government Programme must be offset. The work programme will investigate how offsetting those emissions could also promote biodiversity and wider environmental outcomes.
- **investigating incentives for public and private investment in biodiversity.** This work will investigate how:
  - to remove barriers that landowners face in accessing funding and information
  - investments in biodiversity can protect and enhance carbon stocks and support climate resilience.

6 Controlling deer, goats and other browsers on regenerating native vegetation could have significant carbon benefits (see Manaaki Whenua Landcare Research. 2015. *Wild Animal Control for Emissions Management Research Synthesis*. Summary and main report retrieved from https://www.doc.govt.nz/wild-animal-control-for-emissions-management (accessed 21 April 2022). However, we need more accurate measurements to better calibrate incentives for managing forests for carbon sequestration.

Action 4.3: Report on biodiversity outcomes

To ensure the impacts of climate change initiatives on biodiversity are considered, the Government will:

- report on biodiversity outcomes as part of reporting on the emissions reduction plan.

Action 4.4: Encourage global efforts to use nature-based solutions

Aotearoa encourages global efforts to use nature-based solutions through the United Nations and the Convention on Biological Diversity.

In 2021, Aotearoa signed the Glasgow Leaders' Declaration on Forests and Land Use, which aims to halt and reverse forest loss and land degradation by 2030. We will ensure that our own forest and land use efforts live up to this commitment and continue international engagements to combat illegal logging around the world.

Wider work to drive climate and biodiversity outcomes

Wider work to drive climate, biodiversity and other environmental outcomes will complement actions to promote nature-based solutions and minimise impacts on biodiversity. This includes work on conservation, farm planning, resource management reform, urban development, climate change adaptation and shifting to a circular economy. Key initiatives that will support this emissions reduction plan are outlined in the following boxes.

Conservation work to realise our climate goals

Our conservation work helps our precious biodiversity, while supporting carbon removals and protecting our carbon stocks. Across government, this work includes:

- implementing *Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020*, which has specific goals around indigenous vegetation and carbon sequestration
- delivering the Department of Conservation's *Climate Change Adaptation Action Plan*, which sets out actions to protect indigenous biodiversity and vegetation from climate change impacts
- developing and delivering pest control plans, including a Wild Animal Management Strategy targeted at deer and other browsers
- implementing the National Policy Statement for Freshwater Management 2020, which sets out requirements for preventing the further loss of natural inland wetlands
- managing existing forests (see chapter 14: Forestry).

Looking after our farmland

Farmers and growers have a key role in delivering climate, freshwater and biodiversity outcomes on their land. Key programmes to help to ensure this happens include:

- **Integrated Farm Planning** – This is designed to help farmers bring all their farm planning activities and requirements into one place, including those around greenhouse gas emissions and biodiversity
- **Freshwater Farm Plans** – This could support farmers and growers to make decisions about nature-based solutions (such as riparian planting) through the lens of improving freshwater outcomes.

Broader change is needed to enable nature-based solutions

Promoting nature-based solutions and nature friendly climate policy is also relevant to our urban areas and how we manage our economy more broadly. Key work programmes that can encourage systems change across our regulatory and planning settings include:

- **reform of the resource management system** – considering how the new planning system can encourage the use of nature-based solutions and avoid the adverse environmental impacts of engineered solutions, will be crucial. This includes the role nature-based solutions can play in urban development and in managing the impacts of sea-level rise and flooding
- **adapting urban planning, design and infrastructure** – nature-based solutions in urban areas (blue-green infrastructure) can help us mitigate and adapt to the effects of climate change, improve biodiversity and make cities and towns healthier and more liveable. (See chapter 7: Planning and infrastructure and chapter 10: Transport for more information on integrating nature-based solutions in urban areas)
- **development and delivery of the national adaptation plan** – options to increase the use of nature-based solutions in new and existing urban areas and infrastructure projects will be consulted on through the draft national adaptation plan
- **shifting to a circular economy** – we need to create environmentally sustainable, innovative high-value products and solutions, while supporting regeneration and protection of nature and recognising that access to nature is at the core of our wellbeing. (See chapter 9: Circular economy and bioeconomy for more detail on adopting circular and regenerative approaches).

Local government will tackle biodiversity and climate change

Local government is uniquely placed to deliver nature-based solutions. Local councils are land and infrastructure owners, regulators and agencies responsible for implementing both climate and other environmental policy 'on the ground'. This includes implementing the National Policy Statement for Freshwater Management 2020 and proposed National Policy Statement for Indigenous Biodiversity.

Councils can prioritise nature-based solutions in the provision of infrastructure and influence the restoration and protection of indigenous vegetation and wetlands. For example, Greater Wellington Regional Council has made "implementing nature-based solutions to climate change" a strategic priority in their long-term plan.

Through its Low Carbon Acceleration Fund, Greater Wellington is restoring native forests, peatlands and dunes on the Kāpiti Coast and in Kaitoke Regional Park to remove carbon from the atmosphere and realise wider social and environmental benefits.

CHAPTER 5:

Emissions pricing

Emissions pricing

Lead

MINISTER OF
CLIMATE CHANGE
HON JAMES SHAW

SECRETARY FOR
THE ENVIRONMENT
VICKY ROBERTSON

Supporting

- Minister of Energy and Resources
- Minister for the Environment
- Minister of Agriculture
- Minister of Forestry
- Minister of Transport
- Director-General of the Ministry for Primary Industries
- Chief Executive of the Ministry of Business, Innovation and Employment
- Secretary for Transport
- Secretary to the Treasury

Contribution to our long-term vision

Emissions pricing provides a strong and stable signal of the cost of emissions to the economy. This will encourage climate mitigation across sectors and systems, the public sector and private sectors, businesses and households.

Emissions pricing

Why emissions pricing is important

As we transition, emissions pricing will help drive businesses, households and the public sector to make low-emissions decisions. The New Zealand Emissions Trading Scheme (NZ ETS) is an economy-wide tool that incorporates the costs or benefits of greenhouse gas emissions and removals into day-to-day economic activity.

By aligning with successive emissions budgets and expectations of an increasing emissions price, the NZ ETS supports flexible decision making – empowering businesses and individuals to make decisions that are appropriate for their unique situations.

Key actions

- Align NZ ETS settings with emissions budgets.
- Adjust the NZ ETS to drive an appropriate balance of gross and net emissions reductions.
- Develop an overarching market governance framework.
- Align emissions leakage policies with current and future climate response.
- Develop a voluntary carbon market framework.
- Price agricultural emissions informed by recommendations from He Waka Eke Noa – Primary Sector Climate Action Partnership (see chapter 13: Agriculture).

Emissions pricing plays a key role in delivering our emissions budgets and wider climate goals

Emissions pricing is an economy-wide[1] tool that supports businesses, households and the public sector to incorporate the costs of emitting or the benefits of reducing or removing emissions into day-to-day decisions. Through a strong and stable price signal, emissions pricing provides a clear, consistent signal across the economy of the cost of emissions or the relative benefit of lower-emissions choices or investing in removals like forestry.

Our primary emissions pricing tool is the New Zealand Emissions Trading Scheme (NZ ETS). Aligning the NZ ETS with decreasing emissions budgets, along with expectations of a rising emissions price, allows it to shape future economic development by flexibly encouraging businesses and households to align investment decisions and choices with low-emissions alternatives.

New Zealand Emissions Trading Scheme

The NZ ETS creates a price signal by setting a 'cap' – or limit – on emissions and letting participants purchase, earn and trade permits for the right to emit (New Zealand Units or NZUs). Over time, the cap will decrease in line with emissions budgets, reducing the supply of NZUs available for auctioning and driving up the incentive for emissions abatement.

While upstream emitters (such as fuel importers) are responsible for paying NZUs, businesses and households still feel an emissions price through the increased cost of goods and services.

Read more about the NZ ETS.

1 Except for the agriculture sector and a portion of the waste sector.

Emissions pricing must be complemented by additional measures to support our climate transition

While emissions pricing plays a central role in reducing our gross and net emissions, emissions pricing alone cannot support our transition in an equitable way. A high reliance on emissions pricing without complementary measures would fail to achieve many low-cost emissions reduction opportunities due to the presence of other barriers. This approach would be unlikely to enable us to meet our climate goals and is considered to have the highest economic cost. Instead, a mix of regulation and policies, such as innovation, equitable transition measures, behaviour change and finance, are needed alongside emissions pricing. These are set out in this emissions reduction plan.

For example, this plan sets out the actions we are taking now to support the development, commercialisation and uptake of low-emissions technologies and products that could be incentivised by emissions pricing in the future.

Targeted and sector-specific policies will also help unlock future reductions and removals opportunities by providing early-stage support for new products and services.

Targeted policies can also help address the impacts of our transition from a broader wellbeing perspective. This includes ensuring businesses and households with historically less access to low-emissions alternatives can shift their behaviour as emissions prices rise.

For example, the Government and local government need to ensure there are affordable and accessible low-emissions transport options available for households who are impacted by higher fuel prices.

Mitigating pricing impacts for those most affected

The impacts of emissions pricing and the resulting investment decisions and behaviour change will vary across sectors of the economy, regions and communities. Some communities will be more vulnerable to an increasing emissions price than others, particularly where access to low-cost or effective alternatives are limited.

As the emissions price rises, in line with our increasing climate ambition, targeted policies to support vulnerable communities and ensure an equitable transition will be required. This includes Māori communities – who typically have higher representation in lower income households – and may need support to adapt to the increasing emissions price.

The Government is committed to mitigating the impacts of a rising emissions price alongside other impacts on businesses, households and communities through other aspects of our transition (see chapter 11: Energy and industry, chapter 10: Transport, chapter 3: Equitable transition, chapter 2: Empowering Māori).

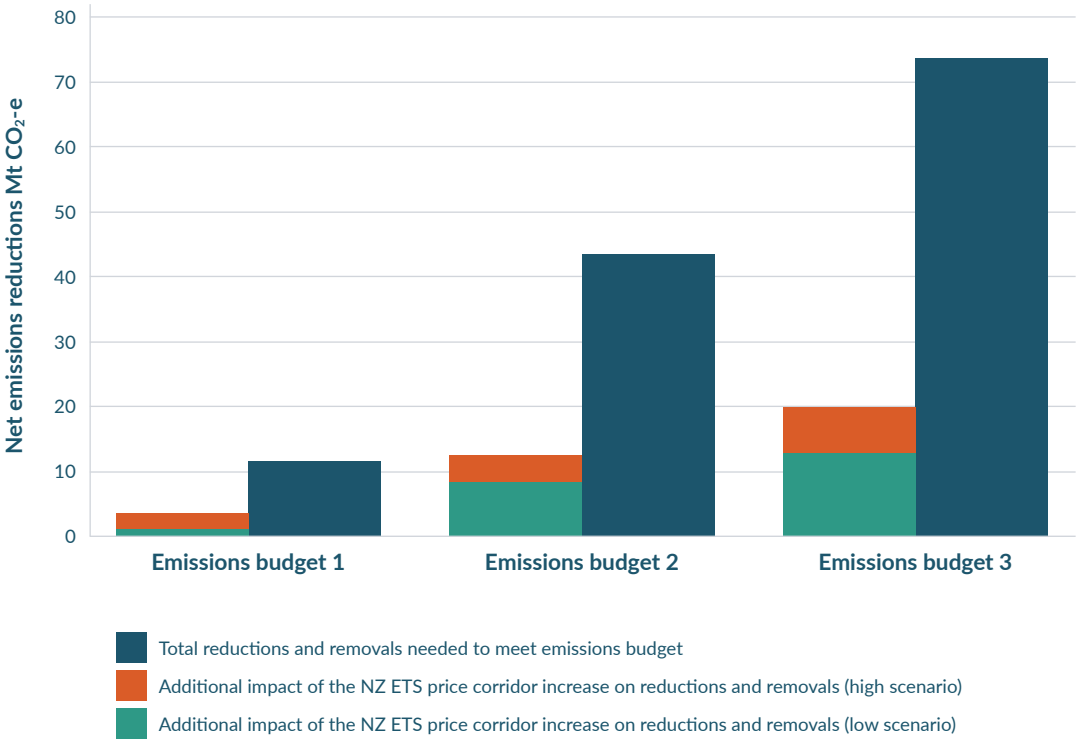
Additional impact of the NZ ETS on reductions and removals

The 2021 update of the NZ ETS price control settings and the recent forestry proposals to restrict permanent exotic forests (if implemented) are estimated to result in a total of:

- 0.9 to 3.5 Mt CO_2-e of emissions reductions and removals in the first emissions budget
- 8.2 to 12.4 Mt CO_2-e in the second emissions budget
- 13.0 to 19.8. Mt CO_2-e in the third emissions budget.

Most of this additional mitigation comes from the energy and industry sector, with a moderate amount from transport. The impact of the actions set out in this chapter on emissions has not yet been quantified.

Figure 5.1. Impact of the 2021 update of the price control settings on mitigation compared with the total new mitigation needed to meet emissions budgets



Note this graph does not account for the actions in this chapter.

Strengthening emissions pricing will support our transition to a low-emissions economy

The NZ ETS has recently been strengthened to include an overall 'cap' on emissions, in line with our emissions budgets and 2050 targets, and an auctioning system. To ensure the NZ ETS can continue to deliver a strong and stable signal over the long-term, the Government is planning the following actions.

Focus area 1: NZ ETS settings

The NZ ETS has a flexible cap that enables the volume of emissions within the scheme to be aligned with our emissions budgets. This alignment is primarily achieved through adjustments to the units available for auctioning.[2]

The Government is also required to set annual price controls for NZ ETS auctions: a 'price floor' and a 'price ceiling'. These controls signal the bounds of acceptable NZU prices at auction and act as a safety valve if an auction's clearing price deviates outside these bounds.[3] They also provide some certainty to businesses and investors on the future trajectory of NZU prices to aid the forecasting of emissions obligations, or to help with investment planning.

Action 5.1: Align NZ ETS settings with emissions budgets

In order to ensure the NZ ETS settings align with emissions budgets, He Pou a Rangi – Climate Change Commission will provide advice on the unit limit and price control settings for 2023–27. Once the advice has been received, the Government will:

- consult on proposed updates and seek final Cabinet agreement
- publish final 2023–27 settings by the end of 2022
- publish supporting information on how NZ ETS settings are determined, including how significant events, such changes to Aotearoa New Zealand's emissions profile or the triggering of the cost containment reserve, will affect unit supply.

2 Auction unit volumes are publicly available and the Government must update them each year to ensure at least five years of published unit volumes are always available.

3 These bounds of acceptable NZU prices at auction are not intended to explicitly control the auction price; rather, the bounds moderate that price by adjusting unit supply. While the price at which units sell at auction will influence the secondary market price, supply and demand of NZUs at a point in time is the primary factor that determines the price at which NZUs sell.

Focus area 2: Adjust the NZ ETS to drive a balance of gross and net emissions reductions

He Pou a Rangi – Climate Change Commission has recommended that the Government consider how the NZ ETS may be amended to provide more robust support for gross emissions reductions, alongside enduring support for emissions removals through forestry. To ensure that the NZ ETS sends a strong, clear price signal that incentivises the right balance of gross and net emissions reductions, the Government will be looking into NZ ETS unit supply and what changes, if any, should be made to the NZ ETS to support this outcome.

Action 5.2.1: Adjust the NZ ETS to drive a balance of gross and net emissions reductions

There are a number of aspects to the NZ ETS that impact unit supply including industrial allocations, the current stockpile of NZUs, rates of afforestation and deforestation, and the number of NZUs being auctioned.

Further policy analysis is underway on unit supply in the NZ ETS to assess whether additional NZ ETS changes are needed to balance gross and net reductions.

Emissions removals other than from forestry activities could help remove emissions from the atmosphere and help achieve our climate goals. Non-forest activities such as restoring peatlands, riparian zones and shrubland are possible options, however, the NZ ETS does not currently accommodate their voluntary inclusion.

Emissions from these activities can be included in Aotearoa New Zealand's Greenhouse Gas Inventory but require resourcing to build a credible evidence base with environmental integrity.

Direct air carbon capture and other activities that are not land-based (such as ocean marine blue carbon initiatives) are also possible options. To be accommodated in the NZ ETS, however, these removal types need to be included in Aotearoa New Zealand's Greenhouse Gas Inventory. This would require a comprehensive evidence base and – if possible – sufficient international guidance.

The impact that new emissions removal categories have on Aotearoa New Zealand's total net emissions will be considered as part of the Government's policy analysis on unit supply in the NZ ETS.

Action 5.2.2: Investigate new sources of emissions removals

The Government will investigate the feasibility of including other forms of emissions removals beyond forestry in New Zealand's Greenhouse Gas Inventory and the NZ ETS.

While the NZ ETS is an economic tool used to price emissions, it should be consistent with Government's biodiversity objectives and support indigenous afforestation. A suite of policies and incentives would be required to achieve this objective and the NZ ETS would likely play a supporting role.

The Government would need to ensure that any incentive for indigenous biodiversity does not undermine the scheme's primary function to provide a strong and stable emissions price signal to the Aotearoa economy. For more detail on indigenous biodiversity initiatives, see chapter 14: Forestry and chapter 4: Working with nature.

Action 5.2.3: Assess how the NZ ETS can support indigenous biodiversity

The Government will investigate how indigenous biodiversity could be supported by the NZ ETS, including supporting long-term indigenous carbon sinks.

Aotearoa New Zealand's recently updated Nationally Determined Contribution (NDC)[4] prioritises domestic emissions reductions and removals. However, achieving it will also require some offshore mitigation. The role the NZ ETS will play in meeting the NDC needs consideration to ensure it effectively and efficiently complements progress to meet our domestic emissions budgets and does not undermine the balance of gross and net emissions reductions determined by action 5.2.1.

4 The Government recently increased Aotearoa New Zealand's NDC (NDC1) to a 50 per cent reduction of net emissions below gross 2005 levels by 2030.

Action 5.2.4: Assess the role of the NZ ETS in supporting the NDC

The Government will assess what ongoing role the NZ ETS should play in supporting our NDC and whether that role requires design changes.

Focus area 3: Market governance of the NZ ETS

The Climate Change Response Act 2002 establishes the legal framework for the implementation, operation and administration of the NZ ETS. It does not provide an overarching framework for its governance. Governance responsibilities are currently fragmented across agencies, and the lack of an overarching framework gives rise to significant advice, trading and market conduct risks.

Action 5.3: Develop an overarching market governance framework

Developing an overarching governance framework will help to ensure the NZ ETS is able to play an effective role over the course of our long-term transition.

- The Government is working on options to address seven identified market risks and construct an effective market governance framework for the NZ ETS. The Government will consider how institutional arrangements could be configured to provide robust oversight of the market.
- Policy decisions are expected in mid-2022, with a legislative Bill introduced in late 2022.

Read more about market governance and its recent consultation.

Focus area 4: The risk of emissions leakage

Emissions leakage is where firms, production, or investment move offshore to countries with weaker climate policy to avoid or reduce climate compliance costs in New Zealand.[5]

In Aotearoa, this risk is currently managed through industrial allocation policy, through which the Government freely allocates NZUs to activities considered at risk of emissions leakage.[6] The free allocation of units can be used to offset emissions-related costs, thereby reducing the risk that New Zealand firms will shift offshore.

However, current industrial allocation policy settings are contributing to over-allocation – where the Government provides eligible industries with more NZUs than necessary to reduce the risk of emissions leakage. In some instances, industries receive more than 100 per cent of their emissions costs.

Action 5.4.1: Update industrial allocation policy

- In 2021, the Government consulted on options to update industrial allocation policy to:
  - remove the over-allocation of units
  - manage ongoing risk of emissions leakage
  - improve alignment with Aotearoa New Zealand's climate change commitments.
- Policy decisions are expected in mid-2022, with a legislative Bill introduced in late 2022.

Read more about the review of industrial allocation and its recent consultation.

5 Additionally, global emissions may increase if this economic displacement is to countries that have no cap on emissions, or if the production is more emissions intensive than domestic production.

6 Activities considered at risk of emissions leakage have a significant emissions intensity and are exposed to international trade.

Action 5.4.2: Investigate long-term options to address emissions leakage

The Government will look at the long-term direction of how we manage the risk of emissions leakage in Aotearoa. One possible alternative is a carbon border adjustment mechanism that is currently being explored by the European Union.

- The cement sector will be used as a test case to determine the feasibility of implementing an alternative policy to industrial allocation that aligns with Aotearoa New Zealand's climate and trade goals and growing international climate ambition.

Focus area 5: The voluntary carbon market

In addition to the price paid through NZ ETS obligations, strong global – and local – trends are driving businesses and households to reduce their emissions voluntarily.

Currently, the Government publishes guidance that provides principles and good practice guidelines for claims of voluntary climate change mitigation made by business and organisations in Aotearoa. The guidance was last updated in early 2022.[7]

Action 5.5: Develop a voluntary carbon market framework

The Government will develop a voluntary carbon market policy framework of rules and guidance to support the growing voluntary carbon market in Aotearoa. This work is being planned now and Cabinet will consider the next steps to deliver it in November 2022.

7 Ministry for the Environment. 2022. Interim guidance for voluntary climate change mitigation. Retrieved from https://environment.govt.nz/assets/publications/interim-guidance-voluntary-climate-change-mitigation.pdf (accessed 21 April 2022).

Other emissions-pricing initiatives

Additional actions contained in other chapters will support emissions pricing to further drive climate ambition.

- He Waka Eke Noa – Primary Sector Climate Action Partnership is currently developing options to price emissions in the agriculture sector. Recommendations from this group are due by 31 May 2022 (see chapter 13: Agriculture).
- The Government recently increased Aotearoa New Zealand's NDC (NDC1) to a 50 per cent reduction of net emissions below gross 2005 levels by 2030. Domestic action will be prioritised; however, offshore mitigation will be needed. The Minister of Climate Change is developing options to meet NDC1 that have environmental integrity and prioritise partnership in the Asia-Pacific region.
- The Government has established the Climate Emergency Response Fund with an initial down payment of NZ$4.5 billion of cash proceeds from the NZ ETS. This fund will help support climate change objectives, including through funding some of the policies in the emissions reduction plan (see chapter 6: Funding and finance).

CHAPTER 6:

Funding and finance

Funding and finance

Lead

MINISTER OF FINANCE
HON GRANT ROBERTSON

MINISTER OF
CLIMATE CHANGE
HON JAMES SHAW

SECRETARY TO
THE TREASURY
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SECRETARY FOR
THE ENVIRONMENT
VICKY ROBERTSON

Supporting

- Chief Executive of the Ministry of Business, Innovation and Employment
- Secretary for Internal Affairs (Local Government)

Contribution to our long-term vision

Robust funding and financing settings support investment that aligns with our climate change objectives.

Funding and finance

Why funding and financing is important

Well-designed funding and finance initiatives are key enablers of the transition to a low-emissions economy. Initiatives in this chapter will help to accelerate the transition, including by supporting effective decision making, mobilising private capital and aligning investment and spending with climate objectives.

Key actions

- Establish the Climate Emergency Response Fund (with initial down payment of NZ$4.5 billion).
- Issue Sovereign Green Bonds.
- Build on the success of the New Zealand Green Investment Finance.
- Issue the Crown Responsible Investment Framework to Crown Financial Institutions.
- Support high-quality investment decisions.
- Support investor decisions through world-first climate reporting legislation.
- Support responsible investment through default KiwiSaver providers changes.
- Support an integrated financial system.
- Collaborate with the finance sector to accelerate sustainable finance.
- Implement the Carbon Neutral Government Programme to lead by example.
- Apply the Government procurement rules to reduce emissions.

Funding and financing are key catalysts for the transition

Finance is an important catalyst for lowering emissions and increasing climate resilience. It can reduce emissions directly and support others to invest in and undertake low-emissions activities.

There is no single 'right' way to direct the flow of finance towards climate goals. Instead, our transition to a low-emissions Aotearoa New Zealand will require a range of changes across the economy – changes that require significant and sustained investment over the next 30 years.

The public and private sectors need to work together to provide the funding and financing that will be necessary to reduce our emissions. This approach to funding and financing will complement other measures to drive emissions reductions, such as regulation.

The Government's approach to funding and financing the transition is guided by four main objectives.

- **Adequacy –** There will be enough money available, at the right time, to meet the challenge of the transition.
- **Certainty –** It is clear who is responsible for providing funding and financing. Central government's role in direct investment will also be clear.
- **Durability and flexibility –** Systems and processes supporting climate change actions are durable, fiscally sustainable and flexible to the dynamic nature of climate change.
- **Private capital –** Private capital is effectively mobilised towards climate objectives, and public spending does not 'crowd out' investment from the private sector.

We need an integrated approach to funding and financing

To reduce our emissions, we will need to change the way we invest and how we use different technologies. These changes will involve financial costs, but will result in benefits and opportunities that make them worth the investment. The Government, private sector and households all have a role to play.

- The Government directly funds and finances projects, ensures its own investments and spending align with climate objectives and ensures that the wider investment landscape supports Aotearoa New Zealand's transition.
- Local government is responsible for funding and financing local projects, including infrastructure. Councils will need to ensure that their investments and spending align with climate objectives.
- Private business and household activities and spending drive our economy. In doing so, they can use sustainable finance mechanisms to deliver the scale of change we need and support our transition.

The Treasury has analysed some of the possible impacts of climate change in its statement on the Government's long-term fiscal position *He Tirohanga Mokopuna 2021*. Fiscal impacts from the transition are likely to include increased spending and changes to government income, such as increasing revenue from the New Zealand Emissions Trading Scheme (NZ ETS) or declining revenue from fuel excise duty receipts.

Actions to ensure effective funding and financing systems

The NZ ETS is one of our most important established tools for supporting investment in climate objectives. The NZ ETS is a key example of a regulatory regime that sends a strong price signal to industry and the market to support low-emissions choices.

However, price signals alone may not be enough to overcome barriers to decarbonisation. To accelerate the pace of change and support an equitable transition, the Government has a direct role in investment and a role in supporting private sector investment. This includes actions relating to:

- government-led funding and financing initiatives to accelerate low-emissions investment
- system settings to support low-emissions decision-making
- achieving a carbon neutral public sector.

Dedicated funding and financing initiatives

In 2021, the Government established the Climate Emergency Response Fund (CERF). The CERF has an initial NZ$4.5 billion down payment, proportional to forecast cash proceeds from the NZ ETS over the 2022/23 to 2025/26 financial years.

The ongoing recycling of NZ ETS cash proceeds into the CERF will ensure certainty of a minimum level of public investment in climate change mitigation and adaptation over the medium term. It will also provide a signal to the private sector that the Government is taking climate change spending commitments seriously.

Recycling NZ ETS cash proceeds into the CERF over time will not be enough to tackle the intergenerational wellbeing impacts of climate change. Therefore, the total size of the CERF will be subject to Ministerial review through annual Budget processes.

Climate Emergency Response Fund

The CERF is designed as an enduring, multi-year fund so that it can help address the long-term challenges of climate change. It provides funding certainty over multi-year periods and a dedicated source of funding for public investment in climate change-related initiatives that is distinct from the main budget allowances. This will ensure that longer-term climate change objectives are not 'crowded out' by shorter-term priorities as part of the annual budget process.

In its first funding round, an initiative seeking CERF funding needed to meet one of the following criteria:

- be included in the emissions reduction plan
- directly reduce emissions
- include removing barriers to or accelerating emissions reductions as a main objective
- support an ao Māori approach to climate response
- facilitate the development of such proposals in the future
- address the distributional impacts of emissions reduction policy.

Action 6.1: Establish the Climate Emergency Response Fund

The Government expects to review the CERF, alongside the main Budget allowances, and increase the funding available to invest in high-value initiatives as necessary.

Sovereign Green Bonds

In November 2021, the Government announced plans to issue Sovereign Green Bonds (Green Bonds) from 2022 onwards. Green Bonds provide financing for low-emissions or environmental projects. They are issued globally to support climate-friendly initiatives, including by the World Bank since 2008.

Action 6.2: Issue Sovereign Green Bonds

Money raised from Green Bonds will support projects that help reach our climate objectives. Green Bonds do not mean the Government takes on new unplanned debt but represent a change to the way some bonds are issued. Subject to market conditions and progress of establishment activity, final details of the Green Bond programme will be announced mid-2022. Following this, Green Bonds will be issued in late 2022.

New Zealand Green Investment Finance

New Zealand Green Investment Finance (NZGIF) is Aotearoa New Zealand's green investment bank. It was established by the Government in 2019 to accelerate investment that supports decarbonisation. Four objectives underpin NZGIF's mandate:

- make investments that lower domestic emissions
- attract private finance
- make investments on a commercial basis
- undertake a market leadership and demonstration role.

To date, the Government has committed over NZ$400 million of capital into NZGIF, including over NZ$300 million through the 2021 budget process. NZGIF invests this money in a range of target sectors, including transport, agriculture, plastics and waste. This helps attract co-investors to green objectives and further develops the market for green investment in Aotearoa.

As of February 2022, NZGIF had invested NZ$77.1 million in capital and committed a total of NZ$122.7 million to accelerate investment to enable our low-carbon future. See the NZGIF website for further information.

Action 6.3: Build on the success of the NZGIF

NZGIF has played a key role in the first steps of our transition. It has accelerated and facilitated investments in emissions reductions across a variety of sectors. The Government expects the NZGIF to continue to play a transformational role across the economy and will work with NZGIF to support its success.

Crown Responsible Investment Framework

The NZ Super Fund, Accident Compensation Corporation, the Government Superannuation Fund, and the National Provident Fund manage over NZ$100 billion on behalf of New Zealanders as Crown Financial Institutions (CFIs). The Government has committed to a new Crown Responsible Investment Framework (the Framework) for CFIs to transition their portfolios and commit to net-zero emissions by 2050.

Action 6.4: Issue the Crown Responsible Investment Framework to Crown Financial Institutions

CFIs will advise on how they will give effect to the Framework up to 2025 and explain how they expect to transition from 2025 to achieve carbon neutrality by 2050. The Government will review progress made by CFIs and consider if any additional measures or guidance are needed to help them maintain or accelerate their transition and commitments.

Climate change in government decision-making

The Government has a responsibility to use its funds wisely. Government expenditure should always offer good value for money and should not crowd out investment that the private sector could make more effectively.

Initiatives funded through the CERF must meet various information requirements, including a robust value for money analysis and a Climate Implications of Policy Assessment analysis.

Action 6.5: Support high-quality investment decisions

To support high-quality decisions, officials have updated the Government's guidance for use of its cost benefit analysis tool: CBAx.

Officials use this tool to compare the costs and benefits of different decisions, including through determining a financial value for – or monetising – certain impacts of a decision. This helps the Government take a consistent approach to decisions, using common values and assumptions. It also supports a broad, long-term view of societal impacts, costs, and benefits.

The recent update allows more robust considerations of the climate impacts of decisions through updated 'shadow emissions values' for Budget 2022. These reflect the anticipated cost of emissions, or benefit of emissions avoided or reduced, in the context of our 2050 targets and emissions budgets.

Climate-related financial disclosures

Financial markets require consistent, comparable and reliable information to enable investors to make good decisions. However, information about the risks and opportunities of climate change to Aotearoa entities is often limited.

Aotearoa has become the first country in the world to require public disclosure of climate-related risks and opportunities, in line with robust climate standards. These standards will be issued by the External Reporting Board (XRB). The XRB develops and issues Aotearoa-specific financial and climate reporting, accounting, and auditing and assurance standards. The disclosure requirements currently apply to around 200 large financial institutions.

Action 6.6: Support investor decisions through world-first climate reporting legislation

The Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 ensures that the effects of climate change are routinely considered in business, investment, lending and insurance decisions. This will help the market to allocate investments in a way that contributes to a low-emissions and climate-resilient economy.

Key initiatives

- Explore the extension of the mandatory climate-related disclosure regime to cover a broader range of activities, for example, public entities at national and local levels.
- Explore how non-listed entities or companies consider climate change risks and opportunities.

Integrated financial system

The Financial Markets Authority (FMA) also supports Aotearoa New Zealand's transition to an integrated financial system. An integrated financial system requires organisations to consider the impact of their activities on the environment, communities and individuals, alongside traditional financial factors.

In late 2020, the FMA published its disclosure framework for integrated financial products to support the growing market for these products. Integrated financial products incorporate non-financial factors (such as natural, social and human capitals). This can include products like 'green bonds', which fund projects or organisations claiming positive environmental impacts.

Action 6.7: Support an integrated financial system

The FMA will support an integrated financial system by continuing to implement its disclosure framework for integrated financial products. This enables organisations to describe the unique features of their products, such as greenhouse gas emissions reductions and climate resilience impacts, while ensuring investors can make informed investment decisions.

Default KiwiSaver funds

In 2021, the Government made rule changes so that investments in fossil fuel production are excluded from the portfolios of default KiwiSaver funds. These are funds that people are automatically enrolled into when they have not actively chosen a fund and begin new employment.

Action 6.8: Support responsible investment through default KiwiSaver provider changes

Supporting responsible investment through changes to default KiwiSaver providers will encourage finance away from high-emitting sectors, such as fossil fuels, towards greener alternatives. In the longer term, this will also support the funds themselves by reducing their risk of investing in 'stranded assets' that become less valuable as we reduce emissions.

Default providers are also required to maintain a responsible investment policy. This must set out how investments support sustainable investment objectives and be made public on providers' websites.

Working with the finance sector

A number of the actions in this chapter support both the 'greening' of finance and the 'financing' of green. This is an area of real interest for the finance industry.

For example, the Sustainable Agriculture Finance Initiative (SAFI) was developed in 2021 as part of a public and private collaboration. It is led by the Aotearoa Circle, to accelerate further investment and support for sustainable agriculture. SAFI has developed guidance for sustainable agriculture finance. This takes note of emerging international frameworks as well as existing good farming practice used by farmers and growers.

SAFI guidance is an evolving, open-source, voluntary tool for use by banks and wider investors. It supports the finance sector to consider and integrate environmental and social factors in funding decisions, products and processes.

In July 2021, the Aotearoa Circle launched Toitū Tahua: Centre for Sustainable Finance. This new entity is tasked with coordinating the implementation of the Sustainable Finance Forum's Roadmap for Action report – which was released in 2020 – and made 11 key recommendations about sustainable finance.

Action 6.9: Collaborate with the finance sector to accelerate sustainable finance

The Government is engaging with the finance sector to mobilise private finance for the climate transition.

Key initiatives

- Support SAFI to enable better on-farm sustainability outcomes.
- Continue to actively engage with the initiatives of the Toitū Tahua: Centre for Sustainable Finance, including regulatory and institutional levers to mobilise private finance.

Actions to achieve a carbon neutral public sector

The Government launched its Carbon Neutral Government Programme (CNGP) to combat climate change and accelerate emissions reductions within the public sector. The programme aims for the public sector to achieve carbon neutrality by 2025.

The programme is backed by the NZ$219.5 million State Sector Decarbonisation Fund. Investment is focused on replacing coal boilers with low-emissions alternatives, because this will have the greatest impact on emissions. Funding is also available for other energy efficiency or renewable energy projects, including electric vehicles.

Action 6.10: Implement the Carbon Neutral Government Programme

The Carbon Neutral Government Programme will make a number of public organisations carbon neutral from 2025.[1] Among other things, participants are required to:

- measure, verify and report on their emissions annually
- set gross emissions reduction targets, in line with a 1.5°C pathway
- develop and implement an emissions reduction plan for their own organisation
- offset remaining gross emissions from 2025.

The Government is committed to achieving positive environmental outcomes through sustainable procurement by buying low-emissions and low-waste goods, services and works. Changes made to the **Government Procurement Rules** in 2019 place a greater emphasis on using government procurement to support wider social, economic, cultural and environmental outcomes and that go beyond the immediate purchase of goods and services. Supporting the transition to a net-zero-emissions economy is an explicit priority. It requires agencies to support the procurement of low-emissions and low-waste goods and services.

1 As at March 2022, 131 agencies are participating in the CNGP. Of these agencies, 85 will be reporting their emissions, targets and reduction plans from December 2023 onwards and the remaining 46 will be encouraged to report them.

Action 6.11: Apply the Government's Procurement Rules to reduce emissions

One hundred and forty government agencies are required to apply the Government Procurement Rules to reduce emissions and design out waste. They will prioritise:

- transitioning the government fleet to electric vehicles[2]
- low-carbon options for new government buildings[3]
- purchasing low-emissions stationery/process heating systems[4]
- purchasing low-waste office supplies.[5]

These agencies must also consider how they can reduce emissions resulting from other procurement.

2 Transitioning the government fleet includes optimising fleets with a view to reducing the number of vehicles, and prioritising battery electric vehicles or plug-in hybrid electric vehicles if a battery electric vehicle is not appropriate.

3 Low-carbon options for new government buildings using an approved sustainable building rating system and meeting certain standards for new non-residential government-owned buildings. This system and these standards apply to buildings with a capital value of NZ$25 million and over from 1 April 2022, and NZ$9 million and over from 1 April 2023.

4 Agencies are not permitted to purchase coal boilers.

5 When purchasing office supplies from the all-of-government office supplies contract, agencies need to purchase items that produce low amounts of waste and/or are recyclable.

CHAPTER 7:

Planning and infrastructure

Planning and infrastructure

Lead

MINISTER FOR
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SECRETARY FOR
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VICKY ROBERTSON

Supporting

- Minister for Infrastructure
- Minister of Housing
- Minister of Climate Change
- Chief Executive of the Ministry of Housing and Urban Development
- Secretary for Transport
- Chief Executive of Te Waihanga
- Secretary to the Treasury

Contribution to our long-term vision

The development of planning, investment in infrastructure, and land and resource management will help to identify opportunities (and remove barriers) to meeting emissions budgets and 2050 targets, while also building climate resilience and improving people's wellbeing.

Planning and infrastructure

Why planning and infrastructure is important

How we use land and other natural and physical resources impacts on our greenhouse gas emissions and determines how well we cope with the effects of climate change. Decisions we make about land use, resources and infrastructure now will determine our emissions pathway well into the future.

Key actions

- Improve the resource management system to promote greenhouse gas emissions reductions and climate resilience.
- Support emissions reductions and climate resilience via policy, guidelines, direction and partnerships on housing and urban development.
- Address infrastructure funding and financing challenges so we can develop low-emissions urban environments and use infrastructure efficiently.
- Improve the evidence base and tools for understanding and assessing urban development and infrastructure greenhouse gas emissions.
- Promote innovation to reduce emissions in Crown-led urban regeneration projects.
- Identify ways to support the private sector to deliver low-emissions development.
- Integrate climate mitigation into central government decisions on infrastructure.

Our planning system and investment in infrastructure can reduce emissions, build resilience and improve wellbeing

The **planning and infrastructure systems** guide decisions on how we use our land and natural and physical resources. They also guide infrastructure investment. These decisions influence the form, location and type of development that takes place.

They have long-term impacts due to the lifespan of the built environment. These decisions cover investment and planning processes for infrastructure, including the development of new infrastructure, and significant renewals or major upgrades of existing assets.

Decisions about when, where and how to invest in infrastructure services should be outcome focused, align with national objectives[1] and consider built and non-built solutions.

We need to get the foundations right

Getting the foundations of our planning and infrastructure systems right today will help our towns and cities generate fewer greenhouse gas emissions in the future. The right planning and infrastructure settings will also ensure we are resilient to the impacts of climate change and help people and nature to thrive.

Over many decades, our towns and cities have been planned in ways that often lead to businesses, communities and households participating in activities that create emissions and make it harder for them to do things that avoid or reduce emissions. Many major infrastructure decisions have not adequately taken climate change into account.

1 These strategic objectives (from deciding when, where and how to invest in infrastructure) are set out across a range of regulatory and policy frameworks, including resource management reform, the Climate Change Response Act 2002, the Government Policy Statement on Housing and Urban Development, the New Zealand Infrastructure Strategy, Future for Local Government, MAIHI Ka Ora (the National Māori Housing Strategy) and the Three Waters Reform Programme.

We need to change the way we use our land and resources and plan, build and operate infrastructure, to support our transition to a low-emissions, resilient society over the next 30 years. To achieve that goal, we need to enable our planning and infrastructure systems to reduce emissions, increase removals and improve climate resilience now.

Our planning and infrastructure systems influence how and where our towns and cities grow. They shape how decisions are made on the types of infrastructure provided and how infrastructure is funded, financed and used.

When infrastructure and planning decisions are made in an integrated way, informed by national objectives, they can help us achieve well-functioning, low-emissions urban environments, while enabling us to use our land and resources more carefully and efficiently.

Well-functioning urban environments can reduce emissions and improve wellbeing

Urban environments with a variety of mixed-use, medium- and high-density development that is connected to urban centres, as well as active and public transport routes, will help reduce greenhouse gas emissions. That is partly because they provide more options for people to travel between where we work, live, play and learn.

Well-planned urban areas provide an opportunity to realise wider benefits too. They enable a greater supply and diversity of housing to be built at pace and scale, improving affordability. Good access to active and public transport routes that safely take people to workplaces and education centres can provide greater access to learning and job opportunities for households, improve public health and wellbeing and strengthen community cohesion.

How we plan and provide infrastructure can reduce emissions and increase resilience

How we provide infrastructure also affects our emissions. Higher-density, mixed-use developments can have lower operational emissions per dwelling and allow infrastructure to be used more efficiently, avoiding or delaying the need for more infrastructure and associated emissions.

Non-built solutions to our infrastructure needs – including nature-based solutions – can also reduce the need for built infrastructure made of materials that carry embodied emissions. They can also help to sequester carbon, improve indigenous biodiversity and create more liveable environments that encourage people to walk or cycle, reducing emissions from transport.

Decisions about investment in infrastructure need to take account of the whole-of-life costs and benefits of that investment, including the cost of emissions associated with that infrastructure.

The planning and infrastructure systems can also help to prevent development in areas vulnerable to the impacts of climate change, such as flooding. Avoiding development in these areas will help us reduce the need for additional infrastructure to protect vulnerable land and assets – saving on emissions from building new infrastructure – and avoid the need to replace or relocate existing infrastructure and buildings.

CASE STUDY

WELLINGTON REGIONAL GROWTH FRAMEWORK

The Wellington Regional Leadership Committee (the Committee) is an Urban Growth Partnership for the Wellington-Wairarapa-Horowhenua area. The Committee is planning for growth that will support the transition to a resilient, low-emissions economy. This collaboration between local councils, central government and mana whenua aims to improve coordination and alignment for housing, land use, transport, climate change and emissions and infrastructure planning.

In July 2021 the Committee finalised the Wellington Regional Growth Framework (the Framework), the region's first joint spatial plan. The Framework describes a 30-plus-year vision for how the region will grow and change and the enabling infrastructure needed to accommodate an additional 200,000 people and 100,000 jobs, making best use of assets and resources, and achieving resilience and emissions reduction.

The Framework supports denser urban forms in locations that are well connected with active and public transport and ensures that new growth areas are well located, use land efficiently and are more self-supporting, with local employment and community facilities.

The planning system and investment in infrastructure needs to support emissions reductions across sectors

Our planning and infrastructure systems need to support emissions reductions across a range of sectors.

- **Transport:** In our urban areas – where most people live – planning that supports low-emissions urban form – the shape, size, density and configuration of settlements – through more mixed-use, medium- and high-density development close to urban centres creates more accessible, healthy, resilient and vibrant towns and cities. In rural areas, planning can support interregional connections for people and freight. In urban and rural areas, infrastructure investment and planning can help make lower-emissions transport an easy, affordable, reliable option for people and freight.
- **Building and construction:** The planning system can promote developments with higher-density buildings, including apartments and townhouses. This type of development can have lower construction and operational emissions than standalone dwellings. We can better provide more efficient and low-emissions infrastructure services to communities and businesses when infrastructure is integrated with development.
- **Forestry and nature-based solutions:** The planning system can promote the location, scale and type of forestry – and forest management techniques – that we need to realise the significant climate and biodiversity benefits that forestry can bring (see chapter 14: Forestry).

  The planning system and infrastructure investment can also support the use of nature-based solutions or blue/green infrastructure – such as water-sensitive urban design, rain gardens and urban trees – which may support carbon removals and improve climate resilience (see chapter 4: Working with nature).

- **Energy:** The planning system can enable the development of renewable energy and infrastructure that we need to decarbonise our energy system and promote low-emissions development – residential, commercial, industrial and infrastructure – that reduce energy demand. When we use less energy, we can delay the need for new electricity infrastructure. As we transition to a low-emissions electricity grid, the planning and investment systems can make sure we develop the right infrastructure in the right places, maximising efficiency and resilience. In turn, those decisions can ensure that embodied emissions – those that arise as a result of construction processes and manufacturing the materials needed to build the infrastructure – are as low as practicable.
- **Waste:** Moving to a circular economy will minimise waste in a number of ways, including by recovering materials – or resources – for reuse. The planning system and infrastructure investment decisions can support us to recover resources at higher rates. They will play a role in:
  - enabling the development of the infrastructure we need to recover resources and stop them going to landfill, which aligns with the new Waste Strategy
  - capturing more of the methane generated at municipal landfills.
- **Agriculture:** The planning system can indirectly support emissions reductions in the agriculture sector. For example, it can support whole-of-farm system assessment of emissions-mitigation scenarios and help to achieve freshwater and biodiversity outcomes via integrated farm planning.

Figure 7.1. The planning and infrastructure system has an important role to play in supporting climate outcomes

Low-emissions buildings and infrastructure

Planning and infrastructure systems support the delivery of low-emissions and efficient buildings and infrastructure to be delivered at pace and scale.

Well-functioning urban environments

Urban areas are liveable, resilient, supported by high-quality urban design with good access to community amenities, and active and public transport.

Mixed-use, medium- and high-density development

Medium- and high-density development close to urban centres and active/public transport provides more choice about where people live and how they travel to the places we work, learn and play.

Strategic planning

Integrated and strategic planning ensures land and resource use in rural and urban areas help to reduce emissions, build resilience and support high-emitting sectors to transition.

Access to active and public transport

Urban environments provide easy access to walking, cycling, scootering and public transport routes.

Freight and transport

Planning and infrastructure systems support improvements to interregional rail services, more on-demand public transport services in provincial towns and the decarbonisation of freight.

Māori

The planning system supports hapū, iwi and Māori to protect areas of cultural significance and to contribute to decisions on land use and local place-making.

Working with nature

Planning and infrastructure systems work with nature to support biodiversity, enable green and blue infrastructure, sequester carbon and manage the effects of a changing climate.

Actions to reduce emissions through improvements to the planning and infrastructure systems

Getting the fundamentals right for the next 30-plus years, and ensuring decisions taken today will not hold us back, is critically important for placing Aotearoa New Zealand on a low-emissions pathway to meeting the 2050 target.

Significant reform to the resource management system – which will help to embed necessary changes to the way we manage land and resources – has already begun. The new system will have an impact on emissions reductions beyond the first emissions budget period.

Together, the package of initiatives outlined below will:

- create a pathway for integrating climate change throughout the planning system – from the legislative framework, through to national direction, regional spatial planning, plan-making and consenting
- build the evidence base to make sure that central and local government, Māori, and the private sector can make decisions and investments that will reduce our emissions and meet our 2050 targets
- show that lower-emissions approaches are viable and affordable, providing a pathway for others to follow
- identify ways to support the private sector, including developers and Māori housing providers, to accelerate development that will have wider benefits for health and wellbeing of our communities
- make sure that government infrastructure decisions help us reduce emissions, in line with our 2050 targets and adapt to the effects of climate change.

Action 7.1: Improve the resource management system to promote lower emissions and climate resilience

The resource management system will be improved to support emissions reductions and climate resilience.

Key initiatives

Among other things, the new resource management system will:

- embed emissions reduction and climate adaptation into resource management frameworks (for example, the proposed Strategic Planning Act and Natural and Built Environments Act), including measures that help to achieve urban density that improves access to community amenities
- support managed retreat for existing buildings and infrastructure at risk of the impacts of climate change through the proposed Climate Adaptation Act
- embed Te Tiriti o Waitangi and Te Oranga o te Taiao – particularly the concept of wellbeing of the natural environment – into the decision-making framework, which will better enable urban development and design to incorporate mātauranga Māori
- establish joint committees with central and local government and iwi and hapū to better align policy and investments
- develop direction on achieving climate outcomes in regional spatial strategies and plans via the proposed National Planning Framework – which will provide strategic and regulatory direction from central government on implementing the new resource management system under the proposed NBA, noting that these outcomes will be consistent with future emissions reduction plans
- assess existing and emerging national direction under the Resource Management Act 1991 against the policy intent of the present emissions reduction plan to determine how to support local authorities in the interim.

Action 7.2: Support emissions reductions and climate resilience via policy, guidelines, direction and partnerships on housing and urban development

To reduce emissions, we need more energy-efficient, mixed-use urban development at medium and high densities, supported by active and public transport. A range of initiatives are underway in partnership with local government, Māori and the private sector that promote housing and development that will help deliver low-emissions and climate-resilient urban environments. It is important that housing and urban development also support accessibility for those living with a disability.

Key initiatives

- The National Policy Statement on Urban Development (NPS-UD) includes emissions-reduction objectives and policies that local authorities must give effect to, including requiring intensification in and around urban centres and rapid transit stops.
- The Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 improves housing supply in Aotearoa New Zealand's largest cities by speeding up implementation of the NPS-UD and enabling more medium-density homes to be built. The Government developed a voluntary design guide to support implementation, in consultation with local government, Māori and industry stakeholders.
- The Government will develop urban design guidance to support local authorities to promote low-emissions urban design initiatives, which may be explored in the future National Planning Framework. Examples of local urban design initiatives (also see chapter 10: Transport) include:
  - designing public spaces (including streets) that appeal to people in higher-density areas, making them more accessible, walkable and bikeable
  - nature-based solutions, such as urban forestry and vertical greening
  - blue and green infrastructure, such as water sensitive urban design.
- The Government Policy Statement on Housing and Urban Development includes reducing emissions among priorities for housing and urban development.
- Urban Growth Partnerships between central government, local government and hapū and iwi in high-growth urban areas are supporting the development of jointspatial plans with emissions-reduction and climate-resilience objectives.
- The MAIHI Ka Ora (the National Māori Housing Strategy) includes plans for supporting Māori housing with self-sustaining technologies that can help drive emissions reductions.

Action 7.3: Address infrastructure funding and financing challenges

The Government will address funding and financing challenges for delivering infrastructure investment that supports urban development and to use infrastructure funding and financing tools in a way that helps to reduce emissions.

Key initiatives

- Respond to recommendations in the Rautaki Hanganga o Aotearoa | New Zealand Infrastructure Strategy by 14 September 2022. This strategy makes recommendations for enabling the development of low-emissions energy infrastructure; reducing the emissions produced by our infrastructure during construction and use; and a principles-based approach to infrastructure decision-making, including consideration of non-built solutions, the cost of carbon and whole-of-life emissions.
- Progress options, through the urban growth work programme (in 2022/23), to address funding and financing constraints for urban infrastructure – for example, the limitations of existing tools and misaligned investment incentives – in a way that responds to climate change and other objectives.
- Consider barriers and opportunities to infrastructure funding and financing to support emissions reductions in the context of other work programmes, including:
  - the review into the Future of Local Government
  - development of transport pricing tools
  - the review of the transport revenue system
  - the review of the future pricing system for water assets under Three Waters Reform.

Action 7.4: Improve the evidence base and tools for understanding and assessing urban development and infrastructure emissions

The Government will look to improve the evidence base and tools to better understand the emissions from urban development and infrastructure. These improvements could inform future frameworks for reducing those emissions.

Key initiatives

- Improve the evidence base for understanding what can help reduce urban greenhouse gas emissions in Aotearoa, for instance, how land use planning and delivering infrastructure in our urban areas can reduce emissions.
- Review existing tools and methodologies and develop new tools, to establish a nationally consistent emissions measurement toolkit to assist decision making on urban and infrastructure development.
- Assess the extent to which existing urban development and infrastructure policy and programmes (eg, NPS-UD) are aligned with emissions-reduction goals.
- This work could also support other planning objectives, such as encouraging trees and vegetation in urban areas for both temperature control and carbon sequestration.

Action 7.5: Promote innovation in low-emissions, liveable neighbourhoods through Crown-led urban regeneration projects

To demonstrate how to deliver low-emissions, liveable neighbourhoods, the Government will:

- identify and aim to pilot innovative approaches that deliver low-emissions alternatives to traditional neighbourhood and infrastructure approaches. Kāinga Ora – Homes and Communities may lead this work within an existing project.

Action 7.6: Identify ways to support the private sector to deliver lower emissions development

To further accelerate the development by the private sector of medium- and high-density development, the Government will:

- engage with the development sector – including non-profit, community and Māori housing providers and developers – to identify barriers to low-emissions urban development.

Action 7.7: Integrate climate mitigation into government decisions on infrastructure

To ensure that government infrastructure investment decisions properly consider emissions reduction and the need to adapt to the effects of climate change, the Government will:

- revise central government guidance, guidelines and tools to ensure they factor climate outcomes into decision-making about infrastructure investments
- implement changes, where appropriate.

Role of local government and private sector

Local government and the private sector have a role to play in ensuring that our planning system and investment in infrastructure support our transition to a low-emissions and climate-resilient society.

Local government engages with local community and tangata whenua to help inform decisions it makes on land use, resource management, urban form, road and transport services, infrastructure funding and servicing, waste management, flood risk management and coastal management.

The private sector funds, finances, designs, constructs, delivers and maintains much of the built environment. This includes developers; community housing providers; infrastructure providers; and those in the finance, building and construction, architecture, engineering sectors.

CHAPTER 8:

Research, science, innovation and technology

Research, science, innovation and technology

Lead

MINISTER OF RESEARCH, SCIENCE AND INNOVATION

HON DR MEGAN WOODS

CHIEF EXECUTIVE OF THE MINISTRY OF BUSINESS, INNOVATION AND EMPLOYMENT

CAROLYN TREMAIN

Supporting

- Chief Executive of the Energy Efficiency and Conservation Authority
- Director-General of the Ministry for Primary Industries
- Secretary for the Environment

Contribution to our long-term vision

Research, science, innovation and technology (RSI&T) provide the knowledge and insights to transform Aotearoa New Zealand to a low-emissions economy that provides economic prosperity and improved wellbeing for all. Good access to new knowledge, technologies and processes provides new ways of doing things to support change and help communities, Māori, the Government and businesses remain resilient over time.

Research, science, innovation and technology

Why research, science, innovation and technology is important

RSI&T activity accelerates the transformation of the economy by enabling development and deployment of innovative low-emissions solutions into industries and sectors. It enables the growth of new sectors, market opportunities and high-value jobs, and the transformation to a prosperous low-emissions economy in an equitable way.

Key actions

- Provide tools to support knowledge development, help sectors to transition and unlock new opportunities.
  - Work towards mission-focused climate innovation platforms to coordinate action on the greatest climate challenges facing Aotearoa.
  - Reorientate the science system to improve its ability to service a low-emissions future.
  - Scale up and further target research funding and innovation support programmes.
- Develop strategic partnerships domestically and internationally to ensure research and innovation has greater impact.
  - Support Māori to use the power of mātauranga in the transition.
  - Attract leading innovators to build a sustained research and development presence in Aotearoa.
  - Partner internationally on low-emissions initiatives with leading researchers and frontier firms.

Research, science, innovation and technology make a low-emissions future possible

He Pou a Rangi – Climate Change Commission (the Commission) identified innovation as one of three key pillars for reducing emissions and highlighted the importance of prioritising low-emissions research, science and innovation to our transition.

In 2050, Aotearoa will look markedly different to today. New high value, low-emissions sectors and jobs will emerge and problems will need to be solved that have not yet been identified.

Research, science, innovation and technology (RSI&T) can enable the behaviour change we need to meet our emissions reduction targets. New, more convenient, or cheaper ways of doing things can make the switch from high-emissions approaches to lower ones easier for communities and sectors. Research also provides critical knowledge about what approaches we can take to better inform decision making and behaviour.

Aotearoa will need a flexible, adaptive approach to identifying and supporting different types of innovation across multiple sectors. It is not always clear which innovations and behaviour change will deliver the greatest emissions reductions. We need to invest in the fundamental science and technology that will underpin future innovation, but we also need to be prepared to let some innovation fail, while rapidly increasing investment in approaches that prove most effective.

The Government and the private sector will need to work together to deploy low-emissions innovation

The private sector accounts for over half of RSI&T activity in Aotearoa and is an important partner in the research, science and innovation (RSI) system. Private sector entrepreneurs and innovation are critical to adopting new knowledge, technologies and practices by managing consumer demand and ensuring new innovations are easy to use, readily available and rapidly adopted.

Cutting-edge science expertise and innovative firms give Aotearoa an advantage in designing new, low-emissions technology, establishing frontier firms and new sectors. Exporting our innovations to the global green economy provides an opportunity to grow our economy and impact other countries' emissions as well as our own.

CASE STUDY

PARTNERSHIP WITH AIR NEW ZEALAND ON SUSTAINABLE AVIATION FUELS

Aotearoa New Zealand's physical isolation from the rest of the world means that aviation will remain a critical way to stay globally connected. The aviation industry's current reliance on fossil fuels presents a particular challenge for our national carrier, Air New Zealand.

Sustainable aviation fuel – a fuel that can be made from non-fossil fuel sources such as woody biomass and materials that will otherwise go to landfill – could potentially reduce lifecycle carbon emissions by more than 80 per cent compared to traditional jet fuel. It is critical for decarbonising long-haul aviation travel, and the tourism and export industries that depend upon it.

Air New Zealand and the Ministry of Business, Innovation and Employment are inviting leaders in innovation to demonstrate the feasibility of operating a sustainable aviation fuel plant at scale.

We need to embed transformative innovation across our climate change response

Transformative innovation is often disruptive and difficult to manage within existing sectors or structures, but there is no 'do nothing' option. Given the scale of the challenge globally, disruptive change will be coming whether Aotearoa is ready or not. This is due to factors like changing consumer preferences, international regulation or new technologies and ideas developed overseas. The Government is positioning Aotearoa for resilience through these changes while providing the basis for new opportunities.

Driving transformative change through the RSI system will unlock the following opportunities:

- achieving an economy that is productive, sustainable and inclusive
- positioning Aotearoa as a provider of low-emissions solutions
- accelerating new high value businesses and industries.

The RSI system will continue to support an inclusive, sustainable and productive future

The RSI system supports our communities and businesses to adapt to a new, low-emissions future by:

- providing grants and funding to help solve the technological challenges of reducing emissions
- developing the knowledge we need to do things differently.

New knowledge and technologies that we develop here in Aotearoa can be exported to a world that is also transitioning to a low-emissions economy – building a future that is sustainable and productive.

CASE STUDY

ENDEAVOUR FUND RESEARCH GENERATING NEW KNOWLEDGE FOR THE ENERGY SECTOR

The Endeavour Fund generates new knowledge that supports sectors to transition to a low-emissions and climate-resilient economy, including through the development of new energy opportunities and new materials.

This includes the GNS Science-led Geothermal: The Next Generation project which explores new ways to extract geothermal energy at greater depths. The knowledge developed will deliver new options to significantly reduce emissions for the energy sector and will provide vital regional perspective and opportunities for iwi and regional development.

CASE STUDY

LOW-EMISSIONS STEELMAKING

Producing steel currently relies on a high-temperature chemical reaction between coal and iron ore, emitting large quantities of carbon dioxide. The process has largely remained unchanged since the Industrial Revolution.

Researchers at the Robinson Research Institute have developed a novel technology which uses hydrogen instead of coal to produce iron and steel, a breakthrough step in the transition to a climate-resilient and low-emissions future. This research also addresses Aotearoa-specific challenges for the manufacture of low-emissions steel due to the unique composition of our indigenous iron sands.

The project was kickstarted in 2019 with a NZ$6.5 million research grant from the Endeavour Fund, to support the development of this new chemical process. The Robinson Research Institute is now collaborating with Wellington UniVentures and New Zealand Steel to accelerate the development of a pilot-scale reactor at New Zealand Steel's Glenbrook site.

RSI&T can maximise our opportunities in the shift to a global low-emissions economy

The RSI system supports the emergence of new initiatives, companies and sectors which can unlock new opportunities to reduce emissions faster, more cost-effectively, or in a way that enables further growth opportunities. This includes supporting start-up companies that want to take novel technology and practices to market or disrupt the status quo.

CASE STUDY

ORION ENERGY ACCELERATOR

The Orion Energy Accelerator is a 2021 partnership between Canterbury electricity lines company Orion, the Ministry of Awesome – a start-up-support organisation, and Ara Ake, an organisation focused on future energy development.

The accelerator was a 10-week mentorship programme open to individuals and start-up companies, producing innovative ideas across a range of energy sectors, including smart grids, e-mobility, electric vehicle charging and energy storage. It also secured a partnership from Ara Institute of Canterbury, EY and Wynn Williams to aid the start-ups during the programme.

The accelerator provided support for 10 start-ups, to validate their ideas and progress the start-ups towards commercial readiness. Two start-ups are working with Orion: one will save millions of dollars in network upgrades and the other is a promising solution to energy poverty.

The RSI system will continue to drive a low-emissions transformation

Mechanisms such as the innovation grants programme and Research and Development Tax Incentive – which supports businesses to undertake research and development, including in relation to low-emissions technology and change – stimulate innovation across the economy.

New technology and innovation provide opportunities to accelerate our transformation. Callaghan Innovation – Aotearoa New Zealand's innovation agency – partners with ambitious businesses of all sizes to provide innovation support services. This includes a cleantech mission that aims to accelerate cleantech innovation and commercialisation.

The RSI system supports the emergence of new businesses and sectors leveraging opportunities for Aotearoa through the start-up support programme. The programme provides capability building mechanisms for start-ups, including Founder Incubators and Technology Incubators.

It also supports access to capital for start-ups through New Zealand Growth Capital Partners. This includes providing support for initiatives such as the CreativeHQ Climate Response Accelerator.

The RSI system also provides targeted support for sectors, including:

- funding research to reduce agricultural emissions, including support for the New Zealand Agricultural Greenhouse Gas Research Centre and the Global Research Alliance on Agricultural Greenhouse Gases
- encouraging low-emissions energy innovation and technology, including funding the advanced energy technology platform, which explores technologies with the potential to radically shift the global energy landscape and develop market opportunities for Aotearoa
- investment in data science to grow our capability, develop useful and transformative data science techniques, and create opportunities for the application of those techniques in our sectors.

Actions to accelerate emissions reduction

The Government is positioning Aotearoa to be resilient to the global move to lower emissions and to seize new opportunities this innovation provides.

This will need a policy and regulatory environment that:

- develops knowledge and is open to new sources of ideas, including from overseas
- allows for solutions to be tested and refined here in Aotearoa
- is attractive to international innovators and investment
- supports early adopters to absorb and trial innovation
- provides a reason to change, accelerating the uptake of low-emissions alternatives once they are available.

This requires coordination beyond RSI&T across industry sectors and a wide range of government agencies and settings.

The Government has two key actions to accelerate emissions reduction through:

- creating a forward looking and adaptive portfolio of climate-focused innovation through the establishment of climate innovation platforms
- scaling up and reorienting existing programmes to generate the new knowledge and technologies we need to tackle the climate change challenge.

Climate innovation platforms can coordinate action on key challenges

To accelerate emissions reductions, the Government is working towards establishing climate innovation platforms to coordinate action on key challenges and take opportunities in our shift to a low-emissions future. The platforms will improve the competitiveness of our existing sectors, grow new ones, and reduce emissions simultaneously.

Climate innovation platforms will be:

- outcome or missioned-focused – they will be designed around a specific goal
- international-facing – they will look for innovation and investment both at home and from across the world
- designed to help Aotearoa absorb climate innovation at pace – with a mandate stretching across different agencies and sectors to identify and remove barriers to testing and widespread use of innovations
- flexible and open to change as the global environment changes.

This all-of-government approach will use a wide range of tools and approaches including proactive policy, regulatory settings, and RSI tools to ensure that ideas from here and around the world can be implemented quickly.

The nature of individual platforms and exact mix of Government support (including but not limited to research and development support, international partnerships, training and skills development, and sector regulatory and policy changes) will depend on the particular sector and challenge. However, platforms will be encouraged to use the full range of roles and policy tools and approaches that the Government has at its disposal.

The Government will take a portfolio approach – in which a range of initiatives are pursued at the same time, and support is boosted for the most promising ones – to adapt to changing priorities and levels of uncertainty as Aotearoa progresses to a low-emissions future.

The portfolio will engage across all areas of the economy to develop future-focused platforms. This will involve working closely with the private sector, including supporting platforms proposed by the private sector, to ensure the platforms have an impact.

Action 8.1.1: Establish climate innovation platforms

To coordinate our climate change response and accelerate our transition by removing barriers to the development and adoption of new ways of doing things, the Government is looking to:

- establish outcome-focused, cross-government climate innovation platforms designed around the key challenges we face, to enable us to develop and absorb innovation at pace.

How a climate innovation platform could work

By way of example, a platform could be focused on reducing the embodied emissions – emissions associated with the manufacture of materials – within the building and construction sector. Opportunities to help reduce embodied emissions, and tools and approaches that could be used by government to promote those opportunities include:

- adoption of existing international best practise such as building information modelling and offsite manufacturing – tools and approaches the Government could use include: government procurement; sector partnerships through the Construction Sector Accord to showcase approaches; targeted grants to support scaling; and regulation to encourage the use of efficient construction processes
- lower-emissions alternatives to existing building materials including green steel – tools and approaches the Government could use include: partner with the sector to pilot new processes; build capabilities by partnering internationally and supporting applied research; and support scaling with targeted grants
- exploration of innovative and advanced materials – tools and approaches the Government could use include: scan the international market for new technologies; establish partnerships with international scientific organisations to explore the feasibility of new materials; establish mechanisms to test new materials; and identify regulatory barriers.

Each of these opportunities are at different stages, from internationally established to emerging. They will require different government tools and approaches to support their impact over time. Sector-wide initiatives – including pricing and regulatory signalling – will support the transition away from high-emissions practices and materials. Work to inform and train local authority regulators, trade agreements to secure the supply of new materials, and skills development for the building and construction sector will also support our transition.

Existing initiatives will be scaled up and reoriented towards the climate change challenge

A range of existing initiatives will be scaled up and reoriented towards tackling the climate challenge and accelerating our transition to a low-emissions economy.

Te Ara Paerangi – Future Pathways will ensure our public science system is capable of solving the challenges we face

The RSI system funds universities, Crown Research Institutes and international partnerships to conduct public good research. This research is focused on developing new knowledge and technology to help existing sectors move to low-emissions. It also provides foundational knowledge and technology to underpin the development of new net-zero sectors.

As at March 2022, approximately NZ$800 million is invested in projects generating new knowledge about:

- developing or producing new zero-carbon or green-enabling technologies (NZ$210 million)
- surveillance, modelling and the historical record of climate change and its effects (NZ$227 million)
- research into direct mitigation of greenhouse gas emissions (NZ$192 million)
- developing sustainable, green economies (NZ$121 million)
- social science for change and awareness of climate change effects and mitigations (NZ$48 million).

To reach our 2050 targets and create a prosperous low-emissions economy, the level of research activity in Aotearoa needs to continue to increase. We also need to reorient and optimise our science system to increase the impact of research into climate change, emissions reduction activities and low-emissions technologies - and improve the flow and adoption of knowledge and technology to sectors and communities.

The Government will reorient the RSI system through Te Ara Paerangi – Future Pathways programme, which will set research priorities to address the challenges that we face. The objective of the programme is to create a modern, future-focused research system which is adaptable, resilient to changes and connected – to itself, to industry, to public sector users of research, and internationally. The programme will consider:

- giving complex challenges, such as climate change, a clear focus and dedicated resourcing
- reshaping the funding system to give effect to the priorities identified and build our capability now and in the future
- shaping our institutions so they can act on those priorities and adapt in a fast-changing world.

These priorities will influence how existing programmes and funding will help us tackle climate change challenges, including:

- the Endeavour Fund – the largest contestable science investment in the country; explicit consideration is given to low-emissions research
- the Strategic Science Investment Fund – supports research programmes including the Advanced Energy Technology platform and the New Zealand Agricultural Greenhouse Gas Research Centre
- the International Science Partnerships Programme – develops connections with governments, science and businesses to advance science and innovation opportunities for Aotearoa
- Te Pūnaha Hihiko: Vision Mātauranga Capability Fund – seeds and grows Māori research capability; most funding awarded to date addresses environmental or sustainability programmes
- the Catalyst Fund – funds international science collaborations including the New Zealand–Germany Green Hydrogen Research Programme
- the Marsden Fund – funds investigator-initiated research such as the Greening economies as an engine for sustainable solutions to climate change initiative (hosted by Massey University)
- research-industry partnership networks – enable impactful engagement with the private sector, for example, the New Zealand Product Accelerator and the Bioresource Processing Alliance.

The programme will work closely with Māori, guided by Te Pae Tawhiti – the whole-of-government response to the Wai 262 claim which looked at the Government's role in relation to mātauranga Māori – to identify how our science system can best support Māori and mātauranga.

Vision Mātauranga

The Ministry of Business, Innovation and Employment's Vision Mātauranga policy enables the science and innovation potential of Māori knowledge. Mātauranga Māori offers insights and solutions to climate change issues that reflect a holistic worldview. The contribution mātauranga Māori can make to the RSI system will be important for meeting our emissions budgets and 2050 targets, as well as creating a low-emissions economy for all.

To enhance the role of mātauranga Māori and reflect Māori aspirations in the RSI system, the Vision Mātauranga policy will be expanded to assist Māori to make future investments in RSI&T. It will be co-developed with Māori to achieve outcomes that are driven by and for Māori, and that reflect Te Tiriti o Waitangi.

Action 8.1.2: Scale up and further target existing initiatives towards climate change

To accelerate our transition the Government is developing proposals to scale up existing policy initiatives. This will support sectors and communities to mitigate and adapt to climate change, as well as provide the foundations for a future low-emissions economy in Aotearoa.

Key initiatives

- **Reset research priorities for the RSI system** – including the transition to a low-emissions economy, through Te Ara Paerangi – Future Pathways programme.
- **Enable the science and innovation potential of Māori knowledge** – through the Vision Mātauranga policy. The Government is looking to expand Vision Mātauranga to help Māori invest in RSI&T capability and activities.
- **Develop strategic partnerships for impact** – partner with Māori, regulators, sector policy leads, international research organisations and frontier firms to ensure research and innovation has impact. For example, the Innovative Partnerships Programme encourages leading innovators to build a sustained research and development presence in Aotearoa.
- **Develop tools to support knowledge development, help sectors to transition and unlock opportunities** – fund and co-invest in initiatives and infrastructure that play a fundamental role in our response to climate change.
- **Support the development, assessment and deployment of technology** – technology will assist sectors to reduce their emissions and underpin many of the new opportunities associated with a low-emissions economy. This support ensures that Aotearoa is an active participant in the global market for technology, as both a developer and procurer.

CHAPTER 9:

Circular economy and bioeconomy

Circular economy and bioeconomy

Lead

MINISTER OF ENERGY AND RESOURCES

HON DR MEGAN WOODS

MINISTER FOR ECONOMIC AND REGIONAL DEVELOPMENT; MINISTER OF FORESTRY

HON STUART NASH

CHIEF EXECUTIVE OF THE MINISTRY OF BUSINESS, INNOVATION AND EMPLOYMENT

CAROLYN TREMAIN

Supporting

- Director-General of the Ministry for Primary Industries
- Secretary for the Environment

Circular economy and bioeconomy

Contribution to our long-term vision

By 2050, Aotearoa New Zealand will have a circular economy with a thriving bioeconomy that seizes the opportunities from global trends and shifting consumer preferences.

Key outcomes include:

- more circular resource and energy use, such as resource recovery
- protecting and restoring ecosystems and ecosystem services, with particular attention to indigenous biodiversity
- more prosperous and climate-resilient people, businesses and communities
- maximising the value of our renewable bioresources for our national wellbeing.

Why a circular economy with a thriving bioeconomy is important

Moving to a circular economy with a thriving bioeconomy will support our economic and social wellbeing and lead to a better balance between the emissions we generate and the environment's ability to store these.

Key actions

- Commence a circular economy and bioeconomy strategy.
- Invest in data collection and research.
- Integrate circular practices across government, communities and businesses.
- Support businesses moving to circular economy business models.
- Investigate a circular economy hub.
- Accelerate the supply and uptake of bioenergy.
- Support research and development and accelerate investment in the bioeconomy.

Moving to a more circular economy will reduce emissions and lead to many other benefits

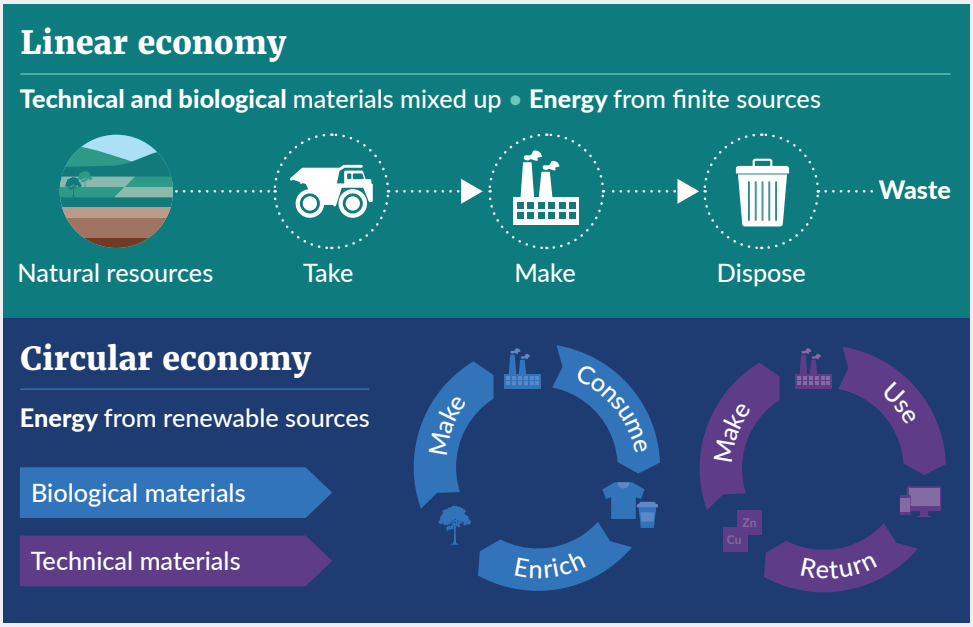
Moving to a circular economy with a thriving bioeconomy is essential to meeting our emissions budgets and our 2050 targets. In addition to helping us reduce emissions, it will create new opportunities (including new jobs such as in resource recovery, bioproducts and design), drive innovation, reduce the amount of waste we produce, and can result in cost savings for households and businesses.

This transition will require us to change the way that we think about – and use – resources.

What is a circular economy?

In a circular economy, we design out waste and pollution, keep resources in use for as long as possible, then recover and regenerate products and materials at the end of their lifecycle. Protecting and regenerating natural systems is key to a circular economy, as is delivering equitable and inclusive outcomes.

Figure 9.1. Linear economy and circular economy



Approximately 45 per cent of global emissions come from making products. Of these emissions, up to 80 per cent are created in the design stage.[1] Moving to a more circular economy is an opportunity to rethink how we design and use our resources to meet our material needs, such as shelter, mobility and nutrition.

Globally, many businesses and governments are adopting circular practices to improve efficiency, support climate goals and meet growing demand for low-emissions and low-waste products and services. A study commissioned by the Sustainable Business Network estimated that a more circular Auckland could reduce emissions by 2.7 Mt CO_2-e and add NZ$8.8 billion in additional economic activity by 2030.[2]

A more circular economy in action can include:

- right-to-repair legislation that protects consumers who seek to repair products
- greater use of the sharing economy, such as car sharing
- digital services, such as online conferences, which provide alternatives to physical products and reduce the need for travel
- designing waste out of food production systems and reusing or composting food surplus
- durable insulated homes which require less repair and less heating.

A thriving bioeconomy will help Aotearoa move to a renewable future

Aotearoa New Zealand's natural resources, which make up our bioeconomy, provide a significant competitive advantage as the world moves away from fossil fuel-based products to bio-based materials, products and chemicals.

What is the bioeconomy?

Bioeconomy describes the parts of the economy that use renewable biological resources to produce food, products and energy.

1 Ellen MacArthur Foundation: https://ellenmacarthurfoundation.org/; European Commission: EU Science Hub. Sustainable Product Policy web page. Retrieved from https://joint-research-centre.ec.europa.eu/scientific-activities/sustainable-product-policy_en#:~:text=It%20is%20estimated%20that%20over,throughout%20their%20entire%20life%20cycle (accessed 21 April 2022).

2 Sapere Research Group. 2018. A circular economy for Auckland - scoping the potential economic benefits. Retrieved from https://www.srgexpert.com/wp-content/uploads/2018/05/A-circular-economy-for-Auckland-9-May-2018.pdf (accessed 27 April 2022).

Scion estimates that the bioeconomy could create an extra NZ$30 billion for our economy and help reduce emissions by 12.5 Mt CO_2-e by 2030.[3]

We need an integrated approach to sustainably manage our biological resources that supports the transition of workers and businesses to a low-emissions economy and meet the needs of rural communities.

CASE STUDY

NGAWHA INNOVATION AND ENTERPRISE PARK

Ngawha Innovation and Enterprise Park (Ngawha Park) is founded on circular economy principles, enabling it to operate with low emissions. The development uses and reuses the Northland region's abundant raw materials – extracting maximum value from them before returning them to Papatūānuku (the earth). This regenerates the whenua (land) and protects our awa (rivers).

Ngawha Park is a 240-hectare green fields development nestled in the heart of Northland, just east of Kaikohe. It converts and restores land that was used for dairying into a centre for value-added manufacturing and innovation.

The park is a collaboration between organisations representing physical development, economic and business development, education and training, research and development, resource recovery, renewable energy, mana whenua, and local business and community groups.

Emissions reductions measures proposed at the site include:

- a biodigester processing biowaste from park businesses and the community to create biogas for energy and digestate for fertiliser and compost
- liquid digestate used as a nutrient carrier for hydroponic horticulture
- biomethane used to supply heat and energy for a local Māori land trust's manuka oil distillery.

3 Scion. 2018. Right tree, right place, right purpose: Scion strategy to 2030. Retrieved from https://www.scionresearch.com/__data/assets/pdf_file/0014/64310/Scion_strategy_4web.pdf (accessed 21 April 2022).

Actions to support emissions reductions

This plan outlines key actions for stepping Aotearoa towards a circular economy and a thriving bioeconomy that delivers equitable and inclusive outcomes.

Actions to create greater circularity and develop our bioeconomy will also need to uphold Te Tiriti o Waitangi, apply te ao Māori and mātauranga Māori principles, and protect Māori interests. This will require meaningful engagement with Māori. Actions should also align with the Te Tumu mō te Pae Tawhiti cross-agency work programme led by Te Puni Kōkiri.

Action 9.1: Commence a circular economy and bioeconomy strategy

Within the first emissions budget period, the Government will start the work needed to deliver a circular economy and bioeconomy strategy (the Strategy). This will align with the Waste Strategy's vision and principles and will include the five areas outlined below.

Meaningful engagement – including with Māori – is essential to ensuring that we move to a circular economy in a way that delivers equitable and inclusive outcomes. It will also improve our understanding of the impacts and opportunities of a circular economy and bioeconomy.

Action 9.1.1: Move to a more circular public sector

The Strategy will enable the public sector to lead by example; it will align with the Carbon Neutral Government Programme as well as other programmes to reduce emissions, pollution and waste.

Action 9.1.2: Innovation, skills and investment

The Strategy will consider the skills, public and private investments, and innovation needed to achieve a shared vision and accelerate the move to a circular economy and thriving bioeconomy by:

- co-creating 'circular missions' or climate innovation platforms that use mission-led innovation (see chapter 8: Research, science, innovation and technology)
- enabling infrastructure, such as resource recovery centres
- supporting high-impact innovations and their deployment in Aotearoa
- building future-ready skills and helping workers transition to low-emissions industries.

Action 9.1.3: Align regulatory systems and the business environment

The Strategy will identify how regulatory systems and business environments can enable this shift by:

- developing principles for aligning regulatory systems and the business operating environment (eg, principles to protect consumers through regulations on the right-to-repair)
- enabling businesses that seek broader outcomes that align with a circular economy
- building on initiatives to transform the waste sector (eg, the proposed new Waste Strategy).

Action 9.1.4: Enable Māori to shape and benefit from the transition to a circular economy and thriving bioeconomy

The Strategy will uphold Te Tiriti and be informed by te ao Māori and mātauranga Māori. Supporting actions will need to be developed collaboratively and provide for – and protect – the interests of Māori. It will also be important to reflect the local context and connections between systems

Action 9.1.5: A bioeconomy framework to guide the use of our bioresources and maximise wellbeing

This part of the Strategy will focus on establishing a baseline of natural resources and an analysis of supply and demand. It will also develop a framework for a bioeconomy that supports the wellbeing of all New Zealanders, and aligns with *Te Mana o Te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020*.

Action 9.2: Invest in data collection and research

Aotearoa can learn a lot from other countries. However, we also need to build our own evidence base to develop circular approaches that will work in our unique context. The Government will:

- measure the circularity of our economy, identifying a baseline and a measurement framework with indicators
- develop maps that show the flow of resources across systems and sectors
- build evidence about impacts through data collection and research.

Action 9.3: Integrate circular practices across government, communities and businesses

The Government will build on public and private sector achievements to unlock the potential of a circular economy. Examples include:

- the Government's 'broader outcomes' procurement policy which supports a circular economy
- Kāinga Ora – Homes and Communities' aim to lead industry in circular waste minimisation practices.

Action 9.4: Support businesses moving to circular economy models

The Government will investigate opportunities to support industry-led and regional programmes that enable businesses to adopt circular economy models. For example, the Government has provided funding for the circular Ngawha Innovation Park (see case study in this chapter).

Action 9.5: Investigate a circular economy hub

The Government will consider partnering with key industry, Māori and local government stakeholders to launch a circular economy hub, to support deployment of circular practices in Aotearoa.

A circular economy hub could include an innovation hub and demonstrate circular practices, such as resource recovery.

For more information about the innovation hub, see chapter 8: Research, science, innovation and technology. For more information about resource recovery, see chapter 15: Waste.

Action 9.6: Accelerate sustainable and secure supply and uptake of bioenergy in Aotearoa

The Government will set up a work programme that is consistent with the bioeconomy objectives, the energy strategy, and takes account of the needs of rural communities. This will consider:

- establishing a baseline for the supply and demand of bioenergy feed stocks
- developing a framework to choose the right type of bioenergy supply from our bioresources
- considering the regulatory framework for bioenergy markets
- helping to match the supply of bioenergy with demand
- undertaking demonstration projects and private/public partnerships.

The Government will investigate ways to increase woody biomass supply to replace coal and other carbon intensive fuels and materials and stimulate private sector investment (see chapter 14: Forestry).

Action 9.7: Support research and development and accelerate investment in the bioeconomy to commercialise bioeconomy technology and products

This action will build on existing research and development funding in this area, as well as potentially new initiatives to turn our bioresources into new bio-based products and biomaterials (eg, low-carbon wood products, marine derived pharmaceuticals)

We all have a role to play in the circular economy and bioeconomy

Local government is a key player in moving to circular economy. Councils have a role to play in designing circular urban plans, enabling resource recovery and using procurement to design out waste and reuse resources in infrastructure building (eg, concrete). They will need to work with businesses to encourage them to move to circular business models and co-locate to form circular hubs. The circular economy and bioeconomy will need to be well coordinated for success – local governments are well-placed to do this at a local level.

The **private sector** has a key role to play in unlocking the significant potential of the circular economy and bioeconomy. We need business to design out pollution, make better use of resources and innovate circular solutions. It is the private sector who will provide biomass and seize the opportunities of the growing bioeconomy.

CHAPTER 10:

Transport

Transport

Lead

MINISTER OF TRANSPORT
HON MICHAEL WOOD

ACTING SECRETARY FOR TRANSPORT
BRYN GANDY

Supporting

- Chief Executive of Waka Kotahi NZ Transport Agency
- Chief Executive of the Civil Aviation Authority
- Chief Executive of Maritime New Zealand

Contribution to our long-term vision

By 2035, Aotearoa New Zealand will have significantly reduced transport-related carbon emissions and have a more accessible and equitable transport system that supports wellbeing.

Contribution to Aotearoa New Zealand's greenhouse gas emissions (AR5) in the first emissions budget period

Projected emissions without the initiatives in this plan	66.5 Mt CO_2-e
Projected average annual emissions without the initiatives in this plan	16.6 Mt CO_2-e
Projected percentage of total gross emissions without the initiatives in this plan	21 per cent
Estimated emissions reduction from the initiatives in this plan	1.7 to 1.9 Mt CO_2-e

Transport

Why reducing transport emissions is important

Transport is one of our largest sources of greenhouse gas emissions and is responsible for 17 per cent of Aotearoa New Zealand's gross emissions.

More sustainable transport options can also reduce the cost of transport and reliance on global fossil fuel markets.

Key actions

- Reduce reliance on cars and support people to walk, cycle and use public transport including by:
  - improving the reach, frequency and quality of public transport and making it more affordable for low-income New Zealanders
  - increasing support for walking and cycling, including initiatives to increase the use of e-bikes
  - ensuring safer streets and well-planned urban areas.
- Rapidly adopt low-emissions vehicles including by:
  - continuing to incentivise the uptake of low- and zero-emissions vehicles through the Clean Vehicle Discount scheme and consider the future of the road user charge exemption for light electric vehicles beyond 2024
  - increasing access to low- and zero-emissions vehicles for low-income households by supporting social leasing schemes and trialling an equity-oriented vehicle scrap-and-replace scheme
  - improving EV-charging infrastructure across Aotearoa to ensure that all New Zealanders can charge when they need to.
- Begin work now to decarbonise heavy transport and freight including by:
  - providing funding to support the freight sector to purchase zero- and low-emissions trucks
  - requiring only zero-emissions public transport buses to be purchased by 2025
  - supporting the uptake of low-carbon liquid fuels by implementing a sustainable aviation fuel mandate and a sustainable biofuels obligation.

Our path to net-zero transport will deliver a better transport system and improve wellbeing

Decarbonising the transport system will deliver better transport for everyone in Aotearoa New Zealand and contribute to more vibrant, resilient and prosperous places to live, work and visit. It will reduce our reliance on volatile global energy markets.

By 2035, all new cars will be low or zero emissions, and significant progress will have been made to decarbonise more challenging transport modes, such as trucks, ships and planes. This will result in vehicles that are cleaner and more affordable to run, and reduce the significant harm caused by air and noise pollution.

More people will be able to walk, cycle and use public and shared transport options, particularly in our largest urban areas. This will reduce congestion, air pollution and noise, create better places to live in, and support public health and wellbeing.

As a result, we will have a more sustainable, inclusive, safe and accessible transport system that better supports economic activity and community life.

Achieving this vision will require transformational changes that will be challenging. The Government has a clear role to play, but this vision requires local government, Māori, businesses and communities to do their part.

The challenge is to deliver change at the pace and scale required to achieve the necessary reduction in transport emissions, while also giving all New Zealanders access to the significant co-benefits that will accompany our transition to a low-emissions transport system.

Transport is one of our largest sources of emissions

Transport is one of our largest sources of greenhouse gas emissions. It is responsible for:

- approximately 17 per cent of gross domestic emissions
- 39 per cent of total domestic CO_2 emissions.[1]

To reach net-zero long-lived emissions by 2050, we need to largely decarbonise transport. Urgent action and system-wide changes are needed to put our transport emissions on the trajectory to a low-emissions future.

The current transport system is also inequitable. Māori, Pasifika, disabled people, low-income households, women, older people, children and rural communities are often underserved by the transport system. They are also overburdened by related negative impacts, such as deaths, serious injuries and illness from transport crashes, and pollution. To ensure an equitable transition, the transport system needs to be more inclusive and affordable.

Current and projected transport emissions

References to current transport emissions are based on the 2019 greenhouse gas estimates from New Zealand's Greenhouse Gas Inventory 1990–2020, published in April 2022. Transport emissions estimates are around 10 per cent lower than New Zealand's previous Greenhouse Gas Inventory 1990–2019, published in April 2021. This drop is due to a reallocation of fuel use from the transport sector to the rest of the energy sector and implies that underlying road transport fuel efficiency is higher than previously estimated. Projected emissions for transport, including emissions reductions, are based on the previous 1990–2019 Greenhouse Gas Inventory, because the transport models used could not be updated in time for publication. This means that projected transport emissions and emissions reductions are likely to be lower when the Government revises its projections using the latest inventory data.

1 These figures are an estimate of 2019 transport emissions based on New Zealand's Greenhouse Gas Inventory 1990–2020.

Actions the Government is taking to reduce transport emissions

This section outlines the Government's approach to reducing transport emissions. While the immediate focus is on action over the next three years, this approach lays the foundation for the next 30 years. Three focus areas guide this approach to reducing transport emissions:

- reduce reliance on cars and support people to walk, cycle and use public transport
- rapidly adopt low-emissions vehicles
- begin work now to decarbonise heavy transport and freight.

The Government is committing to four transport targets

The Government has set four transport targets that will support these focus areas and align with achieving the sector sub-targets for transport.[2] This is approximately equivalent to a 41 per cent reduction in transport emissions by 2035 from 2019 levels.[3]

- **Target 1 –** Reduce total kilometres[4] travelled by the light fleet by 20 per cent by 2035 through improved urban form and providing better travel options, particularly in our largest cities.
- **Target 2 –** Increase zero-emissions vehicles to 30 per cent of the light fleet by 2035.
- **Target 3 –** Reduce emissions from freight transport[5] by 35 per cent by 2035.
- **Target 4 –** Reduce the emissions intensity of transport fuel by 10 per cent by 2035.

2 Sector-sub targets are based on the Climate Change Commission's demonstration path that is benchmarked to New Zealand's Greenhouse Gas Inventory 1990–2019, as opposed to the 1990–2020 Inventory.

3 This 41 per cent is calculated using the New Zealand Greenhouse Gas Inventory 1990–2019, as opposed to the latest 1990–2020 inventory.

4 Kilometres refers to Vehicle Kilometres Travelled (VKT).

5 This target for freight transport includes emissions from trucks, rail and ships. It excludes light vehicles and aviation.

The targets provide guidance on how much effort is required to reduce transport emissions across the system and will shape our policy and investment decisions to support the scale and pace of change required.[6]

To achieve these targets, the Government must work with key partners to take the initial actions outlined in this chapter over the first emissions budget period (2022–25). This includes partnering with Māori to incorporate Māori-led solutions and supporting communities and businesses for an equitable transition.

Further action and refinement will be needed in the second (2026–30) and third (2031–35) emissions budgets depending on how we are tracking.

Achieving the transport targets also depends on complementary policies, such as a strong New Zealand Emissions Trading Scheme (NZ ETS) price to incentivise low-emissions fuels, and changing the way we plan our towns and cities to make it easier and safer for people to reduce car travel.

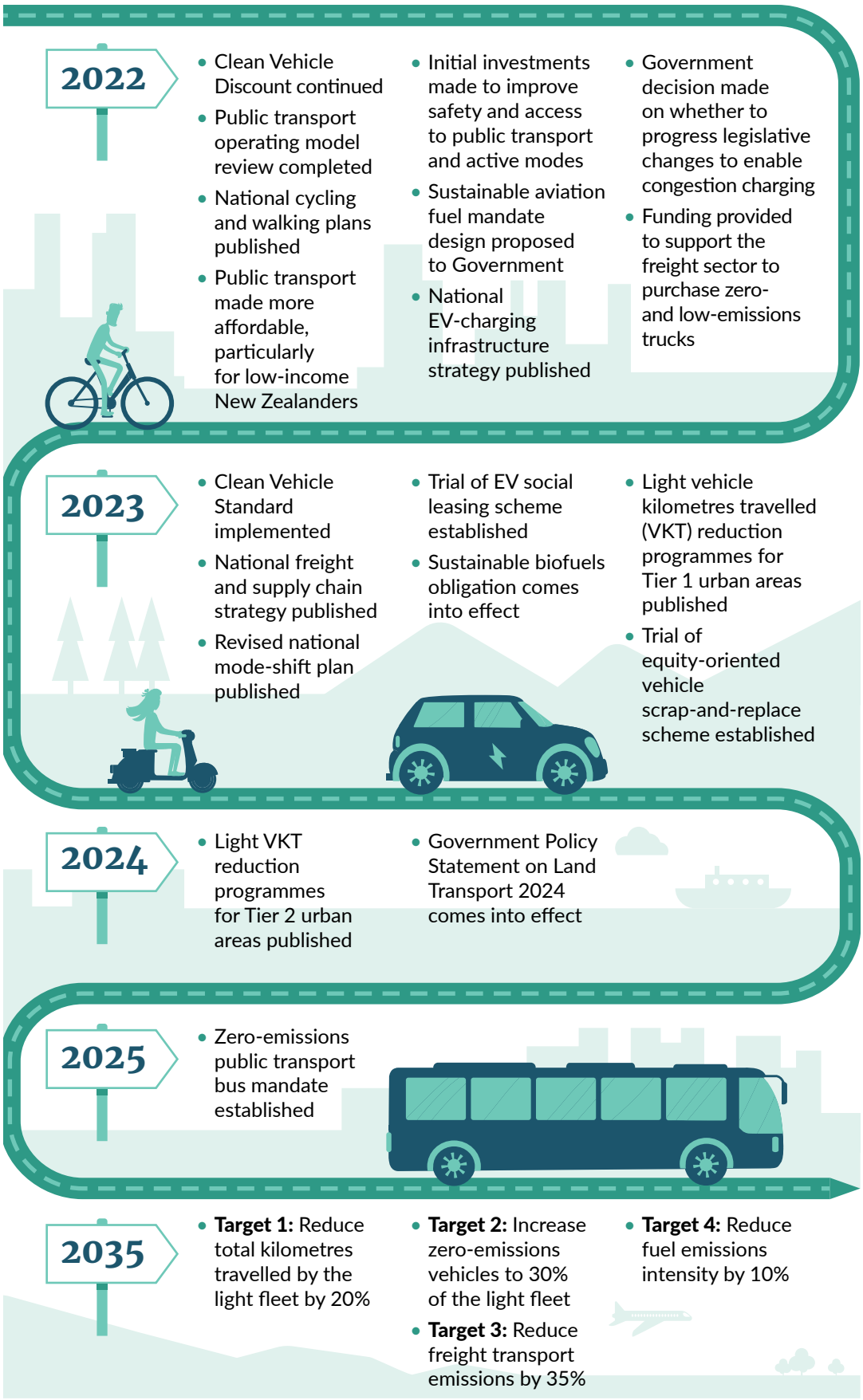
Many of the actions in this plan will also support an equitable transition, including by making clean and affordable transport options more accessible for low-income and transport disadvantaged New Zealanders.

Route map to 2035

Figure 10.1 highlights some of the key actions in this plan that will put Aotearoa on track for achieving the four transport targets set for 2035.

6 The targets are closely interrelated. The projected impact of achieving each target is conditional on achieving one or more of the others. Target 1 reflects a change compared to the Te Manatū Waka Ministry of Transport's baseline projection for 2035. Target 2 is against the 2035 fleet projection, given the effects of achieving Target 1 on the size of the fleet. Target 3 is compared to the level of emissions from freight transport in 2019. Target 4 is conditional on undertaking activities as part of achieving Targets 1 to 3 that would bring about lower projected liquid fossil fuel use in 2035.

Figure 10.1. Transport route map to 2035



Focus area 1: Reduce reliance on cars and support people to walk, cycle and use public transport

Transport target 1

Reduce total kilometres travelled by the light fleet by 20 per cent by 2035 through improved urban form and providing better travel options, particularly in our largest cities.

The amount people travel in fossil-fuelled vehicles is at the heart of the transport emissions challenge. We cannot rely on just decarbonising the vehicle fleet quickly. Improving urban form, offering better transport options, and using other demand management levers to reduce VKT by cars is vital. Most of this reduction needs to occur in our largest cities, where people are more likely to have transport options other than travelling by car. These measures can also deliver significant benefits beyond reducing emissions, such as improving travel choice and accessibility, better health and safety, and less congestion.

CASE STUDY

THE QUEENSTOWN PACKAGE

The Queenstown Package reprioritises existing infrastructure to provide dedicated public transport and active mode infrastructure for communities in the Queenstown area. A response to growing population and existing traffic congestion, it is part of the New Zealand Upgrade Programme.

The NZ$115 million package will deliver the infrastructure needed for more reliable public transport services, and provide more travel options that are safer, healthier and better for the environment. When aligned with spatial planning, it will lead to more housing choices, better transport options and well-designed neighbourhoods that provide for everyday needs.

Action 10.1.1: Integrate land-use planning, urban development and transport planning and investments to reduce transport emissions

Reducing transport emissions offers major opportunities to also create better places for people to live, work and play.

To deliver this, land-use planning and infrastructure investments will allow more people to live in existing urban areas, where social and economic opportunities are greatest. Frequent and rapid public transport services will form the backbone of major urban developments and be well-connected with walking and cycling networks (see chapter 7: Planning and infrastructure).

Key initiatives

- Better integrate transport planning and land-use planning through the resource management reforms.
- Develop the evidence base and tools to quantify and assess transport emissions from proposed transport and urban developments.
- Assess spatial plans to understand emissions implications and key risks and opportunities for reducing emissions.
- Incorporate transport-emissions impact assessments into transport plans.
- Identify ways to incentivise developments that avoid/reduce the need to travel and encourage travel by public transport, walking and cycling.
- Require new investment for transport projects to demonstrate how they will contribute to emissions-reduction objectives and set a high threshold for approving new investment for any transport projects if they are inconsistent with emissions-reduction objectives.

Action 10.1.2: Support people to walk, cycle and use public transport

New Zealanders need better public transport choices and it must be safer and easier to travel by active modes. Increasing travel by public transport, walking and cycling, will see significant benefits for New Zealanders beyond reducing emissions. This includes improved travel choice and accessibility, better health and safety, and less congestion.

Key initiatives

A. Planning – design programmes to reduce total light fleet VKT in our largest cities.

- Set sub-national VKT reduction targets for Aotearoa New Zealand's major urban areas (Tier 1 and 2[7]) by the end of 2022.
- Revise Waka Kotahi NZ Transport Agency's national mode shift plan (Keeping Cities Moving) to ensure nationally led activities align with the pace and scale of VKT reduction and mode shift required in urban areas.
- Develop VKT reduction programmes for Aotearoa New Zealand's major urban areas (Tier 1 and 2) in partnership with local government, Māori and community representatives.

B. Public transport – improve the reach, frequency and quality of public transport.

- Deliver a national public transport strategy.
- Complete the review of the public transport operating model.
- Deliver major public transport service and infrastructure improvements in Auckland, Wellington and Christchurch.
- Deliver nationally integrated ticketing for public transport.
- Support a major uplift in all urban bus networks nationwide, including by improving bus driver terms and conditions.
- Consider improvements to, and new opportunities for, interregional public transport services.
- Identify and consider addressing barriers to integrating public transport with active and micro-mobility modes and networks.

C. Walking and cycling – deliver a step change in cycling and walking rates.

- Substantially improve infrastructure for walking and cycling.
- Support initiatives to increase the uptake of e-bikes.
- Deliver a national plan to significantly increase the safety and attractiveness of cycling and micromobility (eg, electric scooters).
- Deliver a national plan to significantly increase the safety and attractiveness of walking.

7 Tier 1 covers Auckland, Hamilton, Tauranga, Wellington, and Christchurch. Tier 2 covers Whangārei, New Plymouth, Napier Hastings, Palmerston North, Nelson Tasman, Queenstown, and Dunedin.

- Provide support for local government to develop network plans for walking and cycling.
- Implement Accessible Streets proposals nationwide to support safe walking, cycling/scootering and other active modes.

D. Reshaping streets – accelerate widespread street changes to support public transport, active travel and placemaking.

- Incentivise local government to quickly deliver bike/scooter networks, dedicated bus lanes, and walking improvements by reallocating street space (including during street renewals).
- Consider regulatory changes to make it simpler and quicker to make street changes.
- Scale up Waka Kotahi NZ Transport Agency's Innovating Streets for People programme to rapidly trial street changes.

E. School travel – make school travel greener and healthier.

- Set targets for active travel to and from schools and work with councils and schools to implement active transport plans around schools.
- Improve walking and cycling infrastructure to and along school routes, in schools, and in surrounding neighbourhoods.
- Implement the Tackling Unsafe Speeds programme to ensure safer speed limits around schools.
- Investigate opportunities to improve school bus services.
- Explore dedicated active transport funding and/or education programmes for schools.

F. Equity – improve access and travel choice for the transport disadvantaged.

- Work with local government to deliver public transport, cycling and walking improvements in low socio-economic areas and for transport disadvantaged groups[8] (including disabled people).
- Investigate opportunities to improve access for people living in social housing through shared mobility schemes, such as car-share, carpool and bike/scooter schemes.
- Work with local government to make public transport more affordable, with a particular focus on low-income users.

G. Rural areas – investigate the potential for public transport, walking and cycling in rural and provincial areas.

- Investigate the potential for public transport, shared services, walking and cycling in rural and provincial areas, particularly for the transport disadvantaged.
- Investigate further opportunities to provide on-demand public transport in provincial towns, in light of positive signs from the MyWay trial in Timaru.

8 'Transport disadvantage' includes people who have limited options to participate in everyday activities because of a lack of transport choices, and people who overcome lack of transport choice by paying more than they can reasonably afford for mobility. These people include disabled people, who are more likely than others to experience transport poverty, and have specific accessibility needs, which reduces their choices.

Action 10.1.3: Enable congestion charging and investigate other pricing and demand management tools to reduce transport emissions

Pricing tools, such as congestion charging, provide an opportunity to reduce emissions, improve congestion and support shifts to public and active transport modes. Enabling congestion charging could encourage better use of our transport system and reduce the need for expensive and emissions-intensive infrastructure investments.

Key initiative

- Following the recent Inquiry of the Transport Select Committee, the Government is considering progressing legislative changes to enable congestion charging. If the Government decides to progress, it will work with Auckland Council to design a scheme, engage with other councils at their request (eg, Wellington) and investigate ways to mitigate possible adverse financial impacts of congestion charging on low-income households.

Other initiatives

- Investigate additional pricing tools to reduce transport emissions (including parking pricing, VKT pricing and low-emissions zones).
- Review the revenue system in response to longer-term changes in the way New Zealanders travel.
- Explore a pilot Mobility as a Service project.

Action 10.1.4: Require roadway expansion and investment in new highways to be consistent with transport targets

New highways and road expansion projects are sometimes needed to support urban and housing development and the efficient movement of freight, but they can increase emissions by inducing more private vehicle travel. Further investment that expands roads and highways needs to be consistent with transport targets and avoid inducing further travel by private vehicles.

Key initiative

- Establish a high threshold for new investment to expand roads, including new highway projects, if the expansion is inconsistent with emissions-reduction objectives.

Action 10.1.5: Embed nature-based solutions as part of our response to reducing transport emissions and improving climate adaptation and biodiversity outcomes

Nature-based solutions refers to the sustainable management and use of natural features and processes to tackle socio-environmental challenges, such as climate change.

For transport, opportunities to apply nature-based solutions at a local, regional and national scale can reduce transport emissions and improve climate adaptation as well as biodiversity outcomes.

Key initiatives

- Consider the role of nature-based solutions in reducing transport emissions and contributing to other benefits.
- Ensure transport policy and investment settings encourage the use of nature-based solutions, including protecting existing carbon sinks and support for new long-term carbon sequestration opportunities where appropriate.

Focus area 2: Rapidly adopt low-emissions vehicles

Transport target 2

Increase zero-emissions vehicles to 30 per cent of the light fleet by 2035.

Two-thirds of transport emissions come from the light vehicle fleet. Alongside reducing reliance on light vehicles, decarbonising the light vehicle fleet is critical for meeting our targets.

Aotearoa has begun to decarbonise its light vehicle fleet. The Clean Vehicle Standard and Discount Scheme has already provided 14,500 (as at 11 April 2022) rebates to vehicle buyers and helped to triple monthly EV sales (from 500 per month to 1,500). EV sales are 12.1 per cent of sales of brand new passenger vehicles so far in 2022.[9] Light EVs are also exempt from paying road user charges.

The Clean Car Sector Leadership Group has also been established to advise on measures to accelerate the uptake of clean vehicles, including measures to address future supply constraints. Where practicable, government agencies are transitioning to low-emissions fleets.

We need to do more to encourage the rapid uptake of low- and zero-emissions vehicles and, to ensure an equitable transition, make them accessible for more New Zealanders.

9 Year to date January–March.

CASE STUDY

OHOMAIRANGI TRUST

Ohomairangi Trust is a kaupapa Māori early-intervention service based in Māngere, Auckland. The Trust helps families in the community by providing parent training courses, transport, meals and childcare.

When vehicles in the Trust's petrol fleet needed renewal, the team opted for an electric fleet to reduce their carbon footprint and explore potential cuts to running costs. Electric vehicles (EVs) would work perfectly for the short urban trips that make up most of their travel and whānau transport and home visits.

In 2018, with co-funding from the Low Emission Transport Fund (managed by the Energy Efficiency and Conservation Authority), the Trust bought six EVs, a mixture of new and used. Choosing mostly used vehicles helped keep costs down.

The 80–120 km range of the Nissan Leaf and Nissan eNV200 van is ideal for the Trust's teachers, therapists and specialists, and their short local journeys. The 200 km range of the Hyundai Ioniq enables work in the regions.

To get staff onside, the Trust's transport coordinator created his own driver training manual and trained each staff member individually. Some staff were nervous at first. They worried about the unfamiliar technology and being stranded with a dead battery. But adaptation was easy, and staff soon appreciated the quietness, reliability and ease of recharging.

The EVs are running well and have significantly reduced the Trust's running costs. Petrol was costing up to NZ$2,000 a month and rising. Now they spend significantly less, even on charging. The Trust no longer pays road user charges because light electric vehicles are exempt until 2024. Servicing and registration costs have fallen compared with equivalent petrol vehicles. Maintenance costs are minimal, with no tune-ups, cambelts or oil changes needed.

The Trust has shown that investment in EVs is great for the environment and operating costs. The Trust has since bought two more electric cars. Their fleet is currently half electric, with all-electric being the long-term goal. Robert says, "We cannot go on driving petrol- and diesel-powered vehicles – the sooner we all change, the better."

Action 10.2.1: Accelerate the uptake of low-emissions vehicles

The Government will build on existing policies to accelerate the uptake of low- and zero-emissions vehicles. For Aotearoa households, this will reduce fuel bills and vehicle maintenance costs. Cleaner vehicles will also improve air quality, reducing the significant harm caused by air pollution.

Key initiatives

- Continue to incentivise the uptake of low- and zero-emissions vehicles through the Clean Vehicle Discount scheme and consider the future of the road user charge exemption for light vehicles beyond 2024.
- Implement the Clean Vehicle Standard to increase the quantity and variety of low- and zero-emissions vehicles supplied to Aotearoa.
- Consider further measures needed – from 2027 – to increase the fuel efficiency of the imported fleet and avoid high-emitting vehicles being dumped onto our market. This will help avoid Aotearoa becoming a dumping ground for high emitting vehicles.
- Set a maximum CO_2 limit or penalties for individual light internal combustion engine vehicle imports to tackle the highest emitting vehicles.
- Establish whether the Clean Vehicle Discount can be extended to other vehicle classes.
- Investigate how the tax system can support clean transport options to ensure low-emissions transport options are not disadvantaged.
- Determine whether legislative barriers preventing the use of some types of light low-emissions vehicles can be reduced without unduly compromising safety objectives.

Action 10.2.2: Make low-emissions vehicles more accessible for low-income and transport disadvantaged New Zealanders

The Government will help low-income and transport-disadvantaged New Zealanders move away from high-emitting vehicles, including by making low-emissions vehicles more accessible. This will help to ensure that all New Zealanders get the benefits of cleaner vehicles.

Key initiatives

- Support social leasing schemes to make access to cleaner vehicles affordable for low-income households.
- Implement an equity-oriented vehicle scrap-and-replace-scheme trial to make cleaner vehicles and low-emissions alternatives affordable for low-income households.
- Investigate whether further targeted support is required to make low-emissions vehicles more accessible and affordable for other disadvantaged groups and communities.

Action 10.2.3: Support the rollout of EV charging infrastructure

The Government has already co-funded 1,000 public chargers and will continue to improve EV charging infrastructure across Aotearoa to ensure that all New Zealanders can charge when they need to. Charging infrastructure will be accessible, affordable, convenient, secure and reliable for everyone.

Key initiatives

- Continue to develop an EV-charging infrastructure work programme to coordinate policy, investment and engagement with stakeholders.
- Complete a national EV-charging infrastructure strategy to set out the Government's vision and policy objectives (for both the public and private sectors) around EV charging over future emissions budget periods.
- Review the Electricity (Safety) Regulations 2010 to cover the safety needs associated with charging EVs.

Focus area 3: Begin work now to decarbonise heavy transport and freight

Transport target 3

Reduce emissions from freight transport by 35 per cent by 2035.

Reducing emissions from freight transport will be critical to achieving a 41 per cent reduction in transport emissions by 2035. Heavy vehicles, most of which are for freight, emit almost a quarter of our total transport emissions.

Transport target 4

Reduce the emissions intensity of transport fuel by 10 per cent by 2035.

Aotearoa also needs to reduce emissions from the fuels used for transport. Low-carbon liquid fuels, such as biofuels, will play a role, alongside electrification, the use of hydrogen and other technologies. Low-carbon liquid fuels are one of the best options for vehicles already in use, and for hard-to-decarbonise transport sectors, such as aviation and coastal shipping.

The Government's Low Emission Transport Fund has co-funded a range of initiatives to accelerate transport decarbonisation. In early 2022, this included demonstration funding for typically hard to decarbonise sectors, including battery-swap electric truck technology for milk tankers and concrete mixers.

CASE STUDY

WASTE MANAGEMENT NEW ZEALAND

Waste Management New Zealand (WMNZ) is one of Aotearoa New Zealand's leading waste and environmental services provider, offering recycling and resource recovery services, and waste collection and disposal.

In 2016, WMNZ committed to reducing emissions from its fleet. They started to transition some of their diesel fleet and invest in cars to help limit climate change and contribute to Aotearoa New Zealand's circular economy. Today WMNZ operates one of the largest EV truck fleets in Australasia. It also has 93 electric cars in its light fleet.

WMNZ's collection trucks each travel an average of 200 km per day. Their work is stop-start — the driver stops to empty each bin — which is perfect for electric. At each stop, the deceleration creates energy that recharges the truck's on-board batteries. To date, one of those electric trucks has driven about 80,000 km on duty in Auckland. It runs 11 hours and collects 1,200 bins in a day.

WMNZ also captures the gas produced from waste at its landfills. This is converted into electricity and supplies the national grid.

In an agreement with the Energy Efficiency and Conservation Authority, WMNZ developed an electric truck conversion workshop in Auckland. Opened in 2018, the workshop works on WMNZ's fleet and the company helps other companies in Aotearoa with their EV transition too.

If fully diesel, WMNZ's truck fleet would need 10 million litres of diesel a year. Each electric truck that replaces a diesel-powered vehicle, saves 125 litres of diesel a day. Converting the entire WMNZ fleet would save 100,000 litres of diesel a day.

Staff have been upskilled to drive, maintain and complete truck conversions in Aotearoa, and manage the fleet's EVs, keeping the company at the forefront of EV technology globally. WMNZ's EV programme now includes 27 fully electric trucks, including trucks in Hutt Valley and Dunedin.

Action 10.3.1: Support the decarbonisation of freight

Decarbonising the freight sector will be challenging and require consideration of the entire supply chain. Moving towards a more sustainable freight system will reduce harmful diesel emissions, reduce noise pollution, and may provide operating efficiencies to commercial freight businesses.

Key initiatives

- Develop a national freight and supply chain strategy with industry. This strategy will take a long-term, system-wide view of the freight and supply chain. Working with industry it will identify how to best decarbonise the freight transport system to be net zero by 2050, while improving the efficiency and competitiveness of the supply chain.
- Continue to implement the New Zealand Rail Plan and support coastal shipping.
- Provide funding to support the freight sector to purchase zero- and low-emissions trucks.
- Establish a freight decarbonisation unit to help decarbonise the freight sector through regulation and investment policy.
- Evaluate options to:
  - improve the efficiency of heavy vehicles
  - regulate heavy vehicles imports to reduce emissions
  - support infrastructure development for green fuels and fast charging for heavy vehicles
  - reduce emissions from heavy vehicles operated or procured through government activities.
- Evaluate options for road user charges (RUC) to support emissions reductions, including whether to extend the heavy-EV exemption from RUC and whether to set RUC rates differently by fuel type/emissions.
- Consider the implementation timing of Euro VI standard for heavy vehicles.

Action 10.3.2: Accelerate the decarbonisation of the public transport bus fleet

Decarbonising the bus fleet is increasingly important as more people are encouraged to travel by bus. Cleaner buses will not only reduce emissions – they will improve air quality and amenity in our towns and cities.

Key initiatives

- Require only zero-emissions public transport buses to be purchased by 2025, set a target to decarbonise the public transport bus fleet by 2035, and support regional councils to achieve these outcomes through additional funding.
- Identify and remove barriers to decarbonising the public transport bus fleet through the Public Transport Operating Model review.

Action 10.3.3: Work to decarbonise aviation

Air travel has a role in moving both people and freight to domestic and international destinations. In many cases, air travel is a core mode for inter-city and interregional travel. This means improving its sustainability is critical, alongside improving alternatives to interregional air travel in some places.

Key initiatives

- Develop and set specific targets for decarbonising domestic aviation in line with our 2050 targets.
- Establish a public-private leadership body focused on decarbonising aviation, including operational efficiencies, infrastructure improvements and frameworks to encourage research, development and innovation in sustainable aviation.
- Implement a sustainable aviation fuel mandate.

Action 10.3.4: Progress the decarbonisation of maritime transport

The Government has acceded to Annex VI of the International Convention for the Prevention of Pollution from Ships. This is an international agreement to address climate change impacts from shipping. It commits us to implementing future greenhouse gas measures agreed at the International Maritime Organization for Aotearoa-flagged ships and foreign ships operating in our waters.

Key initiatives

- Develop a national action plan to reduce commercial and recreational maritime emissions.
- Set new targets for maritime emissions, including:
  - supporting the uptake of zero-emissions small passenger, coastal fishing and recreational vessels
  - all new large passenger, cargo, and offshore fishing vessels to meet highest carbon-intensity reduction, as set by the International Maritime Organization, by 2035.
- Undertake research to advance the development and uptake of alternative low- and zero-carbon fuels for shipping in Aotearoa and developing safety and environmental standards for their use.
- Work with other like-minded countries to put in place the conditions to allow low- or zero-carbon shipping on key trade routes by 2035.

Action 10.3.5: Implement the Sustainable Biofuels Obligation

In 2021, the Government introduced the Sustainable Biofuels Obligation to help overcome the cost and risk barriers to sustainable biofuels uptake. Sustainable biofuels are a renewable, low-emissions fuel source that can be used immediately to reduce our transport emissions.

Key initiative

- Implement the Sustainable Biofuels Obligation, which requires liable fuel suppliers to reduce the total emissions of the fuels they supply by a set percentage each year through the deployment of biofuels (in blended or in neat form).

  The obligation applies to all liquid fossil fuel for transport refined in or imported into Aotearoa, excluding aviation fuel.

  This initiative is supported by an action to accelerate the supply and uptake of Aotearoa New Zealand's bioenergy market (see chapter 9: Circular economy and bioeconomy).

Cross-cutting measures to contribute to the delivery of a low-emissions transport system

To decarbonise transport in Aotearoa, the Government will need to provide consistent signals and guidance. Aligning policy and long-term planning with the emissions reduction plan, providing evidence, and supporting people and business with behaviour change, skills and capability are all essential to a rapid and equitable transition.

Action 10.4: Support cross-cutting and enabling measures that contribute to the delivery of a low-emissions transport system

Cross-cutting and enabling actions are important to help us understand the changes required and the impact of our choices on reducing transport emissions. These will help us to design a stronger and more equitable low-emissions transport system.

Key initiatives

- Ensure the next Government Policy Statement on Land Transport guides investment that is consistent with the emissions reduction plan.
- Develop a strong evidence base to inform transport decarbonisation and an equitable transition, and to ensure actions taken are effective within the Aotearoa context.
- Embed long-term transport planning to give greater confidence that we are on the right path to eliminate emissions and achieve other goals.
- Provide people and businesses with information and education to support behaviour change as we transition to a low-carbon economy.
- Develop the skills and capability required to transition to a low-emissions transport system and support an equitable transition.

Managing whole-of-life carbon dioxide emissions in transport infrastructure

This chapter addresses emissions from vehicle use. It does not cover embodied or operational emissions from infrastructure construction, maintenance and operation – some of these emissions are addressed in the chapter 12: Building and construction.

A whole-of-life approach to transport emissions should consider emissions that arise from constructing and maintaining transport infrastructure – such as streets and roads, rail and ports.

The operators of a large proportion of transport infrastructure are Crown agencies, and they will be expected to measure, verify, report and reduce emissions from their operations under the Carbon Neutral Government Programme. This approach also supports a circular economy.

The Government is considering how to manage whole-of-life carbon in the aviation and maritime sectors.

What these actions mean for the emissions budgets

We are on track for the first emissions budget period

Aotearoa has made a good start to reduce transport emissions. The Government has made several commitments over the past year that have put transport on track to achieve its targets for the first emissions budget period. This includes the Clean Vehicles package, progress on decarbonising the public transport bus fleet, road user charges exemption policies and introducing a sustainable biofuels obligation.

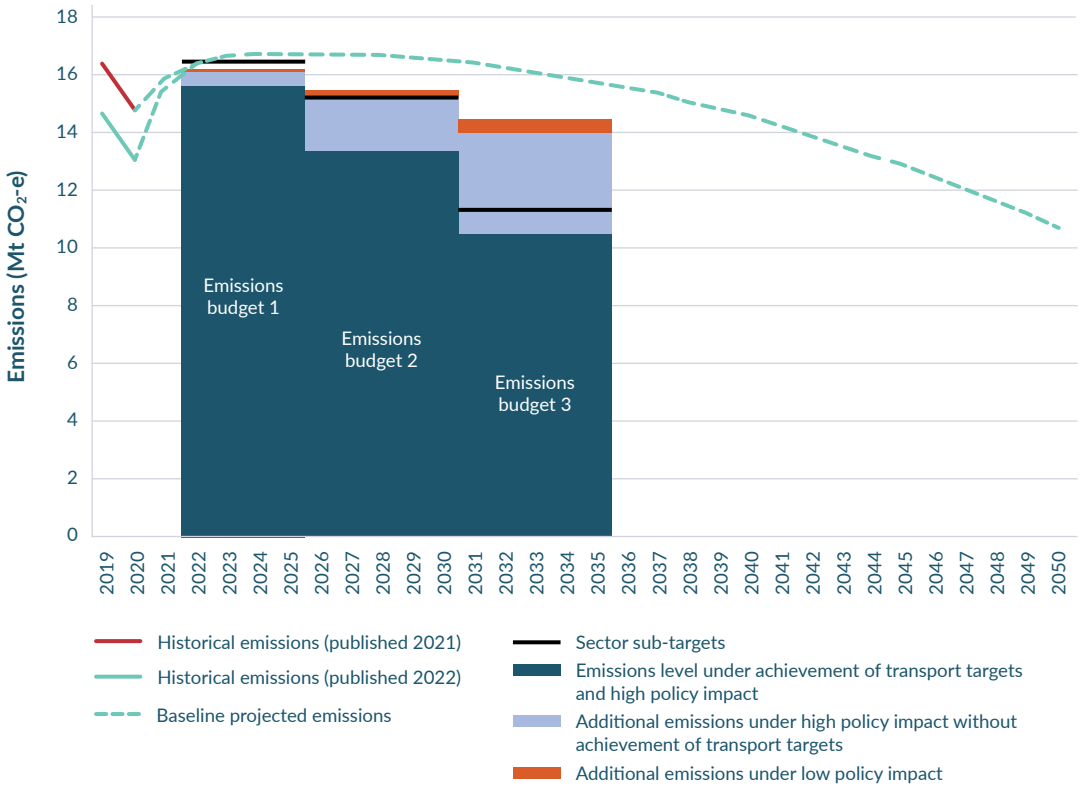
Under high NZ ETS price conditions,[10] the estimated cumulative impact of these policies is between 1.7 Mt CO_2-e and 1.9 Mt CO_2-e over the 2022–25 period. Along with changes in the vehicle fleet's profile and fuel efficiencies over time, these policies are estimated to achieve the emissions reductions required to meet the transport sub-sector target for the first emissions budget period (see figure 10.2).[11]

The Government is confident that we will achieve the first emissions budget based on this analysis and that New Zealanders will benefit from greater access to low-emissions vehicles, which are cheaper to run and improve the quality of our fleet.

10 The high NZ ETS price conditions modelled by the Ministry of Transport reflect the price path used in the Commission's modelling and are higher than the baseline NZ ETS price settings.

11 Emissions reduction estimates are benchmarked to New Zealand's Greenhouse Gas Inventory 1990–2019.

Figure 10.2. Estimated transport emissions based on achieving transport targets



This initial plan will make a good start towards meeting the second and third emissions budgets

Achieving the transport targets set out in this plan aligns with achieving the sub-sector targets for transport. This is approximately equivalent to a 41 per cent reduction in transport emissions by 2035 from 2019 levels (see figure 10.2).[12]

The targets provide guidance on how much effort is required across the system to put us on a pathway to net-zero carbon by 2050. We know from our modelling and international evidence that the actions included in this plan will make significant progress towards the second and third emissions budgets. However, further policy development is needed to determine the specific abatement that many of the actions will achieve.

Further transport actions and refinement will be needed in the second and third emissions budgets depending on how we are tracking.

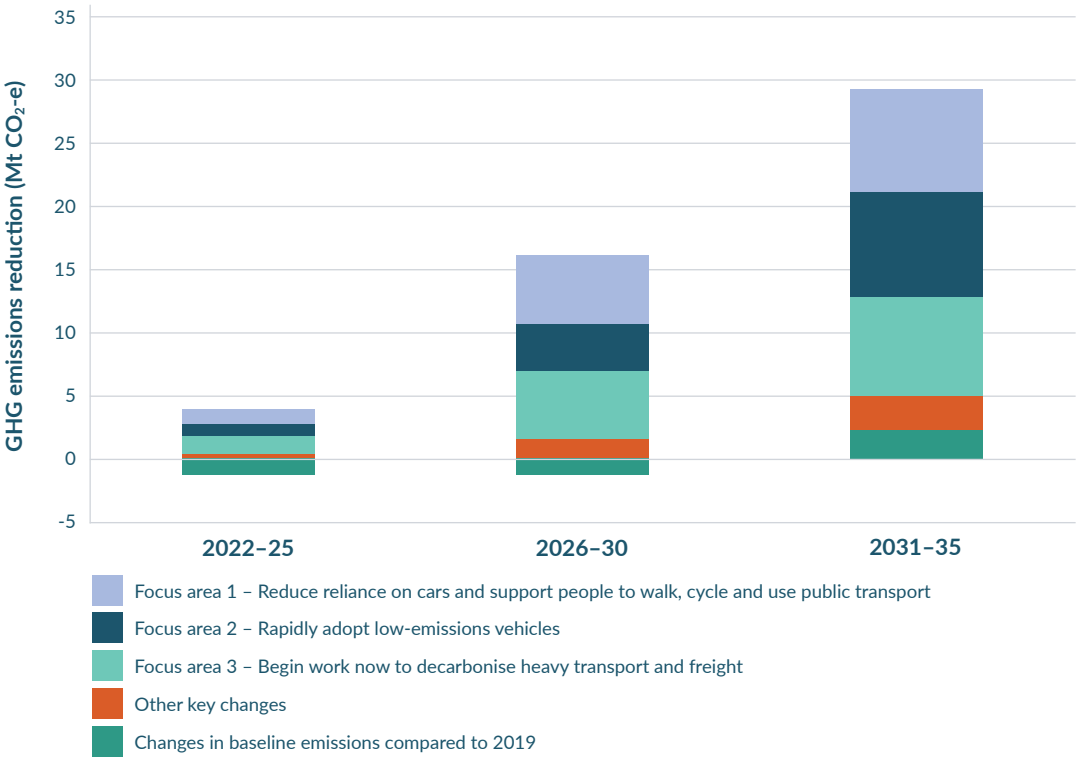
12 This 41 per cent is calculated using New Zealand's Greenhouse Gas Inventory 1990–2019, as opposed to the latest 1990–2020 Inventory.

Potential emissions reductions for each focus area

Figure 10.3 illustrates how each focus area can contribute to achieving the transport sector sub-target.

Baseline changes include the effects of growth in the vehicle fleet and electrification of the vehicle fleet under business as usual. Other key changes include the impacts of the NZ ETS price on electrification and travel. Focus areas 2 and 3 both include the impact of alternative fuels (eg, biofuels).

Figure 10.3. Potential emissions reductions for each focus area, compared to 2019[13]



Risks and uncertainties

This modelling is based on assumptions about what could happen in the future and how effective our actions could be in making changes. The pace and scale of transport emissions reductions will be affected by a range of factors.

For example, changes in how we live, work and travel could support or hinder our ability to achieve a zero-carbon transport system. Changes to technologies, the availability and cost of alternative fuels, and changes in freight demand will also affect our ability to achieve the transport targets.

13 Emissions reduction projections are benchmarked to New Zealand's Greenhouse Gas Inventory 1990–2019.

The ambitious transport targets that have been set are challenging to achieve. This means that delaying action would result in harder and more costly measures in the future, as well as reducing our chance of achieving the transport targets.

We all have a role to play in reducing transport emissions

The Government has a clear role to play in reducing transport emissions, but it cannot achieve this alone. A combined effort is required to reduce emissions and build a healthy, safe and accessible transport system.

Local government has a major role in planning and funding regional and local transport. Decisions made by councils about urban form and transport infrastructure, including for active and public transport, determine how we move around our towns and cities. Bold decisions and strong collaboration with central government will be needed to ensure a joined-up approach to decrease transport emissions.

The private sector (businesses) is a major investor and employer in the transport system. Businesses also rely on transport for moving people, goods and services. The private sector can strongly support changes in the system through a range of mechanisms, from education and innovation to investment.

Communities grow the mandate for change and make change happen. All New Zealanders have a stake in our transport system and can influence its direction. This includes community advocacy groups, such as cycling and neighbourhood groups. Change will vary across communities and effort will be needed to ensure all New Zealanders are equitably served.

Māori partnership will be important to deliver equitable transport outcomes for Māori living in urban centres, in rural communities and on marae. Future work on policies must also consider how to mitigate social and equity impacts that transport policies might create for Māori and what solutions could be put in place to address these issues.

The Ministry of Transport will work in partnership with Māori as the policies for this plan and future emissions reduction plans are progressed. This will build partnerships to uphold the principles of Te Tiriti o Waitangi.

Helping the transport sector adapt to the effects of climate change

The transport sector faces challenges under Aotearoa New Zealand's changing climate, from managing coastal and flood-prone assets to supporting communities during climate-related events where transport infrastructure is often a lifeline asset.

The transport sector is starting to build climate change adaptation into the planning and design of future infrastructure and has plans in place to respond to emergency events (though the costs of this are continuing to increase).

The significant anticipated investment to reduce and remove emissions could also be used to support adaptation and increase resilience to climate change impacts, and in some cases vice versa. This requires the sector to develop knowledge to support long-term system planning in both mitigation and adaptation together.

Climate adaptation initiatives

- Seek to maximise climate change adaptation co-benefits and efficiencies when reducing emissions. For example:
  - Investment to provide for a low-emissions land transport system can also be used to minimise vulnerability to climate-related events by ensuring land-use and transport planning decisions take likely climate impacts into account at the earliest stage.
  - Ensuring that there are a wide range of lower-carbon transport modes available increases resilience to climate-related events.
  - Nature-based solutions are likely to have significant adaptation co-benefits, including by reducing flooding and providing cooling.
- Consider mitigation and adaptation in tandem to reduce the potential for maladaptation, or for adaptation activity to go against emissions reductions. For example:
  - As the climate changes, infrastructure interventions (such as raised roads to reduce the impact of sea-level rise) may be increasingly necessary when maintaining existing levels of service, and this activity creates emissions, both embodied and future enabled.
- Ensure new infrastructure investment avoids locations where near-future climate hazards exist, reducing the risk of stranded assets and/or sunk investment.

CHAPTER 11:

Energy and industry

Energy and industry

Lead

MINISTER OF ENERGY AND RESOURCES

HON DR MEGAN WOODS

CHIEF EXECUTIVE OF THE MINISTRY OF BUSINESS, INNOVATION AND EMPLOYMENT

CAROLYN TREMAIN

Supporting

- Chief Executive of the Energy Efficiency and Conservation Authority

Contribution to our long-term vision

By 2050, our energy system is highly renewable, sustainable and efficient, and supports a low-emissions and high-wage economy. Energy is accessible and affordable and supports the wellbeing of all New Zealanders. Energy supply is secure, reliable and resilient, including in the face of global shocks.

Contribution to Aotearoa New Zealand's greenhouse gas emissions (AR5) in the first emissions budget period

Projected emissions without the initiatives in this plan	72.4 Mt CO_2-e
Projected average annual emissions without the initiatives in this plan	18.1 Mt CO_2-e
Projected percentage of total gross emissions without the initiatives in this plan	22 per cent
Estimated emissions reduction from the initiatives in this plan	2.7 to 6.2 Mt CO_2-e

Energy and industry

Why energy and industry is important

The energy and industry sectors make up just over a quarter of our total gross greenhouse gas emissions.

Aotearoa New Zealand is well-positioned to tackle emissions in the energy and industry sectors because of our high levels of renewable electricity. Decarbonising the energy sector has a range of benefits – creating opportunities to reduce emissions in other sectors, reducing reliance on global fossil fuel markets, reducing costs through energy efficiency and clean technology, and creating high-wage job opportunities.

Key actions

- Use energy efficiently, lower costs and manage demand for energy by:
  - improving business and consumer energy efficiency through programmes such as Equipment Energy Efficiency (E3), Gen Less and Support for Energy Education in Communities
  - helping low-income New Zealanders have warmer, drier homes through Warmer Kiwi Homes.
- Ensure the electricity system is ready to meet future needs by:
  - investigating the need for electricity market measures to support the transition to a highly renewable electricity system and investigating options for electricity storage in dry years
  - reducing barriers to developing and efficiently using electricity infrastructure, including transmission and distribution networks
  - supporting renewable and affordable energy in communities through the Māori and Public Housing Renewable Energy Fund.

Energy and industry

Key actions continued

- Reduce our reliance on fossil fuels and exposure to volatile global fuel markets, and support the switch to low-emissions fuels by:
  - setting a pathway to reduce reliance on fossil gas through a gas transition plan
  - increasing access to low-emissions fuels, including developing a hydrogen roadmap.
- Reduce emissions and energy use in industry by:
  - supporting industry to improve energy efficiency, reduce costs and switch from fossil fuels to low-emissions alternatives through the Government Investment in Decarbonising Industry fund and the Energy Efficiency and Conservation Authority's business programmes
  - banning new low- and medium-temperature coal boilers and phasing out existing ones by 2037.
- Set a strategy and targets to guide us to 2050 by:
  - setting a target for 50 per cent of total final energy consumption to come from renewable sources by 2035
  - developing an energy strategy to address strategic challenges in the energy sector and signal pathways away from fossil fuels.

We need to establish a sustainable, secure and affordable energy system for a low-emissions economy

The Government's 2050 vision for energy and industry is for Aotearoa New Zealand to have a highly renewable, sustainable and efficient energy system supporting a low-emissions economy.

- Energy will be accessible and affordable and will support the wellbeing of all New Zealanders.
- Energy supply will be secure, reliable and resilient, including in the face of global shocks.
- Energy systems will support economic development and an equitable transition to a low-emissions economy.

To achieve this future, Aotearoa needs to move away from fossil fuels and shift towards increased renewable electricity generation, and the development and use of other low-emissions fuels.

A well-planned transition can help reduce energy costs for businesses and New Zealanders, increase energy independence and create high-wage jobs in areas such as hydrogen, bioenergy and electrification. It can also be an opportunity to improve our productivity as we adopt clean technologies and improve energy efficiency.

The energy and industry sectors are vital for achieving Aotearoa New Zealand's emissions budgets

In 2019, emissions from the energy and industry sectors made up just over a quarter (27 per cent) of our total gross emissions.

The energy and industry sectors are essential to the economy and the lives of New Zealanders. Their performance affects the competitiveness of Aotearoa businesses and the cost and quality of many goods and services. Energy heats our homes and powers our transport. Industry accounts for around 11 per cent of real gross domestic product and employs 9 per cent of our workers.

Aotearoa New Zealand's energy system is highly renewable by international standards. Just over 40 per cent of our total primary energy supply[1] and nearly 28 per cent of our total final energy consumption[2] comes from renewable energy sources.

1 Total primary energy supply is the amount of energy available for use in Aotearoa, accounting for imports and exports.

2 Total final energy consumption is the total energy consumed by end users, such as households and industry. It excludes energy that the energy sector uses itself, energy transformation and distribution losses.

Increasing our energy independence

Aotearoa meets much of its energy needs by producing energy domestically. The transition to a more renewable energy system will strengthen our energy independence and ensure our energy supply is affordable and secure in the face of global shocks. The actions in this plan will achieve this by:

- reducing our exposure to international oil markets by accelerating the uptake of low-emissions vehicles and diversifying into new fuels
- using our highly renewable electricity system to further electrify industry and transport
- giving New Zealanders more control of their energy use so that they can save money.

Current and projected energy and industry emissions

References to current energy and industry emissions are based on to the 2019 greenhouse gas estimates from New Zealand's Greenhouse Gas Inventory 1990-2020 published in April 2022.

Energy and industry emissions estimates are around 6 percent higher than the previous New Zealand's Greenhouse Gas Inventory 1990-2019 published in April 2021. This rise is due to a reallocation of fuel use from the transport sector to the rest of the energy sector and implies that underlying road transport fuel efficiency is higher than previously estimated.

Projected emissions for energy and industry, including emissions reductions, are based on the previous 1990-2019 greenhouse gas inventory, because the energy and industry models used could not be updated in time for publication. This means that projected energy and industry emissions and emissions reductions are likely to be higher when the Government revises its projections using the latest inventory data.

CASE STUDY

CUTTING COAL AND CARBON EMISSIONS AT SILVER FERN FARMS

Silver Fern Farms received NZ$1 million co-funding from the Government Investment in Decarbonising Industry (GIDI) fund for a NZ$2.6 million project at its Pareora processing site, south of Timaru. With the support of GIDI co-funding, the company will install a high temperature heat pump to preheat hot water for the processing plant, shifting heating load away from the existing coal boiler. It is the company's third successful project under the GIDI fund.

The benefits will be substantial and include reductions in coal consumption, the associated reduction in greenhouse gas emissions, cost savings as the heat pump system generates hot water at a lesser running cost than coal boilers, and reduction in remaining water heating loads, opening up a variety of possibilities to achieve the final water heating needed.

The current boiler used 27.3 gigawatt hours of coal energy input in 2020 to produce hot water for the site. Using coal to generate this energy produces 8,389 t CO_2-e of emissions each year compared to the proposed project emissions of 2,813 t CO_2-e per year – a 66 per cent reduction. The annual net emissions savings from implementing this project are 5,576 t CO_2-e.

Silver Fern Farms has previously taken a structured approach to reducing energy and carbon emissions, including metering, gap analysis, conservation measures and efficiency gains. The GIDI funding enables the company to accelerate its coal related projects to reduce its carbon footprint in a much shorter timeframe.

The new system is expected to be fully commissioned by the end of December 2022.

Reducing energy and industry emissions will drive down emissions in other sectors

Actions in the energy and industry sectors help to achieve emissions reductions in other sectors, including transport and building and construction. They also contribute to new economic opportunities. For example:

- accelerating the rollout of renewable electricity generation and infrastructure for electrification (such as electric vehicle chargers) will accelerate replacing fossil fuels in other sectors
- low-emissions fuels, such as biofuels and green hydrogen, will help decarbonise our transport system
- improving the operational efficiency of buildings will directly reduce energy emissions.

CASE STUDY

LESS ENERGY, LESS WATER, LESS WASTE: GOVERNMENT INVESTMENT IN DECARBONISING INDUSTRY (GIDI) FUND REDUCES EMISSIONS AT WHAKATĀNE MILL

Whakatāne Mill produces 150,000 tonnes of paperboard a year and runs 24 hours a day, 7 days a week. With over 170 people working at the mill, it is the biggest employer in the region and a significant contributor to the local economy. The GIDI fund is supporting the mill to invest in a new filter system that will significantly reduce emissions and water waste.

The project will install a disc filter and other equipment to return the mill's waste water to be reused. This circular system saves on water, raw materials, and the energy used to heat the water, delivering significant benefits, including:

- reducing energy-related carbon emissions by about 21,600 tonnes each year
- reducing methane and CO_2 emissions from landfill by about 3,000 tonnes each year
- reducing wood and electricity consumption by returning about 4,000 tonnes of fibre to the process instead of sending them to landfill.

Actions we are taking to reduce energy and industry emissions

This section outlines the Government's approach to reducing energy and industry emissions. The short-term focus is to reduce energy and industry emissions through the uptake of new and existing technologies, and ensure our markets and regulations are fit for a low-emissions future. To enable future action, the Government will clearly communicate the approach to decarbonisation and diversification into new fuels.

The following actions to reduce energy and industry emissions will support equitable and inclusive outcomes. This means working to improve energy efficiency and affordability as Aotearoa transitions to a low-emissions economy.

To achieve an equitable transition for Māori, the Government will uphold Te Tiriti o Waitangi, recognise Māori interests in the energy and industry sectors, and work with tangata whenua as policies to transition the energy and industry sectors are developed and implemented. This is critical, especially when identifying challenges and ensuring they are addressed in a way that enables and empowers Māori.

Five focus areas will help achieve a low-emissions energy system that supports New Zealanders' wellbeing

Efforts to drive emissions reductions in the energy and industry sectors focus on five interdependent areas. The actions in these focus areas complement the New Zealand Emissions Trading Scheme (NZ ETS). They are designed to address barriers in responding to the emissions price and minimise impacts on households, businesses, communities and Māori, while unlocking health and other benefits.

Focus area 1: Use energy efficiently and manage demand for energy

Improving our energy efficiency – using less energy to perform the same task – can reduce emissions and costs. Optimising our energy use and energy productivity will support economic prosperity and an equitable transition as we decarbonise.

Energy efficiency can also improve our wellbeing by reducing household energy bills. We can take actions to get the most out of the energy Aotearoa generates and help households, communities and businesses manage their energy demand.

Electrical energy efficiency and measures to help manage electricity demand will also help to reduce emissions from the electricity system (focus area 2). It will also help to reduce both demand-side costs (eg, allowing smaller heat appliances) and supply-side costs (eg, less investment needed in new generation, transmission and distribution capacity).

This will help the electricity system to more easily meet demand and lower the costs of electrifying transport and process heat.

This focus area includes actions to improve:

- business and household energy efficiency
- the state sector's energy efficiency and fuel switching.

Action 11.1.1: Improve business and household energy efficiency

Improved energy efficiency reduces the need for new electricity generation and ensures New Zealanders can affordably light and heat their homes, power their businesses, and meet other energy needs. Supporting households and businesses to actively manage their energy demand gives them greater control, including over their costs.

Key initiatives

- Improve business and household energy efficiency through programmes such as Equipment Energy Efficiency (E3) and Gen Less.
- Improve energy efficiency products and services regulation to support our energy efficiency and emissions reductions goals.[3]
- Help low-income New Zealanders achieve warmer, drier homes by delivering the Warmer Kiwi Homes programme, which offers grants for insulation and heating.
- Continue to support low-income households to improve their energy efficiency to reduce their energy costs and emissions.
- Deliver the Support for Energy Education in Communities programme. This helps community organisations provide advice to help manage energy demand, and low-cost equipment to improve energy efficiency in households facing energy hardship.
- Provide rebates to businesses for installing high energy efficiency equipment, including electric motors and heat pumps. This will accelerate the uptake of high efficiency equipment, rather than the default replacement option or minimum compliant specification.
- Investigate additional programmes to improve the energy performance of existing buildings (see focus area 3, improving building energy efficiency).

3 The Government is considering feedback on proposals in the Energy efficient products and services discussion document, which was released for public consultation in June 2021.

Action 11.1.2: Improve the state sector's energy efficiency and fuel switching

The state sector is a significant energy user. Improving energy efficiency and switching to low-emissions fuels and technologies will reduce emissions and demonstrate leadership as Aotearoa transitions.

Key initiative

Implement the NZ$220 million State Sector Decarbonisation Fund (component relating to energy and industry) to reduce state sector emissions. The fund increases energy efficiency and the use of renewable energy in the state sector. It focuses on replacing the largest, most-used fossil-fuel boilers with low-emissions alternatives. Co-funding is also available for other projects, including electric vehicles (see chapter 6: Funding and finance).

Focus area 2: Ensure the electricity system is ready to meet future needs

Our high level of renewable generation means our electricity system is well positioned to help other sectors – such as transport and industry – move away from fossil fuels and reduce emissions.

Transpower New Zealand estimates Aotearoa will need 70 per cent more renewable generation to electrify process heat and transport, and decarbonise the economy.[4]

To transition our electricity system to 2050, we need to:

- accelerate development of new renewable electricity generation across the economy
- ensure the electricity system and market can support high levels of renewables
- support development and efficient use of transmission and distribution infrastructure to further electrify the economy.

4 Transpower New Zealand. 10 February 2021. A Roadmap for Electrification: Decarbonising transport and process heat. Retrieved from https://www.transpower.co.nz/sites/default/files/publications/resources/Transpower_Electrification%20Roadmap_SCREEN3_LR.pdf (accessed 21 April 2022).

Action 11.2.1: Accelerate development of new renewable electricity generation across the economy

Aotearoa will need to generate more electricity from existing low-emissions technologies such as wind and solar. We will also need to increase our use of new technologies, for example offshore wind, and adopt electricity storage technologies such as pumped hydro and large-scale batteries.

Key initiatives

- Review national direction tools for new renewable generation and electricity infrastructure, including small-scale generation. The review will determine whether – and how – resource consent processes could be improved.
- Develop regulatory settings to enable investment in offshore renewable energy (such as offshore wind farms) and innovation. Regulatory settings are expected to be in place by July 2024.
- Help government agencies and local government explore purchasing electricity from new renewable electricity generation projects, for example, via long-term power purchase agreements.
- Support renewable and affordable energy in communities, including through the Māori and Public Housing Renewable Energy Fund. This fund trials community-scale renewable technologies such as modern geothermal, solar panels and batteries. The most recent round made funding available for larger, more complex, renewable energy technologies, such as small-scale hydro, wind energy generation and projects integrating remote distribution and retail solutions.

Action 11.2.2: Ensure the electricity system and market can support high levels of renewables

Our transition to a more renewable electricity system needs to be orderly, affordable, maintain reliability and incentivise businesses to switch to low-emissions fuels.

Work is already underway to ensure the electricity market and system can operate with an increasing proportion of renewable electricity. This includes how to manage dry-year risk[5] and meet household winter heating needs in an affordable way.

Key initiatives

- Investigate options for dry-year electricity storage through the New Zealand Battery Project. Options include pumped-hydro storage, demand-side response, bioenergy, geothermal energy, hydrogen and other technologies. Phase one, examining option feasibility, is expected to be complete by the end of 2022.
- Investigate the need for electricity market measures by 2024 that support affordable and reliable electricity supply while accelerating the transition to a highly renewable electricity system.
- Investigate future security and electricity system resilience as we move toward 100 per cent renewable electricity. From July 2022, the Electricity Authority and Transpower New Zealand will start a programme of studies and solutions to address challenges and opportunities.
- Ban new fossil-fuel baseload electricity generation, to send a clear message that this has no future in Aotearoa.
- Implement recommendations from the Government's Electricity Price Review 2019 to reduce energy hardship and improve energy affordability. This includes establishing an energy hardship expert panel and reference group, and developing a definition and indicators to identify those in energy hardship.

5 Aotearoa New Zealand's electricity system has a high level of hydro-generation. In dry years, water for hydro-generation is limited. The electricity shortfall has usually been met using coal and gas generation – emissions that Aotearoa would like to avoid in the future.

Action 11.2.3: Support development and efficient use of transmission and distribution infrastructure to further electrify the economy

Higher renewable electricity generation and electrification will reduce emissions and provide Aotearoa with greater energy independence. But we will need the right transmission and distribution infrastructure to cope with renewable generation's more variable peaks and flows.

Coordinated investment in network upgrades and extensions will be required to generate economies of scale that benefit generators, distributors and electricity users. Potential disadvantages for those who invest first will need to be addressed.

New technologies that change the time and direction of peak flows in electricity networks will require different approaches to network design and operation to ensure reliability.

Key initiatives

- Explore development of a Renewable Energy Zones (REZ) pilot. A REZ can expand electricity network capacity in regions where network capacity may constrain new clusters of renewable generation or industry electrification. Transpower New Zealand is exploring a pilot REZ in one region.
- Use regional energy transition plans (see action 11.4.1) to help identify network investments, to optimise industrial connection and electrification.
- Implement a new transmission pricing methodology from 1 April 2023; Transpower New Zealand is implementing a new transmission pricing methodology set by the Electricity Authority which, among other things, seeks to address potential disadvantages for early investors.
- Update electricity distribution network regulation to support the transition to a low-emissions energy system while promoting competition, reliability and efficiency for electricity users' long-term benefit. The Electricity Authority expects to engage on issues and opportunities in the second half of 2022.
- Explore measures to ensure electric vehicle charging is energy efficient and creates a platform for a flexible energy system.

Focus area 3: Reduce our reliance on fossil fuels and support the switch to low-emissions fuels

Aotearoa will need to replace fossil fuels with low-emissions fuels such as bioenergy and hydrogen to:

- support our electricity system to reduce coal and fossil gas use in winter peaks and dry years while maintaining security of supply and affordability
- reduce energy emissions in the short term, while renewable electricity generation increases
- provide alternatives where electrification may not be an option, such as biofuels in heavy freight and aviation.

This focus area includes actions to:

- manage the phase-out of fossil fuels, including fossil gas
- develop low-emissions fuels.

Managing the phase-out of fossil fuels in energy and industry

The Government is working to reduce demand for coal for process heat and electricity generation. This includes investigating options to manage dry-year risk through the New Zealand Battery Project (focus area 2). A ban on new low- and medium-temperature coal boilers, as well as phasing out existing coal boilers by 2037, will further reduce demand for coal (focus area 4). Actions to manage the phase-out of fossil gas are outlined below.

Phasing out fossil fuels in energy and industry will reduce building related emissions as noted in chapter 12: Building and construction.

Action 11.3.1: Manage the phase-out of fossil gas

Phasing out fossil gas presents short-term and long-term challenges, including balancing capital investment with declining fossil gas use, fossil gas affordability and the risk of stranded network assets. The Government is working to address these challenges and set out a pathway for the fossil gas sector.

Key initiatives

- Develop a gas transition plan by the end of 2023. This will set out a transition pathway for the fossil gas industry, explore opportunities for renewable gases, and ensure an equitable transition. The gas transition plan will be an input to the energy strategy.
- Work with the industry co-regulator, the Gas Industry Company, to consider:
  - whether any additional or changed mechanisms are needed to ensure fossil gas is available to industrial users in times of unexpectedly tight supply
  - improving the timeliness and detail of information about fossil gas supply and demand to market participants.

Action 11.3.2: Develop low-emissions fuels

Bioenergy[6] will be significant for reducing emissions, with widespread potential application in the energy, industry and transport sectors. Green hydrogen will also be significant for reducing emissions in areas of the economy that are hard to electrify, such as high-temperature industrial processes, and potentially in some parts of the heavy transport sector, including aviation.

Key initiatives

- Investigate low-emissions energy supply options for renewable gas and bioenergy to support future emissions reduction.
- Develop a roadmap for hydrogen in Aotearoa by 2023. This will build on the vision for hydrogen in New Zealand to set a strategy guiding investment in hydrogen, and maximising economic benefits and emissions reductions.
- Ensure hydrogen regulatory settings are fit for purpose.

6 Developing bioenergy as a low-emissions fuel links to other areas of focus and actions in this plan. Initiatives relating to developing bioenergy supply are outlined in chapter 9: Circular economy and bioeconomy and chapter 12: Building and construction. Initiatives relating to supporting bioenergy demand are included in focus areas 2 and 4 of this chapter.

Focus area 4: Reduce emissions and energy use in industry

By 2050, Aotearoa industries will need to use low-emissions energy efficiently – both to produce the materials and goods we need and to meet consumer preferences. In the short term, changing how we use energy in industry, particularly for process heat, will be crucial to meeting our early emissions budgets.

This focus area includes actions to:

- decarbonise Aotearoa industries
- develop an approach for single-firm industries with emissions that are hard to reduce or remove.

Energy efficiency improvements and fuel switching will benefit businesses by reducing energy use, and exposure to NZ ETS costs, improving productivity, and increasing the economic resilience of domestic producers. These investments can also stimulate economic growth, job retention and creation, and help manage a smooth transition.

The Government is undertaking significant action to decarbonise process heat. These actions – alongside actions to encourage greater energy efficiency, support electrification and increase the uptake of low emissions fuels (outlined under other focus areas) – will support industrial decarbonisation and will provide signals to minimise investment uncertainty in the long term.

The Government will continue to fund fuel switching under the GIDI fund (see the Whakatāne Mill case study in this chapter). Thirty-eight projects received co-funding in the first and second rounds of the GIDI fund to help transition away from fossil fuels. Together, they will make emissions reductions of 6.56 Mt CO_2e over their lifetimes.

Action 11.4.1: Decarbonise Aotearoa industries

Opportunities to accelerate emissions reductions in industrial low- and medium-temperature process heat are significant, low cost, and can also improve productivity and increase energy resilience.

The Government is acting to decarbonise process heat and reduce industrial emissions. These actions, alongside actions to encourage greater energy efficiency, support electrification and increase low-emissions fuel use, will support industrial decarbonisation and provide clear investment signals for the future.

Key initiatives

- By the end of 2024, set an action plan for decarbonising industry. The plan will support existing industries to decarbonise and innovative low-emissions industries to grow. The plan will sit within the energy strategy to align with the broader approach for decarbonising the energy sector, including ensuring competitive energy prices and security of supply.
- Expand and continue the roll out of the GIDI fund to accelerate emissions reductions in industry. This fund provides grants to improve energy efficiency and switch fossil fuel use to low-emissions renewable fuels. In the future, the GIDI fund will be able to provide funding for:
  - high-impact process heat decarbonisation projects
  - using regional energy transition plans to inform investment and optimise options for fuel switching at a regional level
  - additional electricity network connections and distribution network upgrades to unlock and/or accelerate fuel switching for multiple process heat users
  - more technology diffusion projects.
- Provide grant funding for decarbonising commercial space and water heating and high efficiency electrical equipment, to support a much broader segment of the business community, including smaller businesses, to transition.
- Support businesses to decarbonise through the Energy Efficiency and Conservation Authority's (EECA) business programmes and funds, including the energy transition accelerator,[7] large energy user partnerships, sector decarbonisation plans and technology demonstration funding.
- Finalise and begin to implement the Advanced Manufacturing Industry Transformation Plan by the end of 2022. The plan was created through a partnership of business, unions and the Government. It includes an action plan for creating a leading, sustainable, circular net-zero emissions manufacturing sector.

7 EECA's energy transition accelerator provides bespoke technical support for large emitters to develop long-term transition plans, helping to mitigate risks.

- Implement national direction for industrial greenhouse gas emissions in the third quarter of 2022 and ensure that this can be carried through to the National Planning Framework under the proposed Natural and Built Environments Act. The national direction will ban new low- and medium-temperature coal boilers and phase out existing coal boilers by 2037.
- Develop a mandatory energy and emissions reporting scheme for large energy users by mid-2024. The scheme will require large energy users to provide energy end-use and emissions information to the Government and the public.

Action 11.4.2: Develop an approach for single-firm industries with emissions that are hard to reduce or remove

Some large firms that play a significant role in Aotearoa New Zealand's economy have high-temperature heat requirements and few technologically or commercially viable alternatives to fossil fuel use. Examples are steel-making or cement-making. These firms can play a significant role in the economic and social wellbeing of our regions and in our economic resilience. To transition, they may need innovation and new technology.

Key initiative

- Develop a strategic approach or framework for addressing emissions from single-firm industries with emissions that are hard to reduce or remove. This will consider how to support innovation and the role these industries play in Aotearoa New Zealand's economic resilience and in the economic and social wellbeing of our regions.

Focus area 5: Strategic approaches and targets to guide us to 2050

To guide achievement of the vision for 2050 – and provide clarity to the energy sector – the Government will develop strategies and set targets for the energy system. Setting targets and monitoring energy system indicators will help measure progress towards our emissions reductions goals.

This focus area includes actions to:

- set targets for the energy system
- develop energy strategies for Aotearoa.

Action 11.5.1: Set targets for the energy system

The Government is setting a target of 50 per cent of total final energy consumption (TFEC) coming from renewable sources by 2035. In 2020, Aotearoa New Zealand's renewable energy share of TFEC was 28 per cent.

A 50 per cent target is ambitious. It signals commitment to reducing emissions and highlights the need for transformation across the energy system – action that goes beyond business as usual. Success will depend on using our energy system to its best advantage in order to decarbonise other areas of the economy, such as transport and industry.

The renewable energy target builds on the Government's aspirational target of 100 per cent renewable electricity by 2030.

Key initiatives

- Set a target of 50 per cent of total final energy consumption to come from renewable sources by 2035.
- Monitor progress towards the Government's aspirational target of 100 per cent renewable electricity by 2030. Review this target in 2024 before developing the second emissions reduction plan.
- Develop secondary indicators alongside the targets above to:
  - measure progress towards the first four energy and industry focus areas
  - ensure the energy system remains affordable, secure and reliable as we transition.

Action 11.5.2: Develop energy strategies for Aotearoa

The Government will develop strategies to achieve its vision for a net-zero economy in 2050, where energy is accessible and affordable, secure and reliable, and supports New Zealanders' wellbeing. This includes developing an energy strategy to address strategic challenges in the energy sector, and signal pathways away from fossil fuels.

The scope of the energy strategy is not yet confirmed, but may be structured around focus areas 1 to 4 in this chapter. It could also consider broader objectives beyond each focus area to meet our vision and support the wellbeing of New Zealanders, including how to manage pathways to ensure that:

- in addition to becoming more sustainable, our energy system is accessible and affordable, and secure and reliable, including in the face of global shocks
- energy systems support economic development aspirations and an equitable transition to a low-emissions future.

Key initiatives

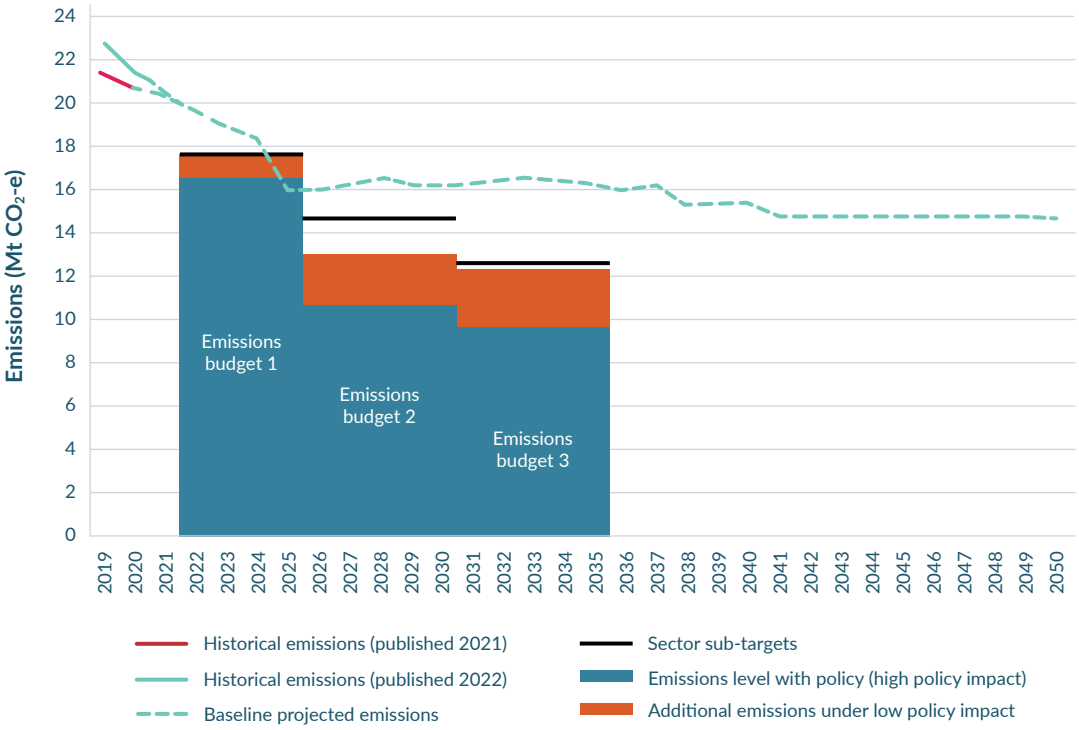
- Develop an energy strategy by the end of 2024, fully collaborating and engaging with Māori and working with energy system stakeholders.
- Develop a new New Zealand Energy Efficiency and Conservation Strategy (NZEECS)[8] that better aligns with current energy efficiency, conservation and climate change priorities. The new NZEECS will align with the emissions reduction plan and the energy strategy.

8 The New Zealand Energy Efficiency and Conservation Strategy 2017–2022 sets the overall policy direction for government support and interventions that promote energy efficiency, energy conservation and use of renewable sources of energy. The NZEECS guides the EECA's work programme. The climate change and energy system priorities have changed since the current NZEECS was published in 2017.

What this means for the emissions budgets

Aotearoa is on track to meet the energy and industry sector sub-targets for the first emissions budget period, as shown in figure 11.1. The energy and industry sector is also on track to meet or exceed the sub-targets for the second and third emissions budget periods, also shown in figure 11.1. This includes emissions reductions from the actions in this plan and assumes that the NZ ETS price follows He Pou a Rangi – Climate Change Commission's expected price path.

Figure 11.1. Energy and industry sectors' emissions reductions



Note: The latest greenhouse gas inventory published in April 2022 (New Zealand's Greenhouse Gas Inventory 1990–2020) is not consistent with the most recent transport and energy and industry emissions projections. This is due to a method change in the compilation of inventory data which reallocated some emissions from transport to non-transport energy. This resulted in a reduced level of emissions for transport and an increase in energy and industry emissions. This inconsistency will be resolved when Government emissions projections are next revised.

These projections incorporate emissions reductions as a result of Refining NZ's transition to an import-only terminal from April 2022 and emissions reductions from a potential closure of New Zealand's Aluminium Smelter in 2024. There is a possibility that the smelter will remain open beyond 2024. This would result in an additional 2.4 Mt CO_2-e, 9.3 Mt CO_2-e and 3 Mt CO_2-e in emissions budgets one, two and three, respectively.

Reducing emissions from the energy and industry sectors requires us to work together

Reducing emissions and building a secure, affordable and sustainable energy system that supports our wellbeing requires a combined effort from all New Zealanders. Businesses, communities and government all have an important role to play.

Local government will need to switch to low-emissions fuels and technologies for council-owned buildings and public facilities, and improve their energy efficiency. Councils also have an important role to play in enabling the development of renewable energy and associated infrastructure via their planning functions – including spatial planning functions under the reformed resource management system.

The private sector (businesses) – Decarbonisation in the energy and industry sectors is dependent on the actions of the private sector. This includes large industrial and manufacturing businesses moving away from fossil fuels, electricity generators accelerating the build of renewable electricity generation and commercial sector businesses providing finance.

Significant levels of investment will be driven from the private sector in order to reduce emissions in Aotearoa's market-based energy system and industrial sector.

Helping the energy and industry sectors adapt to the effects of climate change

The National Climate Change Risk Assessment (NCCRA) found that climate change could increase risk to electricity generation, transmission and distribution infrastructure.

To maintain the quality and security of electricity supply, the Government needs to ensure policy and regulatory settings help asset owners respond to a changing climate. Electricity generators, retailers and distributors are incentivised, but not required, to prepare for and mitigate risks to their infrastructure, and many have asset management strategies.

The Government is developing indicators to ensure that our energy system remains sustainable, secure, reliable, accessible and affordable as we transition.

The Electricity Authority is also looking at how to ensure the electricity system remains secure and resilient as it evolves in the coming decades.

Generation infrastructure

Generation infrastructure that relies on renewable energy (such as hydro, solar and wind) is already exposed to our complex and temperate climate. Changes to average temperatures, rainfall or wind patterns, and the frequency of extreme weather events, could affect the availability of renewable energy.

Electricity generation companies are already actively assessing and planning to manage climate change risk, however, and it is likely that the diversity of renewable sources powering the national electricity grid will help maintain security of supply.[9]

Addressing Aotearoa New Zealand's dry-year risk will further strengthen the resilience of our electricity generation. The New Zealand Battery Project is assessing options for managing dry-year risk. Any resulting infrastructure will be designed to withstand natural and systemic risks.

Transmission and distribution infrastructure

Extreme weather events and higher temperatures increase the risks to transmission and distribution infrastructure. As a result, this infrastructure needs to accommodate greater electrification and become more resilient to a changing climate.

The Commerce Commission is focused on improving asset management practices, including identifying and managing risk and resilience. It encourages electricity distribution businesses to improve their understanding of how major events and storms will impact their networks.[10]

Increasing demand flexibility and distributed energy resources will help to manage electricity infrastructure risk. For example, rooftop solar photovoltaic, in-home batteries, small wind turbines, micro-hydro systems and demand-response technology can improve resilience to adverse weather events or when infrastructure is damaged.

Government initiatives that reflect the future role of distributed energy resources include the Māori and Public Housing Renewable Energy Fund.

9 Ministry for the Environment. 3 August 2020. National Climate Change Risk Assessment for Aotearoa New Zealand: Main report – Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa: Pūrongo whakatōpū. Retrieved from https://environment.govt.nz/publications/national-climate-change-risk-assessment-for-new-zealand-main-report/ (accessed 21 April 2022).

10 Commerce Commission. 2021. Reporting of asset management practices by EDBs: A review of target areas for potential improvements. Retrieved from https://comcom.govt.nz/__data/assets/pdf_file/0027/259632/Reporting-of-Asset-Management-Practices-by-EDBs.pdf (accessed 21 April 2022).

CHAPTER 12:

Building and construction

Building and construction

Lead

MINISTER FOR BUILDING AND CONSTRUCTION

HON POTO WILLIAMS

CHIEF EXECUTIVE OF THE MINISTRY OF BUSINESS, INNOVATION AND EMPLOYMENT

CAROLYN TREMAIN

Supporting

- Chief Executive of the Ministry of Housing and Urban Development
- Chief Executive of Kāinga Ora
- Chief Executive of the Energy Efficiency and Conservation Authority

Contribution to our long-term vision

By 2050, Aotearoa New Zealand's building-related emissions are near zero and buildings provide healthy places to work and live for present and future generations.

Contribution to Aotearoa New Zealand's greenhouse gas emissions (AR5) in the first emmissions budget period[1]

Projected emissions without the initiatives in this plan	32.5 Mt CO_2-e
Projected average annual emissions without the initiatives in this plan	8.1 Mt CO_2-e
Estimated emissions reduction from the initiatives in this plan	0.9 to 1.7 Mt CO_2-e

1 Unlike other sectors, these figures reflect a 'consumption' approach that includes emissions accounted for in other sectors but for which building and construction is responsible (eg, emissions from energy used in buildings, emissions from the manufacture of building materials). Counting only emissions directly produced from buildings (predominantly fossil fuels used for space heating and cooling), building and construction produced 1.59 Mt CO_2-e in 2018. This represents 3.6 per cent of total domestic emissions for that year (excluding biogenic methane).

Building and construction

Why building and construction is important

In 2018, nearly 9.4 per cent of domestic emissions were building-related. These emissions are largely accounted for in the energy and industry, transport and waste sectors. For example, they include:

- emissions from the energy and other resources used when operating a building
- the carbon emitted in Aotearoa by the manufacture, transport, use and disposal of the materials and products in a building across its life – including construction, maintenance and deconstruction.

As we reduce our emissions and build Aotearoa New Zealand's circular economy and bioeconomy, we can expect healthier homes, less reliance on global supply chains for construction materials and more sustainable living.

Key actions

- Reduce the embodied carbon of construction materials by supporting innovation and regulating to promote the use of low-emissions building design and materials.
- Accelerate the shift to low-emissions buildings by promoting good examples, providing incentives and supporting the use of low-emissions practices.
- Improve building energy efficiency by amending the Building Code and measuring energy performance to ensure buildings are designed, and retrofitted, to use less energy for heating and cooling.
- Shift energy use from fossil fuels by developing a gas transition plan and understanding the impacts of transition for households and communities.
- Establish foundations for future emissions reduction by improving emissions data for buildings and materials, building relationships with Māori, and progressing behaviour change and workforce transition programmes.

Buildings are central to New Zealanders' lives and the economy

Buildings are where New Zealanders spend most of their time living, working and playing. They impact on most wellbeing indicators at an individual, community and national level – they are our houses, our hospitals, residential and aged care facilities, our shops and offices, our warehouses and industrial buildings. Buildings are key to our everyday lives.

The building and construction sector is Aotearoa New Zealand's fourth largest employer. It contributed NZ$20.5 billion (around 6.7 per cent) to Aotearoa New Zealand's gross domestic product in the year ended March 2019.[2]

Buildings are long lived – setting emissions patterns for the future – and drive emissions in other sectors

The building and construction sector was responsible for 7.4 Mt CO_2-e of emissions in 2018. This represents 9.4 per cent of domestic greenhouse gas (GHG) emissions, or over 15 per cent of emissions if biogenic methane is excluded (see figure 12.1).[3]

In addition, the building and construction sector was responsible for 2.9 Mt CO_2-e of emissions that occurred outside Aotearoa, largely from the production of imported construction materials and products. These are not included in domestic emissions budgets for Aotearoa but are a significant proportion of the sector's total emissions.

2 Stats NZ – Series, GDP(P), Chain volume, Seasonally adjusted, ANZSIC06 industry groups (Qrtly-Mar/Jun/Sep/Dec). See National accounts (industry production and investment): Year ended March 2019. Retrieved from https://www.stats.govt.nz/information-releases/national-accounts-industry-production-and-investment-year-ended-march-2019 (accessed 22 April 2022).

3 Figures in AR4 terms, based on the New Zealand's Greenhouse Gas Inventory 1990-2018 published in 2020 as opposed to the most recent inventory published 2022.

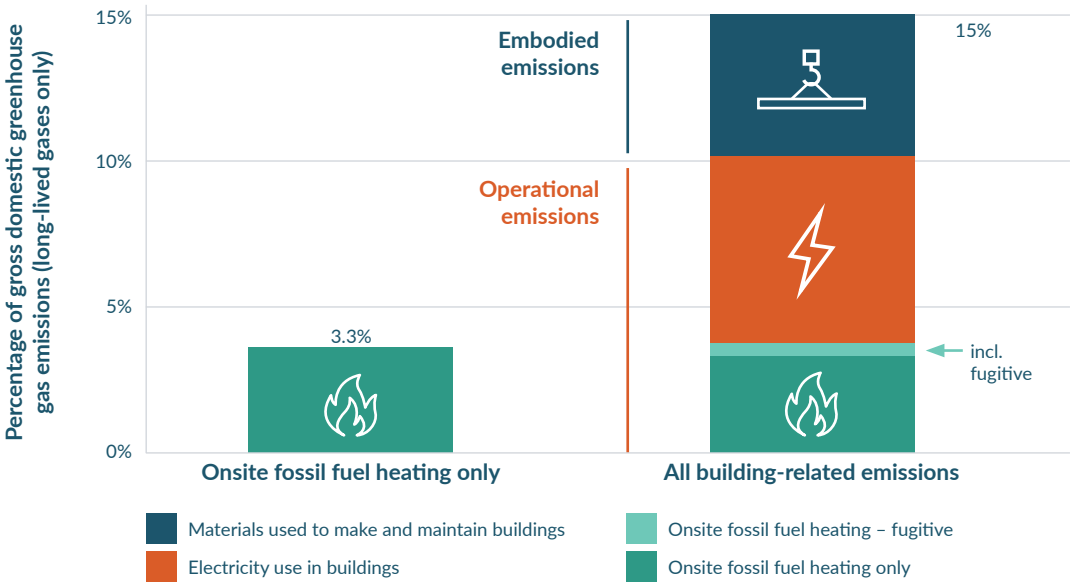
Emissions directly from buildings, such as fossil fuels used for space and water heating, are only one part of the emissions for which buildings are responsible. They also drive emissions that are accounted for in the energy, industry, waste and transport sectors.

To enable us to account for and reduce all of the emissions that buildings generate, this chapter uses a "consumption" approach (as recommended by He Pou a Rangi – Climate Change Commission) which incorporates all the emissions in Aotearoa related to buildings, regardless of the sector that produces them (see figure 12.1). This differs from the 'production' approach of other sector-specific chapters, which specifically incorporate emissions produced within that sector.

The consumption approach includes the impact of two types of building-related emissions.

- **Operational carbon emissions** – from the energy and other resources used for operating the building.
- **Embodied carbon emissions** – from the manufacture and use of the materials and products in buildings across their lifespan, from construction to deconstruction. These include emissions from the production, transportation and disposal of building materials.

Figure 12.1. Building- and construction-related emissions as a proportion of Aotearoa New Zealand's gross greenhouse gas emissions (excluding biogenic methane) in 2018[4]



Buildings and houses are long lived, and the amount of energy used to heat, cool, light and maintain them is affected by their original design and construction. Designing, building, using and deconstructing our buildings more efficiently will provide more opportunities to reduce emissions across many sectors.

4 Figures in AR4 terms, based on the New Zealand's Greenhouse Gas Inventory 1990-2018 published in 2020 as opposed to the most recent inventory published 2022.

Actions we are taking to reduce building and construction emissions

Initiatives are underway across government and industry to reduce emissions from building and construction, and to meet the sector's complex challenges – like workforce and skills shortages, material supply constraints, pipeline uncertainties, productivity constraints, and health and safety concerns.

More needs to be done to ensure this sector can meet the scale of the challenge. Everyone has a role to play – central and local government, business and industry, the finance and insurance sectors, and households and communities. The Construction Sector Accord provides a platform for much of this collaboration.

Together, government and industry must identify opportunities that reduce emissions, create cost savings and support affordability. For instance, changes to building designs or footprints can be cost neutral but significantly reduce emissions. Some opportunities have long-term cost savings, for instance, from reduced energy bills, but can have higher upfront costs.

To provide an equitable transition, the Government will work to understand potential costs and mitigate their negative impacts for groups, including workers, renters, seniors, disabled people and lower socio-economic groups.

Reducing building and construction emissions

The steps we are taking to reduce emissions have two objectives:

- reduce the embodied carbon of buildings
- reduce operational emissions.

Objective 1: Reduce embodied carbon of buildings

We can reduce the emissions created during the extraction, manufacture, operation and disposal of resources used in buildings through the actions below.

Focus area 1: Reduce embodied carbon of construction materials

Actions in this focus area put in place requirements and support for people to measure or reduce their buildings' embodied carbon.

Action 12.1.1: Progress regulatory change to reduce embodied emissions of new buildings

The Government consulted on a Whole-of-Life Embodied Carbon Reduction Framework in 2020. The framework would require reporting and measurement of whole-of-life embodied carbon emissions – from manufacturing building materials to disposing of them at the end of a building's life. The framework would cap new buildings' whole-of-life embodied carbon and reduce the cap over time.

Key initiatives

- Consult in late 2022 on introducing whole-of-life embodied carbon requirements to the Building Code.
- Establish a sector advisory group to help develop proposals for reporting and measurement of whole-of-life embodied carbon emissions and expand the sector's understanding of embodied carbon.
- Explore barriers in existing regulation to the sector considering whole-of-life embodied carbon.

Opportunities for building and construction innovation

The Government is looking to use a climate innovation platform to enable the rapid development and adoption of innovative low-emissions building materials and approaches. This will involve policy and regulatory changes, international cooperation and supply agreements, and developing capability. These tools have the potential to lift competitiveness and increase access to innovation and affordability.

The Government supports innovative use of timber in buildings where this can reduce embodied carbon. The Wood Processing and Manufacturing Industry Transformation Plan and the newly established Timber Design Centre are two examples of work to develop a competitive and resilient timber industry (see chapter 14: Forestry).

To provide an equitable transition, the Government will look to support small businesses, Māori-owned businesses or emerging companies which may not have the same capacity as larger enterprises to access innovation opportunities or funding.

The Government will also explore providing independent specialist advice to households and supporting product information about low-emissions building products, which could also support households to take meaningful action.

Action 12.1.2: Spark and foster innovation across the sector

Key initiatives

- Establish an Embodied Emissions Climate Innovation Platform (see climate innovation platforms in chapter 8: Research, science, innovation and technology).
- Explore providing industry grants to increase the number of Environmental Product Declarations[5] for building materials and products.
- Establish independent household advice, such as expanding the Eco Design Advisor service, and explore grants to support households to reduce their carbon impact.
- Support development of the Forestry and Wood Processing Industry Transformation Plan (see action 14.4.1 in chapter 14: Forestry).

5 Environmental Product Declarations assess the greenhouse gas emissions from a product over the course of its lifecycle, in accordance with international standards.

Opportunities with the waste and transport sectors

Up to half of all waste in Aotearoa is made up of construction and demolition waste, with 20 per cent of this waste going to municipal landfill and 80 per cent to non-municipal landfills or cleanfills.[6] Adopting circular principles, where waste is minimised at the design, construction and deconstruction phases, will reduce emissions from landfills.

A more circular economy, where existing materials are reused and recycled, will lower costs and reduce emissions associated with extracting resources and manufacturing new materials (see chapter 15: Waste and chapter 9: Circular economy and bioeconomy).

The transport of building and construction materials, products and workers generates emissions. Improving coordination and project management across the construction supply chain will help reduce transport costs and emissions.

Action 12.1.3: Realise cross-sector opportunities to reduce whole-of-life embodied emissions

Key initiatives with the waste sector

- Explore requiring waste minimisation or recovery plans for building consent.
- Continue the Kāinga Ora – Homes and Communities waste minimisation programme and share lessons learned.
- Investigate barriers to reusing, repurposing and recycling building materials.
- Explore circular economy initiatives for the sector as part of broader work in this area.

Key initiatives with the transport sector

- Contribute to the national freight and supply chain strategy (see chapter 10: Transport).
- Support the use of project management and prefabrication to reduce road transport.

6 BRANZ. Reducing building material waste. Web page. Retrieved from https://www.branz.co.nz/sustainable-building/reducing-building-waste/#:~:text=Construction%20and%20demolition%20waste%20is,materials%2C%20damaged%20materials%20and%20rework (accessed 22 April 2022).

Focus area 2: Accelerate the shift to low-emissions buildings

Reducing building-related emissions requires lower-emissions alternatives to be the norm for both the sector, and for households and building owners. These must be competitive to produce and affordable. Households and building owners, government and the sector must make informed, deliberate decisions about embodied carbon and operational efficiency when considering the design and use of buildings.

Action 12.2.1: Shift expectations and grow the market for low-emissions buildings

We must adopt and mainstream new manufacturing and construction processes, technologies, building designs, materials and products to reduce building-related emissions and increase affordability and competitiveness.

Key initiatives

- Identify real and perceived financial barriers to low-emissions buildings and explore options to reduce barriers, such as financial incentives, green bonds or green loans.
- Recognise and showcase low-emissions buildings to highlight practices the sector can adopt.
- With the Construction Sector Accord, explore providing business change support and grants to help construction businesses move to a low-emissions business model.

Action 12.2.2: Use the Government's purchasing power to drive market change

The Government owns, manages or procures a large number of buildings, including public and defence housing, schools, hospitals and office buildings. The Government can use its purchasing power to drive the market towards low-emissions alternatives.

Key initiatives

- Support the implementation of Rule 20 of the Government Procurement Rules and the Procurement Guide to Reducing Carbon Emissions in Building and Construction.
- Continue to convene a group for government agencies – the Climate Change Infrastructure and Property Group – to share advice about delivering building and construction climate change initiatives.

Objective 2: Reduce operational emissions

Operational emissions can be reduced by improving building design so that maintaining a comfortable indoor environment uses less energy and by using energy from low-emissions sources. This can also reduce energy costs across a building's lifetime.

Focus area 3: Improve building energy efficiency

Half of all Aotearoa New Zealand's electricity is used in buildings, mostly for heating and cooling spaces and water heating. Building electricity use often occurs in peaks – many homes will use heating at the same time, such as on cold evenings. Peak electricity is more likely to be generated by burning coal or gas. Many buildings in Aotearoa are also hard to heat and not dry or healthy, which can contribute to poor health outcomes for building users.

The Government has already made significant investments to lift buildings' energy efficiency, improve their quality and drive down energy costs. For example, more than 85,000 insulation and heating retrofits have been completed under the Warmer Kiwi Homes programme since July 2018. However, more needs to be done for both new and existing buildings to meet the scale of the emissions reduction challenge.

Opportunities to improve energy efficiency in new and existing buildings

Further reducing operational emissions requires more substantial changes to the Building Code. In 2020, the Government consulted on the Transforming Operational Efficiency framework. It proposes to cap buildings' use of energy and water and defines quality measures for indoor environments. Implementing any proposals will require care to avoid unintended consequences.

This work also presents an opportunity to provide more broadly for an equitable transition. Complementary actions will be explored such as improving building accessibility and seismic resilience, supporting workforce development, and enabling medium- and higher-density housing options that support more liveable urban environments.

The building regulatory system largely focuses on the performance of new buildings. However, we also need to address existing buildings. This means reducing emissions by improving their performance and energy efficiency.

Supporting existing buildings to become low emissions is an important part of an equitable transition. People living in existing buildings, including vulnerable populations, are less likely to benefit from regulation that ensures new buildings are warmer, drier and healthier.

Actions currently in place – such as the Energy Efficiency and Conservation Authority's Warmer Kiwi Homes programme, the continued rollout of the Healthy Homes Standards, and Kāinga Ora's work to improve the operational efficiency of its building stock – will address some of these impacts (see the case study below).

Action 12.3.1: Amend the Building Code to improve new buildings' operational efficiency

Key initiatives

- Implement amendments to Building Code Clause H1 (energy efficiency) compliance pathways.
- Consult in late 2022 on proposed Building Code changes to introduce new requirements for operational efficiency.

Action 12.3.2: Encourage and enable emissions reduction from existing buildings

Key initiatives

- Introduce mandatory energy performance certificates for buildings. Initially, they could apply to government, commercial and large residential buildings and potentially expand to other residential buildings in future.
- Explore how incentives, support or regulatory requirements could reduce existing buildings' emissions, while making buildings warmer and drier.
- Explore options to expand the Warmer Kiwi Homes programme, such as eligibility criteria, to better achieve equitable outcomes.

CASE STUDY

KĀINGA ORA – HOMES AND COMMUNITIES: NGĀ KĀINGA ANAMATA

Ngā Kāinga Anamata (homes of the future) is part of Kāinga Ora's carbon-neutral programme. The proposed public housing development aims to meet the aspirations for mitigating carbon under the Building for Climate Change programme.

The project in the Auckland suburb of Glendowie plans to deliver 30 new homes in five, three-level apartment buildings. Each building will use common structural systems and materials, and achieve significantly reduced carbon and energy outputs compared to typical 2020 construction.

The project team conducted whole-building lifecycle carbon assessments throughout the design process. The result is a lifecycle carbon reduction of approximately 74 per cent less than typical 2020 apartment construction. This includes timber's biogenic carbon sequestration, or a 58 per cent carbon reduction without.

If agreed for delivery, Ngā Kāinga Anamata will share lessons and insights to prove low lifecycle carbon construction is possible now. It will accelerate decarbonisation in new residential construction. Monitoring and evaluation during building and occupancy will establish the overall cost and benefits of low-carbon housing. The project will report this to the industry to help drive change towards a decarbonised, climate-resilient built environment.

Ngā Kāinga Anamata was showcased as one of only 17 global initiatives in the COP26 Build Better Now pavilion – part of the 2021 United Nations Climate Change Conference.

Focus area 4: Shift energy use from fossil fuels

About 4 per cent of Aotearoa New Zealand's domestic emissions in 2018 were from fossil fuels used in buildings for space and water heating, cooling and cooking.

Transitioning buildings from fossil fuels to low-emissions renewable energy will reduce these emissions. It will also improve the health and wellbeing of building users. To be equitable, the transition must take care to mitigate unequal impacts for building users, households, communities and industry.

For example, fossil fuels are currently the only viable energy option in some rural and off-grid communities, homes and marae. Measures that affect the affordability or supply of fossil gas or coal may disadvantage these people unless the transition is supported.

Other actions to reduce emissions from fossil fuel use in buildings

Fossil fuel use in buildings will be reduced through actions already covered in the emissions reduction plan, including:

- managing the phase-out of fossil fuels, including fossil gas (focus area 3 of chapter 11: Energy and industry).
- introducing measures to improve the energy efficiency of new and existing buildings (focus area 3 of this chapter).

Focus area 5: Establish foundations for future emissions reduction

Continuing to reduce building related emissions will require looking ahead and establishing relationships, training systems, data and regulatory systems to support change and make the most of low-emissions opportunities.

Action 12.5.1: Work with Māori to identify new opportunities and support an equitable transition

The Government and the building and construction sector must be well positioned to understand and respond to the diverse needs and aspirations of Māori. Partnership in the building and construction sector needs to be improved to support Māori aspirations and progress key opportunities across the sector.

Hapū, iwi and whānau Māori are significant land and property holders, business owners and participants in Aotearoa New Zealand's construction sector. Empowering Māori and maximising opportunities will contribute to better outcomes, both for Māori and emissions reduction.

Key initiatives

- Access established networks and improve cross-agency coordination when engaging with Māori on building and housing and climate change matters. Coordinated engagement allows more holistic consideration and more efficient use of Māori resources.
- Support Māori to identify and share examples of Māori innovation and leadership in the climate change and building and construction space.
- Establish systems to enable representation of Māori views within the building and construction sector, such as a mātauranga Māori reference group.
- Use resources such as iwi, hapū and local government climate response plans to better understand existing work.

Action: 12.5.2: Develop a strong data and evidence base

High-quality, user-friendly data and evidence is needed to introduce regulation change for operational emissions and embodied emissions reduction. Data and evidence also supports monitoring and evaluation and allows the sector and households to make informed decisions about the emissions impacts of their building choices.

Key initiatives

- Establish an embodied emissions advisory group of government and non-government building emissions experts.
- Develop a national database for building and construction emissions data. It will be underpinned by a data assessment methodology, emissions calculation tools, a data repository, and appropriate guidance and education.
- Support research into reducing building-related emissions by key non-government organisations, such as BRANZ and universities.

Action 12.5.3: Change behaviours of households and the sector

New Zealanders could benefit significantly from low-emissions buildings, materials and practices that are not yet mainstream. Shifting attitudes and behaviours could result in emissions reductions becoming a core consideration when procuring or undertaking building work. This will support business competitiveness and raise the real (and perceived) affordability of low-emissions approaches.

Supporting people to become more aware of low-emissions building and construction opportunities will underpin much of the work in the building and construction sector in the first emissions budget period and complement initiatives across government.

Key initiative

- Develop and implement a programme to raise awareness, reduce barriers, and encourage action to reduce the climate impact of the building and construction sector. This will support action by households, building owners, producers (sector and supply chains) and building-consent authorities.

Action 12.5.4: Support workforce transition to ensure the sector can build for climate change

Reducing emissions in the building and construction sector will create new economic and job opportunities across the sector – including for people and skills that the sector has not traditionally employed.

To take advantage of these opportunities, it is important that the workforce has the right skills, capabilities and capacity. As well as supporting an equitable transition, the actions preparing –and upskilling – the workforce could also help address existing shortages.

The Government will partner with the Construction Sector Accord's people development and environment workstreams, Māori and Pacific businesses and workers, and across regions, industries and professions, to realise opportunities and an equitable transition.

Key initiatives

- Coordinate and facilitate building and construction workforce planning and sector education across government.
- Explore support or training for workers who may need to meet new requirements, such as gasfitters, designers, and building-consent authority staff.
- Explore direct supports such as targeted funding, behaviour change and site-based opportunities to grow skills and attract people to the workforce.

Action 12.5.5: Establish an enabling legislative framework

The Government will future-proof the Building Act 2004 to ensure it is clear about the Government's priorities for climate change. This will lay the foundation for future legislative and regulatory action that might be required to progress emissions reduction and adaptation work.

Key initiatives

- Explore potential legislative barriers that may prevent or disincentivise the sector from engaging in emissions reduction or adaptation work.
- Progress changes to the Building Act to incorporate climate change goals more clearly.

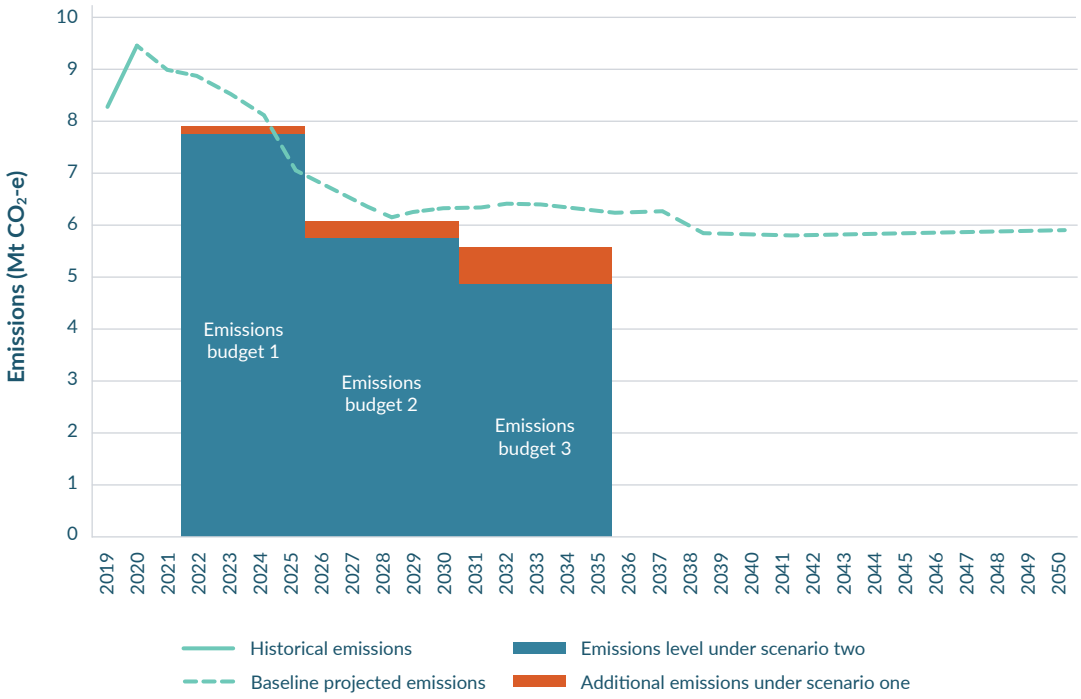
What this means for the emissions budgets

Building-related emissions are expected to reduce by 0.9 Mt CO_2-e to 1.7 Mt CO_2-e in the first emissions budget period, mainly through the potential impact of non-regulatory initiatives such as a behaviour change programme and providing technical infrastructure such as data and tools.

Regulatory actions that could come into force from 2025 are expected to have a more significant impact on emissions reductions in the second and third emissions budget periods. The specific reductions will depend on the strength and speed of the regulatory settings, which the Government will decide at the appropriate time. As an illustration, building-related emissions reductions of between 1.5 Mt CO_2-e and 3.4 Mt CO_2-e could be realised in the second emissions budget period, and between 3.9 Mt CO_2-e and 7.5 Mt CO_2-e in the third emissions budget period.

The Government has modelled two scenarios to show the sector's potential emissions reductions from the actions above. The scenarios show the impact that different timelines and initiatives could have on emissions from the building and construction sector.

Figure 12.2. Illustration of potential building and construction emissions reduction scenarios against baseline (operational and embodied emissions)



- Scenario one illustrates the impact of both embodied carbon and operational efficiency regulatory settings coming online more slowly and with emissions caps set at lower levels.
- Scenario two illustrates the impact of embodied carbon and operational efficiency regulatory settings coming online more quickly and with emissions caps set at higher levels.

The modelled emissions reductions mostly occur in the energy and industry sectors, with some reductions in the waste and transport sectors.

We need to work together to reduce emissions from the building and construction sector

The Government is putting in place the systems and settings to facilitate a low-emissions building and construction sector, but we all need to work together to meet our 2050 targets.

In their role as building-consent authorities, local government co-regulate the building system. They will have a role to play in implementing proposed Building Code requirements to report and measure whole-of-life embodied carbon and operational emissions. Local government will also have a role in reducing construction and demolition waste.

All parts of the building and construction sector have a role in reducing emissions. For instance, designers, engineers and architects can develop and offer lower-emissions building designs, builders can reduce construction waste onsite, and industry training organisations can build the climate change skills and capability needed for the workforce.

The financial and insurance sectors also have levers that may enable or incentivise households and businesses to opt for low-emissions houses and other buildings. For example, mortgage lenders and brokers can offer "green loans" (loans with more favourable terms for more climate-resilient buildings) or adapt lending criteria for efficient, low-emissions buildings with small footprints.

Helping the building and construction sector adapt to the effects of climate change

The 2020 National Climate Change Risk Assessment for New Zealand identified "risks to buildings due to extreme weather events, drought, increased fire weather and sea-level rise" as one of its 10 most significant climate change risks, based on urgency.[7]

The forthcoming national adaptation plan (to be released by August 2022) will outline regulatory and non-regulatory actions to address risks. These actions will be jointly developed by the Ministry of Business, Innovation and Employment and Te Tūāpapa Kura Kāinga (Ministry of Housing and Urban Development) to ensure they consider the linkages between the building regulatory system, housing and Māori priorities.

The Government will ensure system settings mitigate the risk of trade-offs between emissions reduction and building adaptation or resilience. In addition, the national adaptation plan will outline appropriate policies and support to ensure Māori can achieve both adaptation and emissions reduction goals. Work with Māori outlined in action 12.5.1 will support the development of further actions.

7 For an assessment and more details of this risk, see Ministry for the Environment. 2020. National Climate Change Risk Assessment for Aotearoa New Zealand: Main report – Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa: Pūrongo whakatōpū, at pp 82–87. Retrieved from https://environment.govt.nz/assets/Publications/Files/national-climate-change-risk-assessment-main-report.pdf (accessed 21 April 2022).

CHAPTER 13:

Agriculture

Agriculture

Lead

MINISTER OF AGRICULTURE
HON DAMIEN O'CONNOR

DIRECTOR-GENERAL OF THE MINISTRY FOR PRIMARY INDUSTRIES
RAY SMITH

Contribution to our long-term vision

The actions of this plan will build on the efforts of our farmers, growers, businesses, sector bodies and government agencies to deliver a low-emissions future and resilient rural communities.

Contribution to Aotearoa New Zealand's greenhouse gas emissions (AR5) in the first emissions budget period

Projected emissions without the initiatives in this plan	163.1 Mt CO_2-e
Projected average annual emissions without the initiatives in this plan	40.8 Mt CO_2-e
Projected percentage of total gross emissions without the initiatives in this plan	50 per cent
Estimated emissions reduction from the initiatives in this plan	0.3 to 2.7 Mt CO_2-e

Agriculture

Why agriculture is important

Agricultural emissions make up 50 per cent of Aotearoa New Zealand's gross emissions, including most of our emissions of nitrous oxide and biogenic methane. Reducing these emissions is needed to achieve our 2050 target, including the requirement to reduce biogenic methane emissions by 24–47 per cent by 2050.

Reducing agricultural emissions will enhance Aotearoa New Zealand's reputation as a low-emissions and trusted provider of agricultural products. This plan must work with other initiatives to improve productivity, sustainability and inclusivity in the primary sector in line with the Government's *Fit for a Better World – Accelerating our Economic Potential* roadmap.

Key actions

- Price agricultural emissions.
  - Introduce an agricultural emissions pricing mechanism by 2025.
  - Support early adopters of low-emissions practices.
- Accelerate mitigation technologies.
  - Establish a new Centre for Climate Action on Agricultural Emissions to drive a step change in mitigation technology innovation and uptake on farms.
- Support producers to make changes.
  - Fund tikanga-based programmes to support needs and aspirations of Māori.
  - Introduce climate-focused extension and advisory services.
- Transition to lower-emissions land uses and systems.
  - Develop food and fibre science and mātauranga Māori accelerators.

Taiao ora, tangata ora: If the natural world is healthy, so too are the people

In July 2020, the Government released its vision and roadmap for the sector – *Fit for a Better World: Accelerating our Economic Potential.*

The vision for the sector is to meet the greatest challenge humanity faces – rapidly moving to a low-carbon emissions society, restoring the health of our water, reversing the decline in biodiversity and, at the same time, feeding our people. It envisages designing modern regenerative production systems fit for a better world, alongside innovative science and technology. Achieving this vision will increase the economic and environmental resilience of farmers and growers in Aotearoa, including helping ensure high-value exports markets for low-emissions food products.

At the heart of this vision is te taiao. For Māori, te taiao is the natural world that contains and surrounds humanity in an interconnected relationship of respect. The Te Taiao Framework[1] has been developed with guidance from mātauranga Māori specialists, farmers and growers, sector experts and scientists.

The health of the climate, land, water and living systems comes first. When nature thrives, so do our families, communities and businesses. The Te Taiao Framework also represents new leadership based on a genuine partnership with Māori.

Embracing te taiao and reducing emissions will require mahi tahi – working together – with Māori and the sector, to support a transition to a lower-emissions future for agriculture. This will lay the foundations for reduced emissions and high-quality, trusted and healthy products.

1 Te Taiao Working Group Primary Sector Council. July 2020. TAIAO ORA TANGATA ORA TE TAIAO: The Natural World and Our People Are Healthy – Hei anga whakamua mā tātou A new way forward for Aotearoa New Zealand's food and fibres sector. Prepared by Stephanie Howard, Miriana Stephens and John Rodwell. Retrieved from https://fitforabetterworld.org.nz/assets/TE_TAIAO_REPORT_WEB.pdf (fitforabetterworld.org.nz) (accessed 22 April 2022).

Agriculture is a large emitter, but reducing emissions will build the sector's resilience

The agriculture sector not only makes up half of Aotearoa New Zealand's greenhouse gas emissions, but it is also highly exposed to the impacts of climate change. Reducing emissions from the agriculture sector will allow us to meet market expectations for sustainable, low-emissions products and improve the resilience of our rural communities.

The impacts of climate change are already being felt across Aotearoa New Zealand's agriculture sector. Across all regions, increasing pressure is being felt through drought (including in regions which have not previously experienced drought) and increased flooding and extreme weather events. Increased rainfall events are projected across the country and increased drought severity is projected to increase in almost all regions.[2]

Aotearoa is a leader in sustainable agricultural innovation and by addressing our own agricultural emissions, we can provide solutions for the rest of the world.

Agriculture contributes 50 per cent of our emissions

The agriculture sector contributes 50 per cent of Aotearoa New Zealand's gross emissions. Approximately 94 per cent of our nitrous oxide emissions and around 91 per cent of our biogenic methane emissions are from agriculture.

About three-quarters of agricultural emissions are biogenic methane emitted from livestock, followed by nitrous oxide. Nitrous oxide emissions from nitrogen fertiliser use make up about 3.9 per cent of agricultural emissions.

Agriculture needs to contribute to meeting our climate goals.

Nitrous oxide and carbon dioxide emissions from agriculture are included in our net-zero target for 2050. However, there are separate 2030 and 2050 targets for biogenic methane emissions. The target is to reduce biogenic methane emissions by 10 per cent by 2030, relative to 2017 levels, and 24 to 47 per cent lower by 2050.

2 NIWA. 2016. Climate change scenarios for New Zealand. Retrieved from https://niwa.co.nz/our-science/climate/information-and-resources/clivar/scenarios (accessed 27 April 2022).

The split gas target reflects the different impact of methane – which is a short-lived gas – compared to carbon dioxide and nitrous oxide, which are long-lived gases. While methane remains in the atmosphere for less time, its warming effect is 28 times greater than carbon dioxide.[3]

Like all greenhouse gases, methane emissions make the world warmer than it would be otherwise. The Intergovernmental Panel on Climate Change (IPCC) advises that rapid, steep methane reductions, alongside bringing global carbon dioxide emissions to net zero by 2050, are needed to limit global warming to 1.5˚C.

Agriculture is exposed to the risks of climate change and opportunities of the global response

The agriculture sector is a significant part of the Aotearoa economy, accounting for 10 per cent of our GDP, over 65 per cent of our export revenue, and nearly 12 per cent of our workforce.[4]

The sector plays a key role in the Māori economy, as tangata whenua have made significant investments in agriculture, with assets of NZ$8.6 billion in sheep and beef farming and NZ$4.9 billion in dairy farming, in addition to investments in forestry and land retirement.[5] Hapū, iwi and whenua Māori entities are estimated to own 30 per cent of sheep and beef production and 10 per cent of dairy production.

Farming also provides a way of life for our rural communities.

However, the sector is highly exposed to the impacts of climate change, such as droughts and floods, as well as to global responses to climate change.

Other jurisdictions are starting to consider how trade levers can be used to enforce sustainability requirements on imported goods.

While market pressure poses a risk to the sector, it also presents an opportunity to meet the market with low-emissions agricultural products. In turn those consumer preferences will increasingly drive our transition to a lower-emissions agriculture sector.

Our actions now put us in a better position to meet the needs and requirements of markets in the future.

3 This statement is based on information in the Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change, completed in 2014. Retrieved from https://www.ipcc.ch/assessment-report/ar5/ (accessed 26 April 2022).

4 Ministry for Primary Industries. December 2021. Situation and Outlook for Primary Industries (SOPI) December 2021. Retrieved from https://www.mpi.govt.nz/dmsdocument/49066-Situation-and-Outlook-for-Primary-Industries-SOPI-December-2021 (accessed 22 April 2022).

5 Reserve Bank of New Zealand. 2018. Te Ōhanga Māori – The Māori Economy 2018 Retrieved from https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Research/Te-Ohanga-Maori-Report-2018.pdf (accessed 22 April 2022).

We need to build resilience in our communities while reducing emissions

In transitioning the agriculture sector, we need to ensure that the sector is in the best position to seize the opportunities of the transition.

Producers are responding to an increasing number and range of changes – which stem from shifting market requirements (through supply agreements), as well as regulatory changes. The number and speed of these changes will have cumulative impacts on farm productivity and profitability, social and mental wellbeing and the resilience of our rural communities. The effects of those changes on each farm or business will vary.

Agricultural emissions make up a large proportion of the overall Māori emissions profile. The Government is committed to partnering with Māori to support Māori-led solutions to meeting our climate objectives. The Government is working with Māori to understand the issues that affect their interests and whenua within key work programmes, but there is more to be done.

Reducing biological emissions while providing for the economic and social resilience of our rural communities over the long term requires that we have the right tools, technologies and supports in place to enable producers to make changes that reduce their emissions.

The actions in this chapter outline how the Government, farmers and growers, industry and Māori will work together to reduce emissions in a way that improves the resilience of our rural communities, maximises the opportunities of the transition and protects Aotearoa against potential disruptive global shocks as our export markets respond to climate change.

Actions we are taking to reduce agricultural emissions

This section outlines the Government's approach in partnership with industry and Māori to reducing agricultural emissions. It focuses on actions over the next three years and sets the foundation for more accelerated reductions over the next 15 years.

Many of the actions in this section build off He Waka Eke Noa – Primary Sector Climate Action Partnership (He Waka Eke Noa) that was established in 2019. This has seen the Government work in partnership with the primary sector, Māori, farmers and growers on practical solutions to reduce agricultural emissions and build resilience to climate change.

Many producers are already reducing their emissions through actions such as precision fertiliser application and planting marginal land. New mitigation technologies are also emerging that can make noticeable reductions in methane and nitrous oxide emissions. However, barriers prevent widespread action.

- Many farmers are not yet aware of the drivers of emissions on their farms and options to mitigate them.
- Farmers have only limited incentives (primarily coming through processors) to adopt new technologies or make practice changes to reduce their emissions.
- For some farmers, practice changes and available mitigation technologies are not cost effective in the absence of a price on agricultural emissions or clear market premium.
- The most promising mitigation technologies are several years away from use on pasture-based systems (eg, methane inhibitors), or are still in an early stage of research (eg, a methane vaccine).

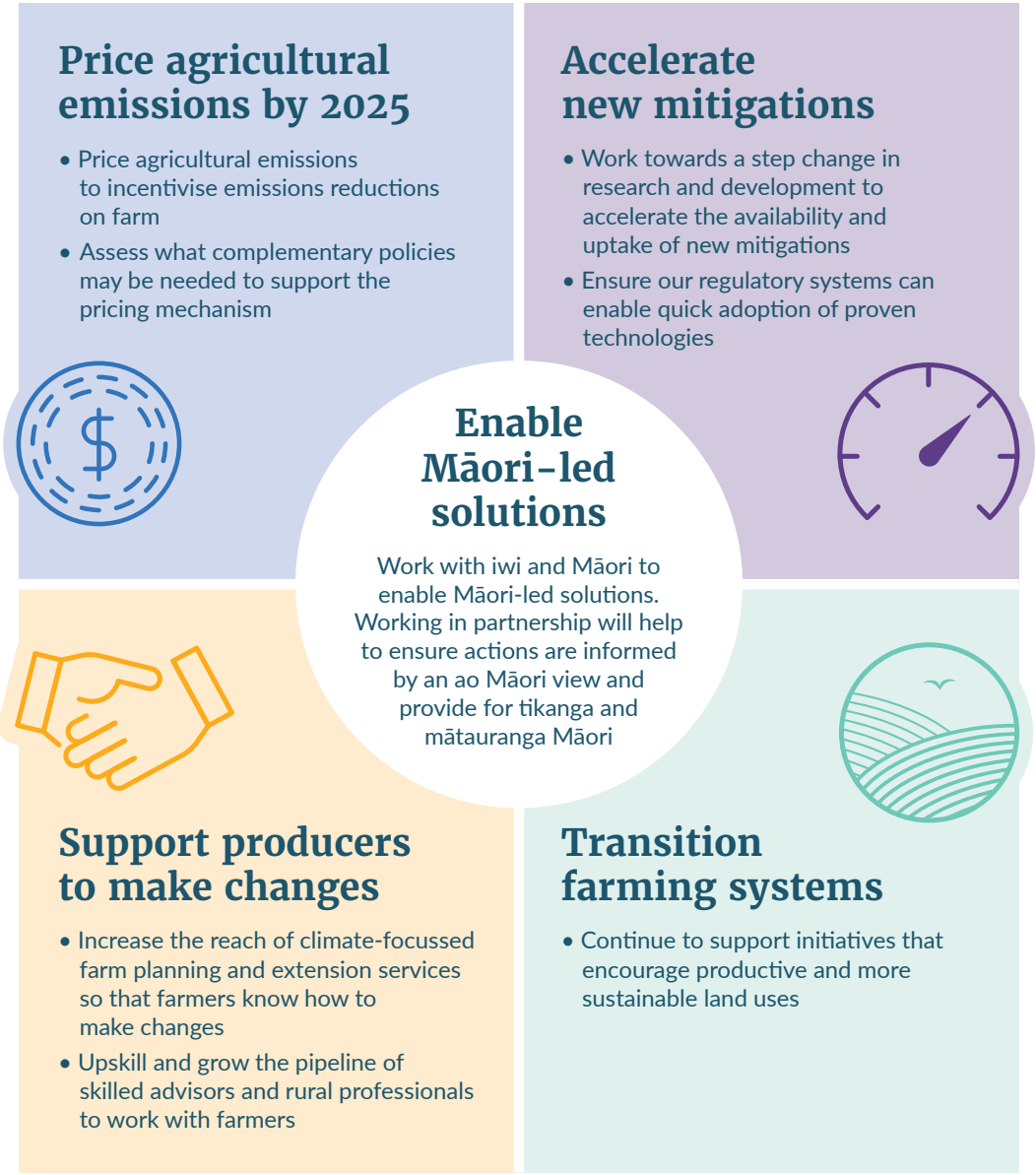
The Government, industry and iwi/Māori are targeting actions to overcome these barriers and enable further development of mitigations technologies.

Five focus areas guide our actions to reduce emissions

Five key focus areas for agriculture have informed the actions included in this emissions reduction plan. These are being driven by our response to He Pou a Rangi – Climate Change Commission's (the Commission) recommendations, feedback from public consultation and the Government's commitment to an equitable transition to a low-emissions future for Aotearoa.

Actions are outlined within our first four focus areas (see figure 13.1). The fifth focus area, "enable Māori-led solutions", is cross-cutting and embedded in actions and work with Māori across the other four focus areas.

Figure 13.1. Focus areas for agriculture



Focus area 1: Price agricultural emissions by 2025

This focus area will enable the Government to deliver one of the Commission's key recommendations: ensuring effective pricing of agricultural emissions.

A key priority of He Waka Eke Noa is to deliver advice on how to price agricultural emissions. Pricing agricultural emissions helps create an incentive for emitters to adopt cost-effective mitigations.

He Waka Eke Noa has explored alternative pricing approaches to the New Zealand Emissions Trading Scheme (NZ ETS) to ensure that the agricultural emissions pricing scheme is effective in driving emissions reductions at the farm level. Its final advice will be provided to Ministers by 31 May 2022.

Expected emissions reductions will depend on the details of the recommended pricing mechanism, such as what mitigations are recognised and rewarded, and how revenue is recycled to support further reductions.

The Commission will report to Ministers by 30 June 2022 on:

- He Waka Eke Noa progress towards farmer preparedness for agricultural emissions pricing
- overall progress towards farm-level obligations of farm emissions reporting and farm plans.[6]

Action 13.1.1: An emissions pricing mechanism is developed, and agricultural emissions are priced by 1 January 2025

Key initiatives

- Ministers will take decisions on pricing agricultural emissions by the end of 2022, to enable implementation by 2025. They will be assessing He Waka Eke Noa's recommendation against the legislated backstop option of bringing agriculture into the NZ ETS at the processor-level (which means the emissions liability sits with manufacturing processors, instead of individual farmers). They will consider the Commission's assessment of He Waka Eke Noa's progress.
- **Te Aukaha** – The Federation of Māori Authorities is leading Te Aukaha, the Māori workstream within He Waka Eke Noa. This is a cross-connecting workstream that integrates Māori perspectives and will ensure the pricing mechanism supports the land development aspirations of Māori farmers, while not exacerbating existing inequities.
- The Government will then support the essential work to develop and implement an agricultural emissions pricing scheme by 2025.

6 See Climate Change Response Act, Schedule 5: Primary sector climate change commitments. Retrieved from https://www.legislation.govt.nz/act/public/2002/0040/latest/LMS371743.html (accessed 22 April 2022).

All farms will have emissions reports and mitigation plans by 2025

To help prepare producers for the introduction of emissions pricing, He Waka Eke Noa has been supporting producers to know their emissions – through the "know your numbers" initiative – and have a plan to measure and manage emissions.

The Climate Change Response Act 2002 has legislated milestones for:

- 100 per cent of farms to measure and document their annual greenhouse gas emissions by 31 December 2022
- 100 per cent of farms to have a farm plan to measure and manage their emissions by 1 January 2025.

As at 31 December 2021, 61 per cent of surveyed farms[7] knew their annual total of on-farm emissions and as at 1 January 2022, 21 per cent of farms had a written plan to measure and manage their emissions.

He Waka Eke Noa has also produced Greenhouse Gases: Farm Planning Guidance to support farmers to incorporate emissions into their farm plan.

Action 13.1.2: All producers will have emissions reports by the end of 2022 and a farm plan in place by 2025

Key initiatives

- Ensure all producers have a greenhouse gas report by the end of 2022.
- Develop outreach programme focused on farm planning.
- Ensure all producers have a greenhouse gas emissions mitigation plan in place by 2025.

7 He Waka Eke Noa – The Primary Sector Climate Action Partnership. 2022. He Waka Eke Noa Milestone update and six-month progress report. Retrieved from He Waka Eke Noa – The Primary Sector Climate Action Partnership (accessed 27 April 2022).

Action 13.1.3: Further incentivising on-farm mitigation

The Government is considering support for early adoption of on-farm changes that will reduce emissions before the introduction of an agriculture emissions pricing system and revenue recycling system from 2025. This support would focus on achieving emissions reductions beyond actions that farmers are already commercially incentivised to take.

Support being considered includes:

- a contribution towards the cost of adopting technologies to mitigate biological emissions
- an acceleration of on-farm trials of overseas technologies to adapt them for the Aotearoa pastoral farming context.

Focus area 2: Accelerate new mitigations

This focus area will speed up the availability of emissions reduction mitigation technologies. The Government and industry have invested about NZ$200 million over the last 10 years[8] into agricultural emissions mitigation research, capability building and international leadership.

This investment has contributed to building an evidence base, developing new technologies, increasing animal productivity while reducing emissions, and improving emissions measurement.[9] For example, it is now possible to selectively breed lower methane emitting sheep without any adverse effects.

Other initiatives being investigated include low-methane and low-nitrous oxide emitting feeds, methane and nitrous oxide inhibitors, and a methane vaccine for ruminants.

8 This figure includes government funding of NZ$82.500 million over 10 years for the Global Research Alliance on Agricultural Greenhouse Gases, NZ$69.050 million over 10 years for the New Zealand Agricultural Greenhouse Gas Research Centre, and NZ$23.025 million over 10 years for the Pastoral Greenhouse Gas Research Consortium (funding in the consortium was matched 50:50 by industry). The figure excludes smaller funds, or funds used for broader outcomes, such as the Sustainable Food and Fibre Futures fund.

9 Domestic research has been supported through the government-funded New Zealand Agricultural Greenhouse Gas Research Centre, alongside other programmes, including the Sustainable Food and Fibre Futures fund, the Sustainable Land Management and Climate Change research programme, New Zealand's Greenhouse Gas Inventory research fund and the Pastoral Greenhouse Gas Research Consortium.

Action 13.2.1: Strengthen the role of research and development to get mitigations to producers sooner

The Government will strengthen the role of research and development in accelerating the availability and uptake of new mitigations, and get mitigations to producers sooner.

Key initiatives

- Streamline the path to market of new innovations to accelerate deployment and uptake.
- Expand greenhouse gas methane measurement capacity to speed development of new technologies.
- Deliver technology and practice demonstration programmes to ensure mitigation options are visible to farmers.
- Support entrepreneurs to encourage technological breakthroughs and demonstrate our international contribution to reducing global agricultural emissions.

This work will be underpinned by a research and development plan for science and mātauranga Māori to reduce biological emissions from agriculture. This plan is being developed by the Government in partnership with industry, Māori and the science sector, under the *Fit for a Better World* roadmap.

It takes a comprehensive system-level view of what is needed to accelerate the availability of mitigations to farmers, across the full pathway from knowledge to impact.

Action 13.2.2: Establish a new Centre for Climate Action on Agricultural Emissions to drive a step change in research, development and commercialisation of emissions reduction technologies

A step change in investment, by both government and industry, is needed to accelerate delivery of emissions reduction tools and technologies and getting these into the hands of farmers sooner.

Government has committed to a significant increase in investment to accelerate the development of greenhouse gas mitigations, including the establishment of a Centre for Climate Action on Agricultural Emissions (the Centre), to drive our efforts.

The Centre will include a new public-private joint venture with a focus on product development and commercialisation to drive our research and development (R&D) activity, and will deliver on three key outcomes:

- faster development, commercialisation, extension and uptake of emissions mitigation technologies
- a strong system to support delivering mitigations over the long term
- strong leadership and alignment of biological emissions efforts.

The joint venture will be supported by an enhanced New Zealand Agricultural Greenhouse Gas Research Centre, with a focus on strengthening the underpinning R&D system. Discussions with the private sector on investment and participation in a joint venture are well advanced.

Action 13.2.3: Support mātauranga Māori-based approaches to emissions reductions from agriculture

The Government is working with Māori to enable mātauranga Māori-based approaches that will support Māori entities to define Māori priorities for climate change mitigation.

This will support climate action, and involve entering into strategic partnerships with business, science, research and the Government as appropriate. These programmes will be Māori led.

Action 13.2.4: Support clear and effective regulatory pathways for agricultural mitigation tools

To make it easier for producers to adopt new mitigation technologies, the Government will strengthen and streamline the greenhouse gas mitigation regulatory regime.

Key initiatives

- The Government will work to have a robust regulatory system to manage the risks of new mitigation tools to the trade of primary produce, along with managing risks to animal welfare, agricultural security, public health and food safety.
- This includes work underway to enable the regulatory oversight of greenhouse gas inhibitors under the Agriculture Compounds and Veterinary Medicines Act 1997 so that risks associated with their use are appropriately managed. The first stage of this work is expected to be completed in July 2022.

Action 13.2.5: Lead and contribute to global agricultural climate change mitigation

Aotearoa will use our significant agricultural investments, commitments and experience to increase global ambition and action to reduce agricultural emissions, while supporting food and nutrition security and sustainable development.

Key initiatives

- Advocate for robust evidence-based approaches and recognition of mitigation efforts which can create a more fair and even international playing field for agricultural exports.
- Actively engage in key intergovernmental organisations and associated initiatives – including through the United Nations Framework Convention on Climate Change's Koronivia Joint Work on Agriculture and the Agriculture Innovation Mission for Climate – for increased commitments, research and on-the-ground actions to reduce agricultural emissions.
- Support the Global Research Alliance on Agricultural Greenhouse Gases (GRA), including using our GRA budget allocations to enable Aotearoa to host the GRA Secretariat and Special Representative and co-lead the Livestock Research Group and Indigenous Research Network.
- Deliver capability programmes, including working with other countries through the GRA to improve greenhouse gas accounting methodologies and develop the skills and infrastructure needed to accelerate mitigation solutions.

Focus area 3: Support producers to make changes

This focus area will work towards supporting producers by enhancing access to the right information, knowledge and tools to make changes that best fit their farming system. As new technologies become available, it will be critical to support and enable uptake at farmer and grower level, translating research and science into on-farm action, and working closely with focus area 2.

The Government is working with industry on specialised climate-focused extension services to help producers adopt emerging technologies and practices. These services provide credible, trusted and relevant information to producers on reducing emissions. They would complement and build on the extension activities already underway through industry groups.

CASE STUDY

AG MATTERS

The Ag Matters website provides science-backed information for farmers, growers and rural professionals on agricultural greenhouse gas emissions. It is managed by the New Zealand Agricultural Greenhouse Gas Research Centre with support from the Ministry for Primary Industries.

The website provides the latest scientific knowledge, with background information and resources, to help Aotearoa New Zealand's primary sector understand how they can manage on-farm emissions.

It collates current mitigation actions, including adjusting stocking rate and increasing performance, reducing nitrogen fertiliser and using urease inhibitors, introducing low-emissions feeds, and once-a-day milking. The success of these actions and the size of the emissions changes has been demonstrated by farmers around Aotearoa.

Ag Matters also provides information on future mitigation technologies under research, and helpfully summarises the latest policy developments.

An important part of the Ag Matters website is its collection of farmer case studies. These share how different Kiwi farmers are getting their heads around climate change, what their on-farm emissions are, and what actions they are planning or already taking to manage them. The case studies also demonstrate that it is possible to reduce emissions at the same time as maintaining or increasing a farm's profitability.

Action 13.3.1: Develop further climate-focused extension and advisory services

The Government will introduce:

- multichannel information campaigns to upskill producers, ie, building and enhancing support networks and rural communities to become more climate resilient in the face of changing local conditions, in parallel with practical on-farm changes that will start to reduce emissions
- extension programmes, including workshops, action groups and on-farm activities
- using the Action Network approach (small, focused and facilitated groups) to provide producers with tools, resources, a network of experts and the advice and experiences of other farmers to develop their confidence to turn knowledge into on-farm action
- growing the pipeline of trusted industry advisers who have a strong understanding of emissions reduction practices and practical experience in working farm settings. This could include a focus on professional learning to upskill existing farm advisers on leading edge research on low-emissions farm practices.

Specialised climate-focused services will complement wider efforts by industry and the Government to support whole-of-system farming change, including by strengthening the Ministry for Primary Industries' Primary Industry Advisory Services and implementing its Integrated Farm Planning programme.

Reducing emissions from synthetic nitrogen fertiliser

Existing and proposed extension and advisory services include best practice advice to reduce emissions from nitrous oxide from fertiliser. Actions to reduce synthetic nitrogen fertiliser include:

- adopting best practice to ensure fertiliser is applied in the right amount, in the right location at the right time to limit the amount of nitrogen lost to both water and the atmosphere. Many farmers and growers have already reduced nitrogen fertiliser use, often with the help of nutrient budgeting tools, and/or implementing good management practices through farm environment plans. The synthetic nitrogen fertiliser cap limits the application of synthetic fertiliser to land as part of pastoral activities to less than 190 kilograms of nitrogen per hectare per year
- increasing the proportion of nitrogen fertilisers applied that have been modified to reduce emissions, for example, urease inhibitors, nitrification inhibitors and slow-release nitrogen fertiliser products.

Enabling a Tikanga-based, Māori-led transition

Māori face a unique set of challenges transitioning to lower-emissions agriculture. For example:

- a significant proportion of whenua Māori is either underused or may be too steep, eroded or remote for productive use
- an inability to access capital through mainstream providers, land tenure systems, ownership structures and historical separation from land
- a lack of access to traditional agricultural extension services.

Without a focus on a Māori-led transition, there is a risk that climate policies may lock in low-value land uses for whenua Māori and compound historical disadvantages.

Action 13.3.2: Support Tikanga-based programmes to support needs and aspirations of whenua Māori entities

For Māori, tikanga-based programmes are needed to support the transition to a low-emissions future for Māori landowners, and to ensure the intergenerational wellbeing of Māori. Such programmes will:

- draw on mātauranga Māori
- support the exercise of tino rangatiratanga and kaitiakitanga, while accommodating the different needs and aspirations of Māori landowners and Māori agribusinesses be designed by a Māori-led process. This could include rohe-based Māori kaiārahi (pathfinders) working directly with whenua Māori entities to deliver programmes, and support them to identify options, uptake practices and models for their whenua that support a low-emissions future.

This action will complement the Māori Agribusiness Extension programme (MABx) which aims to build networks and knowledge of Māori agribusinesses, trustees and landowners to undertake change and achieve more from their whenua.

Expanding digital connectivity to rural Aotearoa is a key enabler for more farmers to monitor, report and reduce emissions on farm

To date, as of 31 December 2021, 70,911 rural homes and businesses can access improved broadband and 983 km of rural State Highway have been provided with mobile coverage. 310 mobile towers are now live, and 70 mobile towers have had a necessary capacity update.[10]

However, many rural communities have internet connections of limited performance, and it is estimated that there are around 5,200 rural premises with no internet service at all. Further providing, or enhancing, broadband internet connectivity (in terms of coverage and performance) will benefit farmers and others working in the primary sector through:

- unlocking access to information on climate change and steps farmers can take
- supporting more farmers to adopt precision farming tools to more efficiently manage inputs, lift productivity and minimise environmental impacts. Precision agriculture tools can provide access to measurement and calculation tools for precision fertiliser application. However, uptake of these precision agriculture tools has been hindered by rural infrastructure limitations – such as lack of rural broadband and 5G accessibility
- lowering carbon emissions from vehicles. Remote internet can reduce the number of avoidable trips (eg, for health, education or business needs) and for every kilometre not travelled, carbon emissions are reduced by around 200 g
- enabling sensors, real-time monitoring, and verification of carbon management techniques such as sequestration and regenerative agricultural practices through wireless 4G and 5G network infrastructure.

Better broadband connectivity and access to online software and services will also reduce transaction costs associated with farm planning, monitoring and reporting. For any farm-level pricing system, uploading data and evidence into the reporting system will be critical. Better digital connectivity will likely help farmers reduce the time and effort needed to participate in these systems.

10 See Quarterly Connectivity Updated Q4: to 31 December 2021. Retrieved from https://www.mbie.govt.nz/dmsdocument/19698-quarterly-connectivity-update-q4-to-31-december-2021 (accessed 27 April 2022).

Action 13.3.3: Improve rural digital connectivity to improve farm efficiency and access to information and online tools to reduce emissions

Improved rural access to information and online tools can support uptake of new emissions mitigations technologies.

Key initiatives

- The Government is working to improve rural digital connectivity, including improved access to broadband and mobile phone coverage. A two-year Rural Capacity Upgrade programme commenced in early 2022. This aims to reduce congestion and improve network performance for around 47,000 rural users.
- The Government is developing a more strategic, integrated and long-term approach to guide the Government's investment in telecommunications infrastructure, including meeting the needs of rural and remote communities.

Focus area 4: Transition to lower-emissions land use and systems

As identified in the *Fit for a Better World* roadmap, the Government and industry will assist producers in a transition to a more circular and low-emissions economy, integrating the ki uta ki tai (from the mountains to the sea) principle into sustainable land management.

Over the course of the first emissions budget, the Government will continue to fund initiatives that support a more sustainable, productive and inclusive primary sector. The Government will explore opportunities for the state-owned Landcorp Farming Limited (trading as Pāmu) to lead in this area.

Invest in the sustainable food and fibre future

The Government will continue to invest around NZ$40 million per annum via the Sustainable Food and Fibre Futures co-investment fund, with a number of initiatives expected to have a focus on sustainability.

As an example, in 2022 the Government will invest in prototyping spatial integrated farm plan – a mapping tool to support farm plans that include environmental and greenhouse gas reduction considerations as well as farm productivity.

Build knowledge on regenerative agriculture

More research is needed to understand and measure the potential environmental benefits of regenerative agriculture – a nature-based solution – in Aotearoa New Zealand's specific context – including how such practices can contribute to our 2050 targets.

Regenerative agriculture practices aim to increase soil carbon, improve soil health and contribute to improved freshwater quality, reduce the climate footprint of food systems and enhance biodiversity.

Action 13.4.1: Build the evidence base for regenerative agriculture

A Technical Advisory Group for regenerative agriculture was established by the Ministry for Primary Industries in September 2020. Its purpose is to help establish an evidence base for regenerative farming and horticultural practices. The Sustainable Food and Fibre Futures fund is investing in projects to test and validate regenerative agriculture practices.

Action 13.4.2: Reduce the emissions of our largest farmer – Pāmu

The Government will work with Aotearoa New Zealand's largest farmer, the state-owned enterprise Landcorp Farming Limited (trading as Pāmu), to investigate options to further reduce its gross emissions beyond current plans.

This work will consider opportunities for Pāmu to demonstrate sector leadership by accelerating on-farm emissions reductions while continuing to fulfil its principle objective of operating as a successful business over the long-term.

Pāmu manages 110 farms over 364,000 hectares, which in financial year 2021 contributed 0.75 Mt CO_2-e gross annual emissions and sequestered around 0.33 Mt CO_2-e per annum, with revenue primarily coming from dairy and livestock farming.

Pāmu has already committed to achieving gross emissions reductions of four per cent per annum out to 2024 and setting longer-term science-based emissions targets for its operations.

Provide food and fibre research and development plans

Through the *Fit for a Better World* roadmap, several science and mātauranga Māori R&D plans are being developed. These aim to accelerate areas of R&D to grow and transform the food and fibre sector, while promoting lower-emissions land use and food production. Te ao Māori and mātauranga Māori are central to the development of these plans and each plan identifies R&D needs for both science and mātauranga Māori.

For example, the landscape scale decision-making accelerator will provide land stewards, rural communities and regulators with practical tools to make informed decisions about land use. This includes finding the best way to convey information that considers constraints and pressures at the individual farm level, including the requirement to reduce emissions. It also considers ancestral knowledge of the land alongside technology and science to develop diverse and sustainable landscapes.

Action 13.4.3: Develop food and fibre science and mātauranga Māori accelerators

Key initiative

- Develop science and mātauranga Māori-based research and development plans to accelerate R&D to grow and transform the food and fibre sector, while promoting lower-emissions land use and food production.

An ao Māori leadership group has been established to ensure the different needs and aspirations of whenua Māori entities are taken into account in developing the plans. This work is Māori-led and is intended to ensure the research and development areas and related key innovation initiatives under Fit for a Better World make up a connected whole from an ao Māori perspective and collectively deliver for Māori.

These actions will support work already underway to lower emissions

Sustainable finance for on-farm sustainability outcomes

The Sustainable Agriculture Finance Initiative (SAFI) was established in 2021 through The Aotearoa Circle (a public and private partnership) to accelerate further investment and support for sustainable agriculture in Aotearoa. It supports the finance sector to take into account environmental and social factors when making decisions on financial solutions, ultimately supporting better on-farm sustainability outcomes.

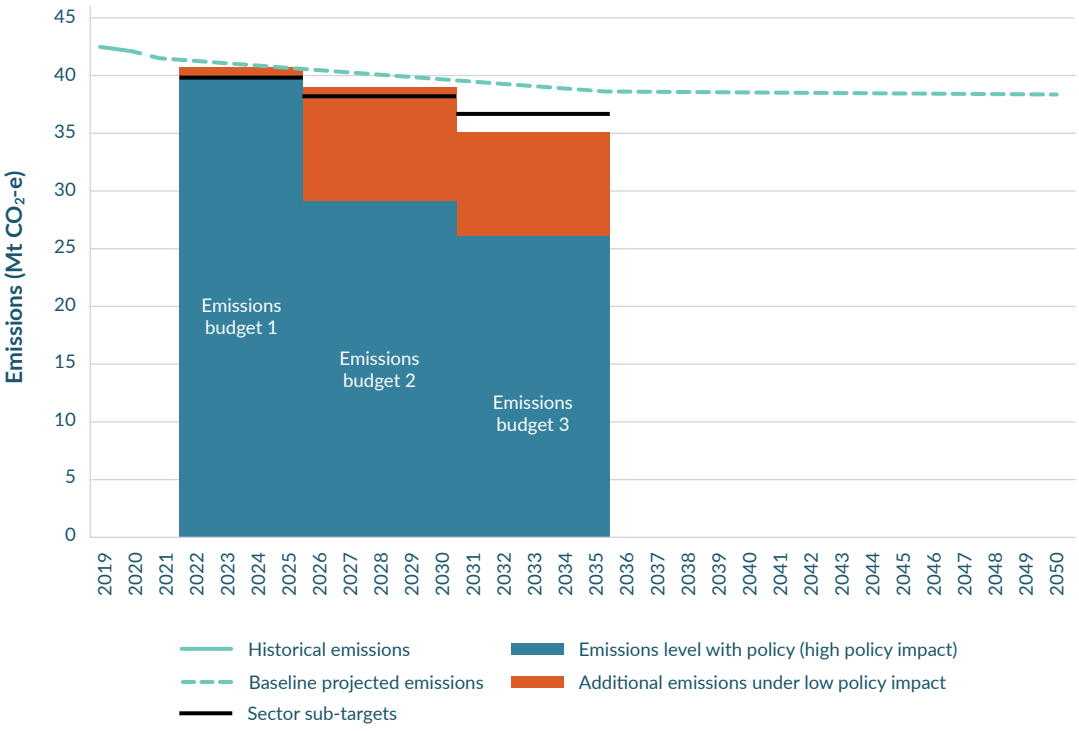
What this means for the emissions budgets

The following table sets out the sub-targets recommended by the Commission and accepted by the Government, for the agriculture sector.

Table 13.1. Sub-targets for the agriculture sector

ALL GASES, NET (AR5), EXPRESSED IN MT CO_2-E	EMISSIONS BUDGET 1 (2022–25)	EMISSIONS BUDGET 2 (2026–30) PROVISIONAL	EMISSIONS BUDGET 3 (2031–35) PROVISIONAL
Agriculture – baseline projections	163.1	199.0	194.8
Agriculture – emissions budgets sub-target	159.4	191.0	183.0
Additional emissions reductions required	3.7	8.0	11.8

Figure 13.2. Agriculture sector emissions reductions



Action now will lay the foundations for deeper cuts in emissions from the second and third emissions budgets

The actions in this plan will help us lay a strong foundation for reducing agricultural emissions. As initiatives in this chapter are developed their contribution to reducing the shortfall between agriculture's sub-target and the expected policy impacts for the first emissions budget will become clearer.

The Government's baseline emissions projections are based on current policy settings. These include the expected impacts of freshwater regulations, productivity gains, afforestation programmes, NZ ETS-driven land-use change and the new initiatives included in this chapter. They also assume agricultural processors are entered into the NZ ETS from 2025 onwards.[11] This is the legislated backstop if sufficient progress is not made on designing an alternative farm-level pricing scheme.

We need to work together to reduce emissions from agriculture

We have a big task ahead. However, reducing our agricultural emissions over the next 30 years can help us build a strong and resilient agricultural sector for the future. We need to do this together.

Local government (regional councils) will have a key role in the implementation of Essential Freshwater reforms, which includes regional councils administrating the regulatory Freshwater Farm Plans. In some cases, freshwater mitigations will have climate co-benefits, so the way local government carries out this function is an opportunity to support our climate goals.

Our **farmers and growers** have a key role to play in lowering their emissions and moving to regenerative production systems.

Aotearoa New Zealand's **innovators and processors** can build off our expertise in agriculture to help provide solutions to the world on low-emissions nutrition.

11 In this scheme, processors would report and pay for emissions produced on farm. The projections assume 95 per cent free allocation, which means processors would only initially have to pay for 5 per cent of reported emissions.

We need to consider climate change resilience as we reduce emissions

Actions taken to reduce agricultural emissions must take the opportunity to build climate change resilience for Aotearoa producers, and not limit future options that could be progressed as part of the national adaptation plan.

- The Government's climate focused extension and advisory services have the main goal of reducing emissions but may lead to discussions regarding adaptation if emissions reduction opportunities are limited. This will be the case also if predicted climate change makes the current land use unviable, less productive, or unsafe for producers.
- The work with Māori in this chapter (particularly the Government's Māori Agribusiness Extension programme and an initiative to support the development of a Māori-led tikanga-based programme) will support the development of further adaptation and emissions-reducing actions.

CHAPTER 14:

Forestry

Forestry

Lead

MINISTER
OF FORESTRY
HON STUART NASH

DIRECTOR-GENERAL
OF THE MINISTRY FOR
PRIMARY INDUSTRIES
RAY SMITH

Contribution to our long-term vision

By 2050, Aotearoa New Zealand has a sustainable and diverse forest estate that provides a renewable resource to support our transition to a low-emissions economy. Forestry will contribute to global efforts to address climate change and emissions reductions beyond 2050, while building sustainable communities, resilient landscapes, and a legacy for future generations to thrive.

Contribution to Aotearoa New Zealand's first emissions budget (AR5)[1]

Projected contribution without the initiatives in this plan	-24.3 Mt CO_2-e
Projected average annual contribution without the initiatives in this plan	-6.1 Mt CO_2-e
Projected percentage of total gross emissions without the initiatives in this plan	-8 per cent
Estimated impact from the initiatives in this plan assuming permanent exotics are not restricted into the Permanent Post-1989 NZ ETS category	0.1 Mt CO_2-e
Estimated impact from the initiatives in this plan assuming permanent exotics are restricted into the Permanent Post-1989 NZ ETS category	-0.3 Mt CO_2-e

1 Negatives (-) represent removals of carbon dioxide from the atmosphere, while positives (+) represent emissions of carbon dioxide to the atmosphere.

Forestry

Why forestry is important

Forests store carbon from the atmosphere, helping offset other sectors' greenhouse gas emissions. Forestry and wood processing already make an important contribution to Aotearoa New Zealand's bioeconomy.[2] The actions in this emissions reduction plan will ensure forestry supports the transition to a more productive, innovative, circular and sustainable economy.

Key actions

Actions to support the role of forestry in meeting our 2050 targets focus on the following areas.

- **Support afforestation** by:
  - considering amendments to the New Zealand Emissions Trading Scheme (NZ ETS) and resource management settings to achieve the right type and scale of forests, in the right place
  - supporting landowners and others to undertake afforestation, particularly for erodible land
  - providing advisory services to land users, councils, Māori and other stakeholders to support choices for sustainable afforestation.
- **Encourage native forests** as long-term carbon sinks through reducing costs and improving incentives.
- **Maintain existing forests** by exploring options to reduce deforestation and encourage forest management practices that increase carbon stocks in pre-1990 forests.
- **Grow the forestry and wood processing** industry to deliver more value from low-carbon products, while delivering jobs for communities.

2 Bioeconomy describes the parts of the economy that use renewable biological resources to produce food, products and energy – see chapter 9: Circular economy and bioeconomy.

Our diverse forest estate supports a sustainable, thriving, low–emissions economy

Over the last century, Aotearoa New Zealand has developed a sustainable and productive forest estate and industry. This provides a renewable resource and helps to capture and store carbon.

By 2050 we need to expand, diversify and better utilise this renewable resource to support our transition to a low-emissions economy. This will contribute to global climate change efforts and emissions reductions beyond 2050, while building sustainable communities, resilient landscapes, and a legacy for future generations to thrive.

Reducing gross emissions from the sectors that make up our economy is the Government's priority – but forestry has a part to play in offsetting the emissions of sectors that cannot easily reduce or remove their emissions. It also contributes to lowering gross emissions in other sectors through providing inputs to the bioeconomy. Forestry can provide flexibility in our path to a cost-effective, timely and equitable transition.

In the Government's vision for our forests for 2050:

- forests continue to play a critical role as carbon sinks, directly offsetting emissions, and as a sustainable source of high-value, low-emissions materials, and bioenergy, which form a key part of our low-emissions economy
- forests maintain and increase native biodiversity. This provides benefits such as improved soil and water health, recreation, and cultural benefits
- wood fibre-based products from our production forests provide a substitute for high-emissions materials, and opportunities to develop high-value exports
- much of our remote, unproductive and highly erodible land is forested, providing a long-term carbon sink to offset emissions that are hard to reduce and remove
- forests and forest products support the cultural, environmental and economic aspirations of Māori, hapū and iwi
- our thriving forestry and wood processing sectors provide sustainable, rewarding jobs across the regions and accelerate decarbonisation of the economy.

Forestry provides long-term carbon sinks, supports biodiversity, and contributes to our bioeconomy and equitable transition

Forestry has a critical, ongoing role in reaching the net-zero component of Aotearoa New Zealand's 2050 target. Our forests are a productive source of renewable materials that can provide substitutes for emissions-intensive materials and fossil fuels.

By seizing the opportunity to grow the forest and wood processing industry, we can support regional economies and provide jobs that will contribute to the Government's objective for an equitable transition.

Māori are well positioned to contribute to and lead developments in forestry, both for exotic and native species. Māori own NZ$4.3 billion of assets in forestry and have ownership of more than 30 per cent of land under plantation forestry and large areas of indigenous forest.

The roughly 1.4 million hectares of Māori customary and freehold land makes up approximately 5.7 per cent of all land in Aotearoa.[3] In 2018, around 2,200 Māori were working across the forestry sector.[4]

Much Māori-owned land is landlocked and far from urban centres.[5] Options for this type of land are narrow, but it is suitable for forestry. Exotic afforestation can add to Māori-owned plantation forestry and provide economic benefits, including employment in forest management and revenue at harvest.

3 Business and Economic Research Limited (BERL) and Land Use Capability Assessments (2021). Māori economy emissions profile – Climate change mitigation impact on the Māori economy. https://www.mpi.govt.nz/dmsdocument/47929-Maori-economy-emissions-profile-Climate-change-mitigation-impact-on-the-Maori-economy (accessed 9 May 2022).

4 Reserve Bank of New Zealand. 2018. Te Ōhanga Māori – The Māori Economy 2018 Retrieved from https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Research/Te-Ohanga-Maori-Report-2018.pdf (accessed 22 April 2022).

5 Business and Economic Research Limited (BERL) and Land Use Capability Assessments (2021). Māori economy emissions profile – Climate change mitigation impact on the Māori economy. https://www.beehive.govt.nz/release/new-rules-proposed-carbon-farming-exotic-forests-future (accessed 9 May 2022).

Careful planning of the right forests, in the right place, is required to ensure the benefits of forestry and the full supply chain are realised. Different types of forests will play different roles.

- Permanent forests can provide a long-term carbon sink to help offset emissions that are the hardest to remove or reduce, alongside a wide range of other environmental benefits, including supporting indigenous biodiversity. The Government wants to encourage more native forests as permanent forests.
- We also need production forests to provide a sustainable source of biomass to make biofuels, and wood products to replace emissions-intensive products, like steel and cement in building and construction. Growing our forest products will contribute to a just, fair and inclusive transition by growing jobs in regions.

We have choices about how we grow the forestry sector to support its role in our transition. We need to do so in a way that ensures our forests are managed to get the best outcomes for Aotearoa, particularly in terms of our climate change, biodiversity, and economic goals and aspirations.

Actions to improve forestry's contribution to reducing emissions

The actions set out in this section are focused on what we can do in the next three to five years, as well as laying the foundations for achieving the 2050 vision for forestry.

What are pre-1990 and post-1989 forests?

Forest land is classified differently depending on when it was first established – pre-1990 or post-1989 forest land.

The Kyoto Protocol set 1 January 1990 as the international baseline date for net emissions. Forests established before 1990 are considered part of Aotearoa New Zealand's baseline emissions and removals. They cannot be counted as additional carbon storage in the New Zealand Emissions Trading Scheme (NZ ETS). Forests established after 1989 are considered new carbon sinks. They can be registered in the NZ ETS to earn units for that carbon storage.

Focus area 1: Support the right mix, level and location of afforestation

Strong carbon prices in the NZ ETS are proving an effective driver of afforestation, particularly exotic forests. The significant contribution that forests are playing in meeting our 2050 targets means that we can further tune our afforestation settings to deliver a broader range of outcomes.

This focus area is about supporting the right mix, level and location of afforestation to achieve the carbon removals and storage we need, and to provide wood and other sustainable bio-products, while maintaining the incentive for gross emissions reductions.

CASE STUDY

PARTNERING WITH IWI TO DEVELOP INTEGRATED FORESTRY SOLUTIONS: OTARAHANGA FOREST

The Otarahanga Forest is a 600-hectare forest established as a commercial partnership between Crown Forestry and Tūwharetoa mai Kawerau ki te Tai.

The forest is planted on land owned by Ngāti Tūwharetoa Holdings Limited, which was established to hold and manage the commercial assets arising out of the 2005 Ngāti Tūwharetoa (Bay of Plenty) Treaty Settlement.

In 2018, following a review of the farming operation, Ngāti Tūwharetoa identified the opportunity to improve the economic returns from the land, create jobs, and protect the fragile volcanic soils through a farm forestry development.

A forestry joint venture was agreed in 2018 and Crown Forestry completed planting in 2021. The farm area targeted for afforestation included undulating hills of volcanic geology unsuitable for grazing. In total, 600 hectares of production radiata pine forest has been established, with the balance of the farm retained by Ngāti Tūwharetoa Holdings Limited for farming activities as well as a significant area of native planting. The forest improves the land's overall productivity, provides alternative revenue streams, and will store around 0.4 Mt CO_2-e during its life.

Otarahanga Forest is an example of applying the right tree, in the right place, for the right purpose.

Action 14.1.1: Ensure regulatory settings deliver the right type and scale of forests, in the right place

To ensure regulatory settings deliver the right type and scale of forests, in the right place, the Government is considering changes to:

- the NZ ETS, to support a better mix of forest type, retain important productive land uses, to avoid displacing gross emissions reductions and to better manage the potential long-term environmental effects of exotic forests, including:
  - restricting exotic forests from the permanent post-1989 forest category
  - adjusting the application of accounting rules to land which is remote and/or marginal to harvest, to support production on this land.
- the National Environmental Standards for Plantation Forestry (NES-PF), to ensure environmental management of all exotic afforestation, including consulting on whether greater local control over location and forest types/species of forests is required.

Consultation on these proposals will occur during 2022. It is expected that Cabinet will decide on proposed changes in late 2022 or early 2023.

Action 14.1.2: Support landowners and others to undertake afforestation

Current and historical government grants and other support have driven afforestation which it's estimated will remove and store around 46 Mt CO_2-e over the period from 2022–35 (excluding afforestation driven by the NZ ETS).

The Government is continuing to assist landowners and others to undertake afforestation and conservation projects through:

- the One Billion Trees Fund (1BT)
- Crown Forestry joint ventures
- the Hill Country Erosion Programme
- the Erosion Control Funding Programme (ECFP).

While the 1BT programme and ECFP have closed to new funding, planting will continue for several years for grants that have already been approved.

Action 14.1.3: Enhance forestry planning and advisory services

Landowners face a future in which traditional land uses may need to adapt to a changing climate or in which better outcomes can be achieved by a transition to production or permanent forestry.

There is an opportunity to provide better planning and advisory services to support afforestation and ensure that the right forests are in the right place, for the right purpose. To achieve this, the Government will:

- better support and inform current and potential forest growers and the full forestry system by providing advisory services across the full cycle of establishing, managing and harvesting forests
- work with regional councils, tangata whenua, and other landowners to support climate change work programmes including native afforestation, land reversion and establishment of new production forests in the right location
- help understand at a regional level where forests will be grown and where harvested wood will be needed so that the forest estate, regional infrastructure and processing capacity align to support the growth of production forestry and domestic manufacturing
- provide advice on diversifying forestry regimes, including alternative species, in order to develop new types of forest crops that deliver new products or woody biomass for emerging markets (eg, bio-energy)
- build and share knowledge within the nursery sector to enable the increase in native afforestation.

There will be a focus on:

- working with councils to increase their capability and capacity to result in more informed decisions
- working with hapū, iwi and Māori landowners to integrate native and exotic forestry into land-use decisions, to best meet their aspirations.

Focus area 2: Encourage native forests as long-term carbon sinks

He Pou a Rangi – Climate Change Commission (the Commission) recommended greater investment in new and regenerating native forests to deliver a long-term carbon sink to offset emissions that are hard to reduce or remove, improve biodiversity, soil and water health, and realise recreational and cultural benefits.

Current native afforestation levels are well below the Commission's recommendations, and on current settings are projected to fall further.

There is widespread public support for native afforestation in Aotearoa. Native forests with long-lived tree species (from regeneration and new planting) absorb carbon more slowly than exotic forests. If well managed, they continue removing and storing carbon for centuries as the forest reaches maturity.

However, native forests are slower growing and have high establishment and maintenance costs due, in part, to the availability/cost of seedlings and their survival rates. This is compounded by the slower returns on carbon and lack of downstream wood industry, making the economics challenging.

The Government is considering how to encourage native, biodiverse forest, including on Māori land. This will build on the experience gained through established programmes such as Ngā Whenua Rāhui, which provides a specific mechanism for Māori landowners to protect natural values on their land, providing for generational review.

Action 14.2.1: Update NZ ETS yield tables to include indigenous species

The NZ ETS recognises and rewards the carbon stored by different forest types by using specific NZ ETS yield tables. The yield tables could better recognise and reward carbon stored by native forests, which would encourage native afforestation.

To encourage native forests as long-term carbon sinks, the Government is:

- investing in a review of the NZ ETS yield tables (carbon look up tables) to ensure their accuracy. The review will look at ways to:
  - develop more accurate indigenous yield tables
  - extend the tables beyond the current 50 years
  - recognise carbon storage resulting from particular indigenous forest management practices, promoting positive outcomes.
- exploring technologies that:
  - enable accurate measurement of carbon in specific forests
  - provide improved understanding of how current management of forest links to the long-term carbon stock.

These actions will provide an opportunity to better match the recognition of carbon to the specific actions within a forest.

Action 14.2.2: Reduce the cost of native afforestation

The Government is making an initial investment to work with the nursery sector to address the issue of cost and survivability of native tree seedlings and the need to expand production. This includes work to:

- explore and test science-based practices and technologies to support the sustainable expansion of the sector. This includes demonstrating best practice/ technology, and providing training for the native plant nursery sector
- harness technology to increase scale and lower the cost of native seedlings. This will focus on developing and demonstrating best practice in seed collection, propagation and forest management
- investigate options for additional support for early adopters in the nursery sector to gear up for higher native afforestation levels.

Action 14.2.3: Encourage greater levels of native afforestation over the long term

To encourage greater levels of native afforestation over the long term, over the next two years the Government will:

- investigate options to lower costs, address supply chain barriers and improve the successful establishment of native forests
- engage stakeholders on a longer-term strategy and action plan
- undertake research to protect/enhance stored carbon in existing native forests
- support Māori-led approaches to native forest establishment
- establish a cross-agency group to improve demand signals to nurseries, to ensure seedling supply.

Focus area 3: Maintain existing forests

Our native forests are significant carbon stores. They are estimated to hold about 1.8 billion tonnes of carbon in their biomass.[6]

Despite a range of policies designed to restrict deforestation of pre-1990 forest, deforestation still occurs at low levels. It was estimated that around 750 hectares of the 7.8 million hectares of pre-1990 native forest lands were deforested in 2019.[7] This resulted in around 308,460 tonnes of CO_2 emissions.

In addition, native forests experience significant browsing pressure from introduced mammals, leading to a decline in carbon stocks.

There is evidence that some forest management activities can increase carbon removal and storage and protect carbon stocks in the long term, particularly in regenerating forest and successional vegetation. However, pre-1990 forests cannot earn credits in the NZ ETS for the additional carbon stored. There is therefore little incentive to manage forests to increase carbon stocks.

Pre-1990 exotic forests are primarily managed to produce sustainable timber and wood products. While the estate holds large amounts of carbon, this amount tends to fluctuate as the estate is harvested and then the replanted forests grow. Pre-1990 exotic forests only interact with the NZ ETS if they are deforested. Recognising additional carbon stored in pre-1990 forests could also help address historical disadvantages faced by Māori landowners.

6 Ministry for the Environment. 2021. New Zealand's Greenhouse Gas Inventory 1990–2019, at p. 260. Retrieved from https://environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-1990-2019/ (accessed 22 April 2022).

7 Of these 750 deforested hectares, around 401 hectares were regenerating and 349 hectares were tall forest.

The actions set out below address how the Government intends to help maintain our existing forests and improve their contribution to carbon removal and storage.

Action 14.3.1: Explore measures to reduce deforestation of pre–1990 native forests

The Government will:

- continue to monitor the deforestation of pre-1990 native forests
- explore how to address the Commission's recommendation to improve and enforce measures to reduce deforestation balanced with the scale of the issue, the need for additional measures, and the need to avoid unintended consequences.

Action 14.3.2: Maintain and increase carbon stocks in pre–1990 forests

To maintain and increase carbon stocks in pre-1990 forests, the Government will:

- research and investigate which forest management activities will increase carbon storage in pre-1990 forests
- consider opportunities to incentivise and encourage those management activities, including mechanisms to enable the recognition of additional carbon storage for pre-1990 forests.

Focus area 4: Grow the forestry and wood processing industry to deliver more value from low-carbon products

Aotearoa New Zealand's forestry estate is a vital strategic asset. It provides significant potential to further reduce emissions by replacing emissions-intensive materials and fossil fuels with domestically manufactured wood products and wood-derived biomaterials, biochemicals and bioenergy, such as biofuels (also see chapter 9: Circular economy and bioeconomy).

Long-lived wood products, such as engineered wood products, are a viable substitute for emissions-intensive materials such as concrete and steel, and store carbon for many decades. The residues from timber processing and harvesting skid sites can be used to generate solid heat energy and produce biofuels, displacing carbon intense fossil fuels, like coal. There is economic potential to make more of the environmental properties of our wood fibre, with opportunities emerging from specialist chemicals through to biopharmaceuticals.

Maximising the contribution of the sector to the Government's climate change and wider economic development objectives – including growing jobs in the regions and supporting growth in the bioeconomy – will require strategic management of our current forestry assets. This includes ensuring the right forests are grown to meet future needs, increasing the amount of wood processed onshore, and developing new export markets and domestic demand for wood products.

Action 14.4.1: Develop forestry and wood processing industry transformation plan (ITP)

The forestry and wood processing industry transformation plan (ITP) is being developed in partnership with Māori, industry, and workers to deliver more value from our existing and future forest estate, stimulate production of new cost-effective low-emissions products and wood-based biofuels and provide sustainable jobs across the regions. It will:

- set out a cohesive set of actions to transform the forestry sector, grow the domestic wood processing industry and get more value from our logs
- consider options to attract investment in the production of low-emissions wood products and biofuels, including how forests can provide a more consistent supply of wood fibre
- provide a transformation roadmap to lift value from the forestry and wood processing sector while delivering for communities and our climate change goals
- identify specific actions to:
  - increase wood processing and accelerate the bioeconomy
  - lift productivity and resilience across the forestry and wood processing supply chain
  - scale up internationally competitive wood-processing clusters
  - support increased use of wood in construction and improve export outcomes.

The draft of the ITP will be released for public consultation in 2022.

Action 14.4.2: Invest in expanding supply of woody biomass

To secure sufficient supply of woody biomass to fuel the bioeconomy, the Government will investigate options to:

- work with landowners to increase planting of commercial forest crops to replace coal process heat and/or as input to biofuels and biomaterials
- undertake research to support cost effective recovery of harvest residues to supply biomass
- undertake operational research to support species selection and forest management of short rotation crops.

Action 14.4.3: Develop policies that support Māori to meet their aspirations

The Government is working with Māori groups, including forestry experts, to identify priorities for Māori. The aim is to develop and implement forestry policies that support Māori rights to exercise kaitiakitanga and rangatiratanga and meet Māori aspirations.

CASE STUDY

SUPPORTING MĀORI LAND USE ASPIRATIONS: WHENUA OHO (AWAKEN THE LAND)

Whenua Oho is a three-year initiative funded in 2020 by the One Billion Trees Fund to assist Māori landowners to achieve their aspirations for their land. Whenua Oho means "awaken the land". It provides a trusted and independent entity with subject matter experts in forestry, tikanga and iwi issues.

The initiative aims to increase Māori participation in the forestry sector – including both exotic and indigenous forestry. Māori experts provide education, assistance and connections, empowering Māori landowners with information and partners who can best help them with decisions for their land and their aspirations.

The services of Whenua Oho have resulted in land management decisions being made by Māori landowners which contribute to both iwi and emissions reductions goals, including tree planting, carbon removals and storage, and erosion prevention on vulnerable land.

As well as working with Māori landowners, Whenua Oho has created a network of relevant government agencies to provide assistance, removing some of the barriers Māori face when engaging with government agencies. Whenua Oho has also created a suite of like-minded investment-ready partners to provide capital and resources for ventures, including planting. By December 2021, planting of around 2,000 hectares was planned, as part of investments of more than NZ$10 million.

What this means for the emissions budgets

Aotearoa has a sustainable and diverse forest estate, which is already playing a critical role in meeting our international commitments and achieving net-zero long-lived emissions by 2050. Growing the estate and making it more diverse will ensure that forestry continues to play this vital role.

Across all emissions budget periods our forestry[8] baseline projections are estimated to deliver around 144.5 Mt CO_2-e in carbon removals and storage. Our forests will provide significant mitigation for other sectors, before proposed policies and measures deliver gross emissions reductions in those sectors and the wider economy in the third emissions budget.[9]

Table 14.1. Baseline projections for forestry

	FIRST EMISSIONS BUDGET (2022–25)	SECOND EMISSIONS BUDGET (2026–30)	THIRD EMISSIONS BUDGET (2031–35)
Forestry baseline removals	(24.3 Mt CO_2-e)	(49.6 Mt CO_2-e)	(70.6 Mt CO_2-e)
Forestry total estimated removals and assuming permanent forests are not restricted into the PP89 NZ ETS category	(24.2 Mt CO_2-e)	(55.8 Mt CO_2-e)	(119.1 Mt CO_2-e)
Forestry total estimated removals and assuming permanent forests are restricted into the PP89 NZ ETS category	(24.6 Mt CO_2-e)	(52.4 Mt CO_2-e)	(77.7 Mt CO_2-e)

Table 14.1 shows the baseline projections calculated in June 2021, and the estimated impact of policy proposals and actions included in this chapter.

8 Emissions budgets include sequestration from post-1989 forest until the long-term average carbon stock only and all forest deforestation. For production forests, the long-term average carbon stock represents the average amount of carbon sequestered over harvesting and replanting cycles. For permanent forests this represents carbon sequestered at maturity.

9 Emissions budgets are based on June 2021 projections and reflect policies and measures at that time.

In June 2021, the Government updated its baseline projections for forestry, after the Commission delivered its final advice in May 2021. These projections are based on policy settings at that time and use the results of the 2020 Afforestation and Deforestation Intentions Report,[10] New Zealand's Greenhouse Gas Inventory and other completed research and evidence to projected future emissions and removals from forestry.

The level of carbon removal and storage from forests in the Commission's demonstration pathway falls within the range the Government has projected for each of the three budget periods. Continued new forest planting over the coming decades and the prevention of deforestation is needed to continue on the trajectory for meeting emission budgets.

We need to work together to fine-tune the role that forestry plays in reducing our emissions

We need to work together to make sure we are using our forestry sector to its full potential – to offset those emissions that are hard to reduce, and to replace high-emissions products with biomaterials and biofuels.

Local government has a role to play both as regulators and land users in implementing national direction to make sure the right trees are planted in the right place, for the right purpose. Councils can facilitate the use of forests in adapting to the risks of climate change by encouraging the use of marginal land for forestry where that will mitigate the impacts of extreme weather events. They can also encourage production forestry to provide biofuels and materials (see chapter 9: Circular economy and bioeconomy).

Consultation is underway on whether greater local control over location and types/species of new forests is required. The outcome of that consultation may change the role of councils in influencing the location of forests.

The private sector has a key role in planting, maintaining and funding forests. Businesses and innovators are key to seizing the opportunities from the bioeconomy as the world moves away from fossil fuel products to bio-based materials, fuels, chemicals and products.

10 Ministry for Primary Industries. July 2021. Afforestation and Deforestation Intentions Survey 2020 Final Report. MPI Technical Paper No: 2021/14. Prepared for MPI by Professor Bruce Manley, School of Forestry, University of Canterbury. Retrieved from https://www.mpi.govt.nz/dmsdocument/46564-Afforestation-and-Deforestation-Intentions-Survey-2020 (accessed 22 April 2022).

Helping the forestry sector adapt to the effects of climate change

The National Climate Change Risk Assessment identifies risks and opportunities to forestry from a changing climate. Increasing temperatures and shifts in seasonality and rainfall patterns will drive changes in tree growth and forest maturation, as well as increase risks from pests and disease, wildfires and severe weather.

This will directly impact on forest productivity, carbon removal and storage, and the ecosystem services our forests provide. These factors may influence efforts to increase afforestation and maintain permanent carbon sinks.

The Government and industry will need to consider timescales of decades for plantation forests or longer for permanent forests – as well as the ability of tree species and forest ecosystems to adapt to potential changes in climate over these timescales. A forest established today will reach maturity in a climate that is quite different. The impacts on tree growth rates, and the associated impacts on carbon removal and storage, will likely vary around the country.

Wildfire risk is predicted to increase with a climate that is projected to become drier. Some forest types may amplify this risk by providing fuel for these fires (noting that most forest fires start from non-forest sources). Addressing these risks will require well-considered adaptation preparation and fire risk management (see action 14.5 below).

There are also opportunities our forests can provide us in adapting to a changing climate. Forests and trees can improve the resilience of production systems and communities by reducing erosion, landslips, and peak flooding, and offering shade for stock.

The Government is committed to ensuring that innovation, investment, policies, and planning controls enable these opportunities for future climate changes

Policies and measures will be reflected in Aotearoa New Zealand's national adaptation plan, to be released in late 2022.

Action 14.5: Improve fire management planning

To increase awareness of forest fire risk and improve planning for fire management, the Government will:

- consult later in 2022 on options to require fire management plans for all exotic forests over one hectare.

CHAPTER 15:

Waste

Waste

Lead

MINISTER FOR
THE ENVIRONMENT
HON DAVID PARKER

SECRETARY FOR
THE ENVIRONMENT
VICKY ROBERTSON

Contribution to our long-term vision

By 2050, Aotearoa has a circular economy that keeps materials in use for as long as possible.

The waste sector has contributed to the 2030 and 2050 targets for biogenic methane, and achieved a 40 per cent reduction by 2035 (relative to 2017 levels). The sector has also met successive sub-sector targets.[1]

Contribution to Aotearoa New Zealand's greenhouse gas emissions (AR5) in the first emissions budget period

Projected emissions without the initiatives in this plan	14.2 Mt CO_2-e
Projected average annual emissions without the initiatives in this plan	3.5 Mt CO_2-e
Projected percentage of total gross emissions without the initiatives in this plan	4 per cent
Estimated emissions reduction from the initiatives in this plan	0.2 to 0.4 Mt CO_2-e

1 The Government has also committed to a waste sector sub-target of 13.7 Mt CO_2-e over the first emissions budget period (2022–25). For more information, see chapter 1: Playing our part.

Waste

Why waste is important

In 2019, 94 per cent of waste emissions were biogenic methane – largely generated by the decomposition of organic waste (such as, food, garden, wood and paper waste).[2] While waste contributes a small percentage of our total emissions, biogenic methane has a warming effect 28 times greater than carbon dioxide.[3]

Taking steps to reduce, recycle and recover greater volumes of organic waste – and improve services and infrastructure – will also create opportunities. These steps will support the shift to a circular economy, create new employment and business opportunities, improve the ability to dispose of waste responsibly, and generate cost savings for households and businesses.

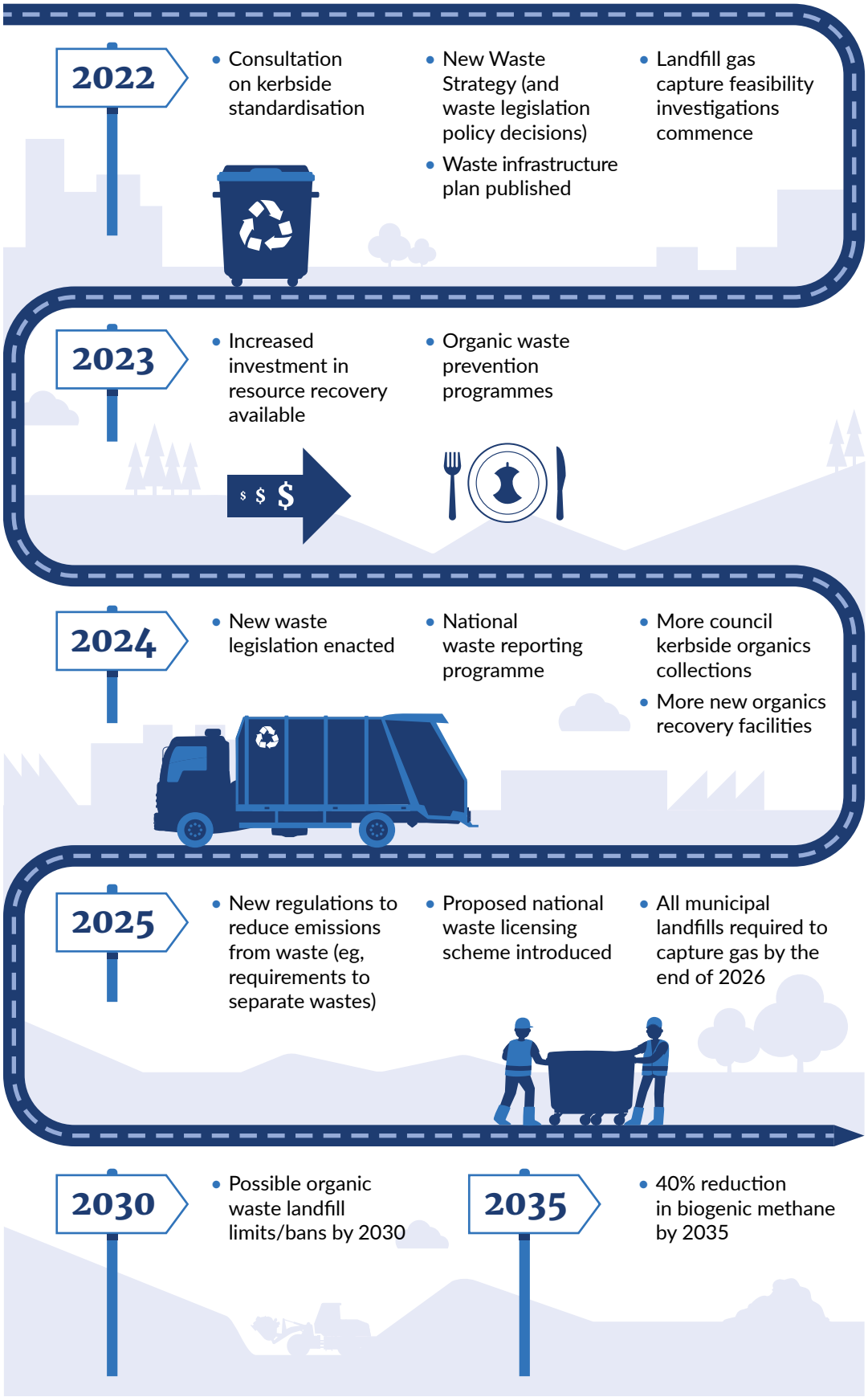
Key actions

- Enable households and businesses to reduce organic waste.
  - Encourage behaviour to prevent waste at home.
  - Enable businesses to reduce food waste.
  - Support participation in improved kerbside collections.
- Increase the amount of organic waste diverted from landfill.
  - Improve household kerbside collections of food scraps and garden waste.
  - Invest in organic waste processing and resource recovery infrastructure.
  - Require the separation of organic waste.
- Reduce and divert construction and demolition waste to beneficial uses.
  - Support the building and construction sector to minimise waste through research and improved capability.
  - Invest in sorting and processing infrastructure for construction and demolition materials.
  - Enable the separation of construction and demolition materials.
- Explore bans or limits to divert more organic waste from landfill.
  - Investigate banning organic waste from landfill by 2030.
- Increase the capture of gas from municipal landfills.
  - Regulations will require landfill gas capture at municipal (Class 1) landfills.
  - Feasibility studies will determine the need for additional landfill gas capture requirements.
- Improve waste data and prioritise a national waste licensing scheme.
  - Develop a national waste licensing scheme.
  - Improve information on greenhouse gas emissions from waste disposal.

2 In 2019, the main sources of waste emissions were from the organic waste that is part of solid waste disposal (82 per cent), followed by wastewater treatment (11 per cent), incineration and open burning (5 per cent), and biological treatment of solid waste (compost) (2 per cent). These figures are based on the latest greenhouse gas inventory adjusted to AR5 terms.

3 This statement is based on information in the Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change, completed in 2014. Retrieved from https://www.ipcc.ch/assessment-report/ar5/ (21 April 2022).

Figure 15.1. Waste pathway to 2035



Targeting waste emissions will support the shift to a circular economy

While waste contributes a comparatively small share of emissions, our path to a low-emissions future will support bigger shifts and yield multiple benefits – including enabling emissions reductions in other sectors.

We are working towards an Aotearoa where we waste less. This means making waste is avoided, and discarded organic materials – such as food and garden waste, paper and cardboard, and timber – are used as resources in a circular economy.

In this future, emissions from waste are minimised, captured and – wherever possible – used for beneficial purposes (eg, biogenic methane from landfills is used to generate electricity).

Changing the way we think about waste, alongside improving our services and waste infrastructure, will enable communities and businesses to build resilience. There are also economic opportunities for businesses and communities from more efficient use of materials that also reduce waste.

We need to reduce our biogenic methane emissions from waste

In 2019, waste was responsible for 4 per cent of our total gross emissions. Of these emissions, 94 per cent were biogenic methane generated by the decomposition of organic materials at landfill.[4]

While agriculture contributes the bulk of our biogenic methane emissions (91 per cent), waste has a role to play in meeting the 2030 and 2050 targets for biogenic methane.[5]

4 The remaining emissions were nitrous oxide (4 per cent) and carbon dioxide (2 per cent).

5 In 2019, the agriculture sector contributed around 91 per cent of our total biogenic methane. The remaining 9 per cent came from the waste sector.

Strategic changes will support emissions reductions

Wide-ranging changes to the strategic framework for waste will set goals and priorities for the next 10, 20 and 30 years, guide investment, and enable systemic shifts.

- **A new New Zealand Waste Strategy (Waste Strategy) will be published in 2022** – The Ministry for the Environment is currently developing a new strategy to address waste in Aotearoa. This will take a broader approach that goes beyond emissions reductions. It will ensure that waste is minimised and that organic and inorganic materials are recovered and available for reuse in a more circular, low-emissions economy. It will also include principles to ensure that changes are delivered in an equitable way.[6]
- **A new infrastructure plan will guide investment from 2022** – An infrastructure plan will sit alongside the Waste Strategy. This will guide investment into resource recovery and other waste minimisation infrastructure over a 10-year period.
- **We are updating Aotearoa New Zealand's waste legislation** – New legislation will be developed to replace the Waste Minimisation Act 2008 and Litter Act 1979. This legislation will create new powers to support delivery of the Waste Strategy and this emissions reduction plan. Additional regulatory tools will help achieve emissions reduction goals. The updated legislation is likely to be enacted in 2024.

The Government already has initiatives underway to reduce waste and emissions, including changes to the waste disposal levy, new regulated product stewardship schemes,[7] and the Waste Minimisation Fund. For more information on the Government's broader approach to waste minimisation, see the waste reduction work programme.

6 These principles – which also underpin actions to reduce emissions from waste – include (a) recognising the perspectives of local communities, businesses, hapū, iwi and whānau; (b) considering who bears the cost of change and addressing inequity; (c) developing and investing to create opportunities and build resilience; and (d) identifying and fixing problems now to avoid an unfair burden on future generations.

7 Six product groups were declared a priority in July 2020, including synthetic greenhouse gases (see chapter 16: Fluorinated gases) and electrical and electronic products (which includes large batteries, such as those used in electric vehicles).

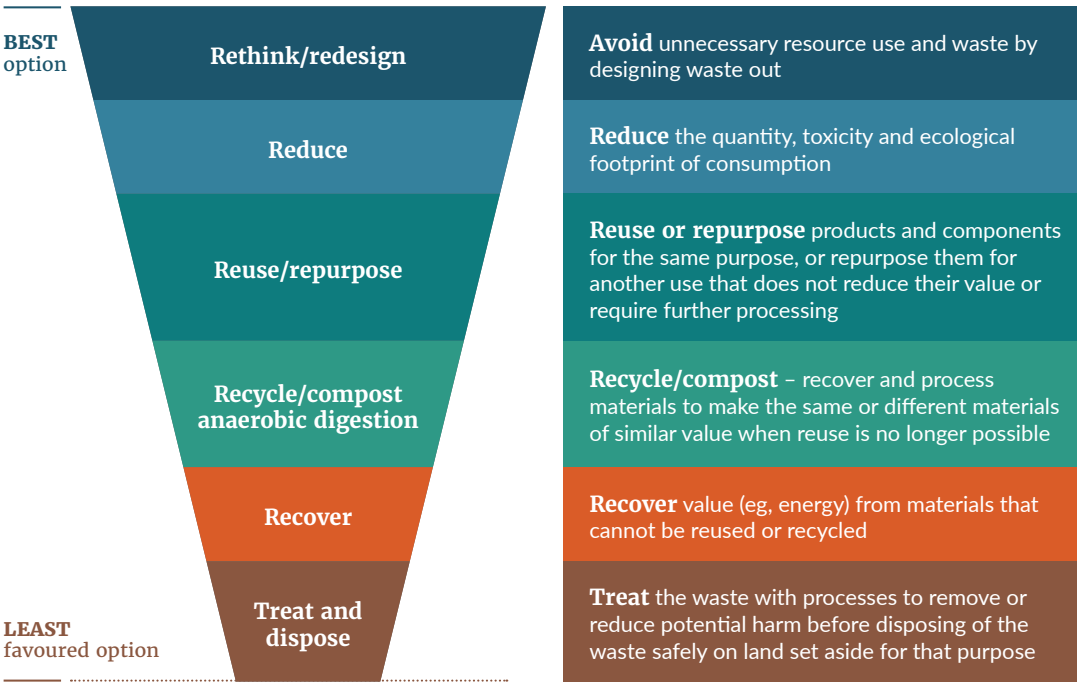
Efforts to reduce waste emissions must focus on organic waste

To reduce waste emissions, we need to focus on organic waste. This includes anything that contains degradable organic carbon – for example, materials like food and garden waste, paper, cardboard and timber.[8]

Our plans to reduce emissions fall into broad categories of the waste hierarchy:

- avoid and reduce – minimise the amount of organic waste we produce (see Chapter 9: Circular economy and bioeconomy)
- recycle – divert organic waste to beneficial uses so that it is not sent to landfill
- recover – reduce emissions from organic waste when it does end up in a landfill – capture biogenic methane emissions for energy.

Figure 15.2. Waste hierarchy



8 Future emissions reduction plans may have a broader focus. For example, they may include initiatives to address emissions from farm fills and/or wastewater.

In several areas, actions will be informed by further consultation with local government, sector stakeholders, communities and – importantly – with Māori.

As new waste reduction policies and programmes are developed, the protection of Papatūānuku needs to be paramount. This means engaging with Māori to identify, understand and respond to Māori rights, interests and aspirations. For example, this will involve:

- considering whether a location is of significance to iwi and hapū when establishing waste resource recovery facilities
- understanding tikanga and kawa when considering where different types of compost products are applied
- working with Māori to ensure that the impacts of policy and legislative proposals are understood and addressed.

Focus area 1: Enable households and businesses to reduce organic waste

Preventing organic waste has multiple benefits. It avoids emissions associated with the disposal of food and garden waste, and saves upstream emissions across the supply chain – from the production of food through to its consumption. For households and businesses, small changes can result in multiple benefits, including cost savings.[9]

Action 15.1.1: Encourage behaviour to prevent waste at home

Households can prevent and reduce food and garden waste in several ways. Small changes can have an impact – for example, food waste can be reduced through meal planning, food preparation and storage. In the garden, green waste can be reduced through low-cost, home-based solutions (eg, composting, planting and mowing techniques).

Key initiative

- Support national programmes to help households prevent and reduce food waste and, where possible, garden waste.

9 Reducing organic waste can lead to significant co-benefits. For example, households could save an average of NZ$644 a year by throwing away less edible food (see Love Food Hate Waste. 2021. Don't let food go to waste – retrieved https://lovefoodhatewaste.co.nz/food-waste/ (accessed 22 April 2022)). Restaurants and cafes may also see reduced costs by, for example, using better stock management or storage, using non-traditional parts of ingredients and reducing plate waste.

Action 15.1.2: Enable businesses to reduce food waste

Businesses can take steps to prevent food waste, save money[10] and support manufacturing, retail and hospitality sectors across the food supply chain.

Key initiatives

- Develop programmes to drive business practices that prevent food waste, including by encouraging businesses to engage in voluntary agreements to reduce food waste. These programmes are planned to start in 2023.
- Continue to investigate the production and consumption of food waste as a symptom of the failure of wider food systems. This reflects the Ministry for the Environment's priority on sustainable and resilient land use and food systems.

Action 15.1.3: Support participation in improved kerbside collections

Providing the services and infrastructure for kerbside organic collections makes it easier for households to manage their organic waste in a responsible way. However, the success of these collections relies on households using them correctly.

Key initiative

- Provide support and education to households for better use of kerbside organic collections. Potential improvements to kerbside collections across the country will be consulted on from March to May 2022.

10 One study from the United Kingdom found that "for every $1 (or other relevant currency) invested in food loss and waste reduction, the median company site realized a $14 return". The business case for reducing food loss and waste: A report on behalf of Champions 12.3. March 2017. Report prepared by Craig Hanson (Global Director of Food, Forests, and Water at World Resources Institute) and Peter Mitchell (Head of Economics at Waste & Resources Action Programme). Retrieved from https://champions123.org/sites/default/files/2020-08/business-case-for-reducing-food-loss-and-waste.pdf (accessed 22 April 2022).

Focus area 2: Increase the amount of organic waste diverted from landfill

Organic material – such as food or garden waste – does not need to go to landfill. Instead, it can be used for other purposes. For example, food waste can be turned into compost (or other soil amendment products), used as stock food or used to generate energy through anaerobic digestion. Other edible food waste can be donated to food rescue groups.

This diversion has wide-ranging benefits, including job creation for the circular economy.[11] It can:

- significantly reduce emissions and reduce landfill disposal costs for households and businesses
- give communities more options for disposing of waste responsibly
- increase donations to food rescue and other community-led programmes, increasing food security.[12]

Reuse, redistribution, recycling and recovery can all result in a range of social, economic and environmental benefits. The relative benefits need to be carefully assessed when determining how best to divert organic waste.

To ensure that the shift to greater resource recovery is equitable, the Government will also continue to engage with the resource recovery sector to encourage training and skills development. The following actions can help to address inequity by supporting infrastructure development for organic waste diversion in areas less well serviced.

11 Transforming our waste and resource recovery infrastructure is likely to have a positive effect on the workforce overall. Studies show that – on average – for every five jobs in landfilling, 15 to 20 jobs could be created in resource recovery. See Ministry for the Environment, 2019. Reducing waste: a more effective landfill levy consultation document. Retrieved from https://environment.govt.nz/assets/Publications/Files/reducing-waste-a-more-effective-landfill-levy-consultation-document.pdf (accessed 22 April 2022).

12 In New Zealand, food rescue organisations redistribute around 8,000 tonnes of food each year.

CASE STUDY

HAMILTON CITY COUNCIL: KERBSIDE COLLECTION OF FOOD SCRAPS

By 2024, Hamilton City Council aims to achieve a 10 per cent reduction in the amount of waste each person sends to landfill. This goal – established in 2017 – is part of the council's Waste Minimisation and Management Plan.

Food scraps made up more than a third of household waste collected at the kerbside. To divert this organic waste from landfill, the council rolled out a city-wide, rates-funded 'Para Kai' kerbside collection of household food scraps. The weekly collection began in 2020 and is serviced by a fleet of specialised collection trucks, half of which are electric.

Food scraps are taken to the Hampton Downs composting plant, mixed with garden waste collected from residential drop-off points, and processed over 12 weeks to produce compost.

The compost is sold to commercial businesses, used for community projects, and residents can buy it for use in their gardens.

So far, over half of eligible properties have been using the food waste service. In just over a year, some 8,073 tonnes of food waste have been diverted from landfills.

Action 15.2.1: Improve household kerbside collection of food and garden waste

Kerbside collections for food and garden waste services, as well as home and community composting programmes, enable New Zealanders to manage their organic waste responsibly, rather than sending it to landfill.

While many councils offer home composting programmes for households and a growing number offer separate kerbisde collections for food and/or garden waste, the availability of these services varies from district to district.

Key initiatives

- Introduce enabling regulation to standardise and improve kerbside collections – by requiring household kerbside food scraps collections and accelerating complementary organics processing infrastructure investment – as part of improving household kerbside collections nationwide. Options for diverting more garden waste will also be considered, including combined collections or separate opt-in collections for garden waste. Consultation on detailed proposals is taking place March to May 2022 and includes proposals for improving the collection of paper and cardboard.
- Engage with local government to support implementation of kerbside food scraps collections.

Action 15.2.2: Invest in organic waste processing and resource recovery infrastructure

The collection of organic waste – such as food and garden waste, paper, cardboard and wood waste – must be supported by appropriate processing and resource recovery infrastructure.

Improving the recovery and diversion of organic waste in Aotearoa will require new infrastructure and upgrades to existing infrastructure (eg, transfer stations). This infrastructure will support our move to a more circular economy, in which less organic waste enters landfills – and more inorganic resources are recovered (eg, metals, plastics and glass).

Key initiatives

- Prioritise improvements to our resource recovery infrastructure and emissions reductions through the new Waste Strategy. This will be complemented by the long-term Waste Infrastructure Plan, which will guide planning and investment in resource recovery infrastructure across Aotearoa.
- Invest in processing and recovery of food and garden waste (such as composting facilities), and paper and cardboard recovery and recycling (such as transfer stations upgrades) via a targeted resource recovery infrastructure fund. This will build on previous resource recovery investment by the Government's Waste Minimisation Fund.

Action 15.2.3: Require the separation of organic waste

Business food scrap collections are only available in some parts of the country. Where they do exist, there are several barriers that stop businesses using them. These can include higher costs, less convenience, and the need for property owners or body corporates to agree. A lack of services is often due to a lack of nearby processing facilities.

Requiring businesses to separate food scraps would encourage more providers and processors to enter the market. It could also motivate businesses to look for ways to reduce food waste in their general rubbish, including by donating to food rescue organisations.

Key initiatives

- Investigate whether to require businesses to separate food waste for collection. Consultation is taking place from March to May 2022, with decisions expected later in 2022.
- Investigate whether to require paper, cardboard (and/or glass) to be collected separately from other recyclables. Consultation is taking place from March to May 2022. If introduced, a separate collection could decrease the amount of paper, cardboard and glass that ends up in landfill.
- Once appropriate collections are in place, explore whether regulations should be introduced to require businesses, households and transfer stations to separate out organic materials for recovery – including cardboard and paper waste. Enabling powers to allow for future changes are being explored as part of the development of the new waste legislation.

Focus area 3: Reduce and divert construction and demolition waste to beneficial uses

Organic materials – including treated timber, untreated timber and other composite products – are used extensively in our construction sector. With residential and commercial development on the rise, this brings an increase in construction and demolition (C&D) waste. Growth in construction activities and material costs provides an incentive to reduce, reuse and recycle key materials.

We need to increase the recovery and reuse of these C&D materials, rather than disposing of them to landfill, where they can generate greenhouse gas emissions. This will be done through additional research, sector support, investment in resource recovery processing infrastructure and consideration of future regulation for waste separation.

CASE STUDY

GREEN GORILLA: DEMOLISHING AUCKLAND'S INDUSTRIAL WASTE STREAM

C&D material is the largest source of waste going to municipal landfills. In Auckland, nearly 570,000 tonnes of C&D waste goes to landfill each year. A Kiwi-owned company, Green Gorilla, is tackling this significant waste stream. To do this, they have received over NZ$5 million in financial support from the Waste Minimisation Fund.

Green Gorilla process about 6,000 tonnes of C&D waste each month in their custom-built waste processing facility in Onehunga, which opened in 2012. Around 75 per cent of the C&D materials Green Gorilla processes are diverted from Auckland landfills for recycling on-site or supplied to other organisations for recycling or reuse.

Waste timber is a large component of the C&D waste received (20 to 30 per cent) and contributes to greenhouse gas emissions in landfills. Green Gorilla diverts treated and non-treated timber by separating it out and processing it into products such as biofuel, landscaping wood chip, and animal bedding. Green Gorilla also collects and processes steel, paper and gypsum.

Over time, an increase in green building techniques in the construction industry and efforts to design out waste will reduce C&D waste. In the meantime, the construction industry continues to produce vast amounts of materials that can be readily recycled and diverted.

Action 15.3.1: Support the building and construction sector to minimise waste through research and improved capability

Greater quantities of C&D waste – including wood waste – could be diverted from landfill.

Wood waste is a mixture of products from the construction industry. Untreated timber, when identifiable, can be more easily reused (native timber in particular) or used as a feedstock for fuel production. Treated timber, on the other hand, forms a large proportion of C&D waste and is more difficult to manage.[13]

Key initiative

- Scope measures to accelerate the reduction and diversion of construction and demolition waste, including:
  - further research into cost-effective and safe solutions, such as alternative woods or treatments, low-waste design, clearer labelling, and genuinely sustainable end-of-life solutions
  - training programmes to build capability, design out building waste and support the shift from demolition to deconstruction.
- This work is being scoped by the Ministry for the Environment in collaboration with the Ministry of Business, Innovation and Employment's Building for Climate Change programme.

13 It is possible to burn or otherwise process treated wood for energy. Yet doing so remains a challenge, as there are risks that extremely harmful toxins (such as arsenic) may be emitted and/or concentrated into hard-to-manage hazardous waste streams if treated wood is not appropriately managed.

Action 15.3.2: Invest in sorting and processing infrastructure for construction and demolition waste

Diverting and recovering greater volumes of construction materials could generate savings and emissions reductions in other parts of the economy. For example, separating out organic material streams, such as timber, could also facilitate the separation of inorganic materials (such as concrete and steel). By increasingly recovering and reusing these materials, we could reduce the need to produce and use new materials, and avoid associated emissions.

Key initiatives

- Prioritise improvements to our resource recovery infrastructure and emissions reductions through the new Waste Strategy and complementary long-term Waste Infrastructure Plan.
- Increase support for resource recovery infrastructure through:
  - the expansion of the waste disposal levy to construction and demolition landfills (Class 2). This will act as a price signal to foster resource recovery from mid 2022
  - the Waste Minimisation Fund (which identified C&D waste as a strategic outcome and investment signal in 2021)
  - a targeted resource recovery infrastructure fund, providing co-investment in sorting and processing infrastructure for C&D waste, targeting wood waste.

Action 15.3.3: Enable the separation of construction and demolition materials

Improving the separation of organic materials will support the diversion of waste from landfill and enable increased recovery of construction and demolition waste, such as treated and non-treated timber products.

Key initiative

- Explore enabling powers to allow for future changes as part of the development of the new waste legislation. These changes could include regulations that introduce obligations to separate C&D waste, with a particular focus on wood waste.

Focus area 4: Explore bans or limits to divert more organic waste from landfill

Action 15.4: Investigate banning organic waste from landfill by 2030

In order to reduce emissions in line with the waste sector sub-target, modelling suggests that it may be necessary to limit or ban disposal of all or some types of organic materials to landfill by 2030.

Banning organic materials from a range of landfill types would also incentivise businesses and households to look for ways to reduce or recycle/compost their organic waste. Any ban would ideally be supported by data, detailed research, and enabling infrastructure – providing a reasonably practicable alternative to disposal. Without viable alternatives, there is a risk of perverse outcomes, such as stockpiling, illegal disposal and levy avoidance.

Key initiative

- Investigate banning organic waste from landfill by 2030, subject to consultation, further analysis and viable alternatives being in place.

Focus area 5: Increase the capture of gas from landfills

Landfill gas (LFG) is a by-product of decomposing organic waste in landfills. It is mainly composed of biogenic methane and carbon dioxide. With the appropriate equipment, modern landfills can capture some of the gas and either flare (burn) it or use it to produce energy. The process converts the biogenic methane to carbon dioxide, which has a lesser impact.

Capturing LFG is a valid way to reduce harmful biogenic methane emissions and, in some cases, gain added benefits. However, it is not a perfect solution. Improving LFG capture does not encourage the recovery of organic materials and – because of practical and economic limitations – still results in some biogenic methane emissions.[14]

14 On average, the latest New Zealand greenhouse gas inventory assumes the lifetime efficiency of LFG capture at open landfills as 68 per cent. Ministry for the Environment. 2021. New Zealand's Greenhouse Gas Inventory 1990–2019, at p. 377. Retrieved from https://environment.govt.nz/assets/Publications/New-Zealands-Greenhouse-Gas-Inventory-1990-2019-Volume-1-Chapters-1-15.pdf#page=401 (accessed 22 April 2022).

Action 15.5.1: Regulations will require landfill gas capture at municipal landfills

Increasing the amount of biogenic methane captured at municipal (Class 1) landfills will require capture systems to be installed (where feasible). Municipal landfills receive organic waste from households and businesses mixed with rubbish. Sites without LFG capture could be banned from receiving organic waste.

Key initiative

- Require all municipal (Class 1) landfills to have LFG capture systems by 31 December 2026.[15]

Action 15.5.2: Feasibility studies will determine the need for additional landfill gas capture requirements

A phased approach will provide time for the sector to adapt and for research into whether additional LFG capture requirements or organic material bans should be implemented.

As noted in action 15.5.1, the first phase will require LFG capture at all municipal (Class 1) landfills by 31 December 2026. This will allow time to improve enabling systems and infrastructure. It will also provide time to assess whether similar requirements should be applied to non-municipal (Classes 2 to 5) landfills that receive less organic waste.

Key initiatives

- Phase the introduction of additional LFG capture requirements to avoid unintended impacts across the landfill system.
- Undertake feasibility studies to determine whether additional LFG capture requirements or organic material bans should be implemented at non-municipal (Classes 2 to 5) landfills.

15 The Government intends to enact this requirement by lowering the threshold and related provisions under the National Environmental Standards for Air Quality (or its equivalent under new resource management legislation), or potentially using new tools under revised waste legislation. See Ministry for the Environment. National environmental standards for air quality. Web page. Includes a link to the Resource Management (National Environmental Standards for Air Quality) Regulations 2004. Retrieved from https://environment.govt.nz/acts-and-regulations/regulations/national-environmental-standards-for-air-quality/ (accessed 22 April 2022).

Focus area 6: Improve waste data and prioritise a national waste licensing scheme

Future emissions reduction policies rely on having quality data on emissions and the waste materials that produce them. Currently our waste data has high levels of uncertainty. This applies to managed landfills, where there is a lack of information about waste composition and LFG capture rates. The data gaps and uncertainties are even greater for other waste disposal types (such as unmanaged fills, farm fills, composting and wastewater).[16]

Action 15.6.1: Develop a national waste licensing scheme

A national licensing scheme allows more coordinated and efficient data collection and management of the effects of waste, including emissions. A national scheme would build a better evidence base to help prioritise and measure actions to minimise waste and reduce emissions in Aotearoa.

Key initiatives

- Explore proposals to enable the collection of data. A proposal to regulate the waste and resource recovery sector through licensing and related measures was included in consultation on new waste legislation in late-2021. The Government will undertake further engagement with the sector before any new regulatory system is developed. This could include obligations and reporting requirements for individuals and entities in the waste and resource recovery sector, including disposal facilities, waste transporters, exporters and resource recovery entities.
- Engage with local government and waste service providers to ensure that obligations and data reporting requirements of a national scheme are feasible.

16 For Class 2 to 5 landfills, data uncertainty is estimated to be ±140 per cent. For more about landfill classifications and waste disposal to land, see Waste Management Institute New Zealand (WasteMINZ). August 2018. Technical Guidelines for Disposal to Land. Retrieved from https://www.wasteminz.org.nz/wp-content/uploads/2016/04/Technical-Guidelines-for-Disposal-to-Land-9Aug18-FINAL.pdf (accessed 22 April 2022).

Action 15.6.2: Improve information on greenhouse gas emissions from waste disposal

Changes to the waste disposal levy have extended tonnage reporting requirements to all landfills and to transfer stations and are set in regulation. Future data reporting includes requirements for landfill operators, transfer station operators and territorial authorities to report the activity that generated the waste received.[17] In addition, a new national data collection and reporting programme on emissions reductions from waste is planned.

Improving waste data and building our understanding of waste sector emissions will help to identify future opportunities, including those around farm fills and wastewater treatment.

Key initiatives

- Undertake a national data collection and reporting programme to improve our understanding of emissions from waste.
- Publish national waste statistics each year (this is likely to begin from 31 December 2023).

17 These reporting requirements will be introduced as part of the expansion of the waste disposal levy.

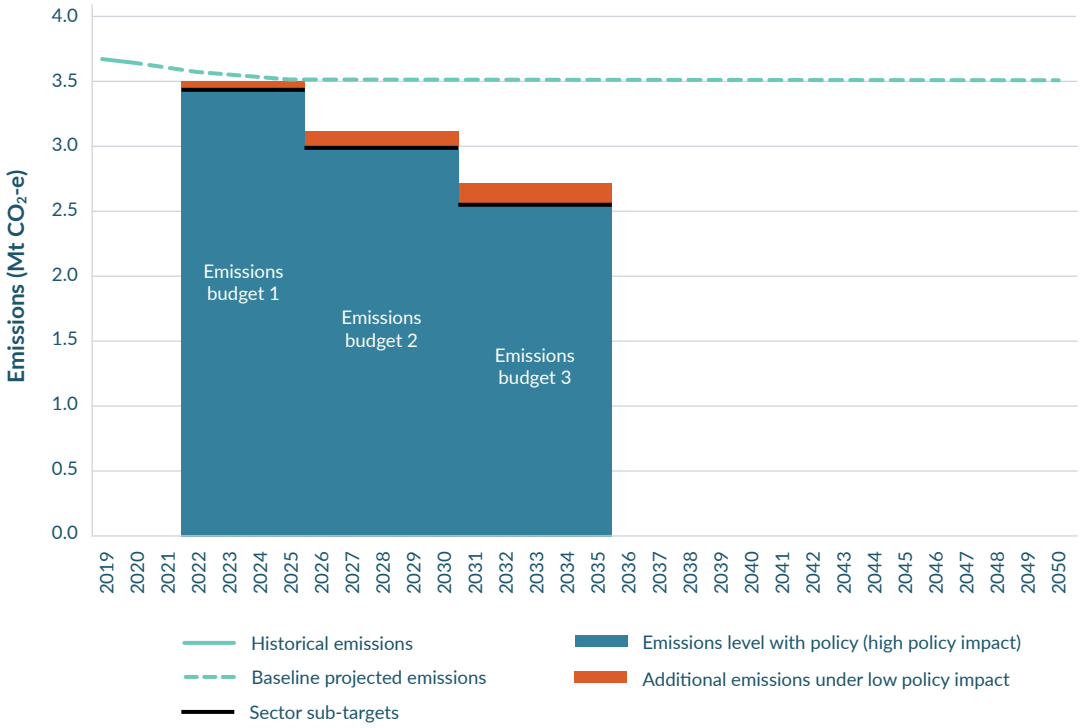
What this means for the emissions budgets

Waste emissions are expected to be reduced. This emissions reduction plan describes the policies and potential pathway to reducing organic waste disposal emissions in Aotearoa.

Figure 15.3 shows that in a 'do everything' scenario the sum of the waste policies comes close to achieving the pathway necessary to meet the first waste sector sub-target (2022–25). This scenario also indicates that greater emissions reductions from 2026–35 will mean the waste sector comes very close to achieving its provisional sector sub-targets for the second and third emissions budget periods.

While the waste sector is initially expected to fall short to 2025, improving our evidence base will support the development of future interventions.

Figure 15.3. Waste sector emissions reductions



Note 1: Modelled impacts have varying degrees of uncertainty and, for completeness, figure 15.3 shows all sources of waste emissions, including those that produce more of the other greenhouse gases such as carbon dioxide and nitrous oxide.

Note 2: This model is based on a cumulative policies scenario that assumes:

- a broad and high abatement approach to 2035, with organic materials increasingly diverted to resource recovery by 2030 ahead of a potential material disposal ban
- a mix of processing options for the various organic waste types[18]
- regulatory measures that require materials separation at source
- that there is some interaction between options (for example, coupled together, improved LFG capture and diverting food waste to composting will have less emissions savings than the sum of their individual emissions abatement potential).

18 This assumes 40 per cent of food waste diverted to composting (20 per cent window and 20 per cent in-vessel composting, or IVC) and 60 per cent to anaerobic digestion. It also assumes 100 per cent of diverted green waste to composting (60 per cent compost and 40 per cent IVC). In practice the best processing option should be selected based on availability of waste types and markets for potential products.

We all have a role to play in reducing emissions from waste

We all create waste and we can all help reduce the emissions it generates.

Resource recovery infrastructure to collect and process household waste has been largely led by local government. Councils will need to provide services, such as kerbside collections and related infrastructure, that enable us to reduce and recycle organic waste. New Zealanders should be able to recycle organic waste responsibly no matter where they live.

In addition to local government, the private sector (in this case, waste and recycling companies and landfill operators) also has a key role in supporting the provision of resource recovery infrastructure, participating in national licensing and waste data collection, and implementing LFG capture systems. Businesses across the supply chain will need to design out waste and look for innovative opportunities to reuse and recycle resources.

Individuals and communities can also help to reduce waste and emissions from waste. Individuals can make personal efforts to avoid creating waste in the first place, compost at home or use collection services. At a community level, groups can lead waste minimisation education, operate local recycling centres and advocate for change.

With the right support from government, partnerships and clear direction, there is significant scope for local government, Māori, community agencies and the private sector to invest in the transition to a low-emissions, low-waste future.

Helping the waste sector adapt to the effects of climate change

Climate projections and impacts

Climate change effects, such as sea-level rise, flooding, temperature rise and the risk of wildfires, have the potential to negatively impact on waste infrastructure and disposal sites.

Flooding can have compounding effects for waste. For example, flooding can result in house-loads of damaged material being disposed to landfill, as well as contaminated waste. Severe weather events can also lead to beaches and waterways littered with contaminated and hazardous materials, creating risks for human health and the environment.

Failing to adequately prepare for and build resilience to climate impacts, can put waste recovery services under pressure and reduce the capacity to recover materials.

There is also a risk that contaminants will be discharged from disposal sites, affecting water quality. For Māori, this degrades the mauri of waterways, contaminates mahinga kai (food-gathering areas), affects taonga species, and is likely to impact cultural practices.

Some landfills (active and closed) and contaminated sites are considered vulnerable, as they are situated in high-risk flood and erosion prone areas.

Measures to improve the waste sector's ability to adapt to the effects of climate change

The risk to human health and the environment from vulnerable landfills and contaminated sites is moderate at present but will likely increase.

As a result, the development and implementation of waste policy needs to consider:

- increasing the waste sector's resilience to the effects of climate change
- the effectiveness of short- and long-term solutions, so we address the hazard and the risk
- climate impacts when siting and designing new landfills, waste infrastructure and LFG capture
- how assets are adaptable to future changes (for example, increasing LFG capture could encourage more organic waste to be disposed to landfill and/or result in infrastructure that is redundant when the amount of organic waste going to landfill decreases)
- how data improvements (such as climate projections and impacts) can help to identify opportunities for the waste sector to build resilience (for example, when planning infrastructure).

The upcoming national adaptation plan will be published in late-2022 and will include actions to respond to the risk posed by vulnerable landfills and contaminated sites.

CHAPTER 16:

Fluorinated gases

Fluorinated gases

Lead

MINISTER FOR
THE ENVIRONMENT
HON DAVID PARKER

SECRETARY FOR
THE ENVIRONMENT
VICKY ROBERTSON

Contribution to our long-term vision

By 2050, Aotearoa New Zealand will have transitioned away from fluorinated gases (F-gases) with high global warming potentials (GWP), while safeguarding activities that currently rely on F-gases, such as refrigeration and heating. Training and accreditation programmes will upskill the workforce and enable a safe transition to low-emissions alternatives.

Contribution to Aotearoa New Zealand's greenhouse gas emissions (AR5) in the first emissions budget period

Projected emissions without the initiatives in this plan	7.2 Mt CO_2-e
Projected average annual emissions without the initiatives in this plan	1.8 Mt CO_2-e
Projected percentage of total gross emissions without the initiatives in this plan	2 per cent
Estimated emissions reduction from the initiatives in this plan	0.1 to 0.5 Mt CO_2-e

Fluorinated gases

Why F-gases are important

In 2019, emissions from the F-gases sector made up 2 per cent of Aotearoa New Zealand's total gross greenhouse gas emissions.

F-gases are mainly used as refrigerants in heating and cooling appliances. Hydrofluorocarbons (HFCs) are a subset of F-gases, and HFCs are mainly used as refrigerants used in heating and cooling appliances. HFCs are believed to contribute significantly to global warming despite being emitted in relatively low quantities. This is due to their predicted impact on global warming (as indicated by their GWP).[1] The GWPs of F-gases can be thousands of times greater than carbon dioxide.

The Government has committed to sector sub-targets. The first sector sub-target limits F-gas emissions to 6.8 Mt CO_2-e from 2022 to 2025.

Key actions

- Build the capability to shift to alternative low-emissions refrigerants.
  - Develop training and accreditation for handling alternative gases.
- Prohibit the import of pre-charged equipment.
- Investigate prohibiting F-gases with high GWP.
- Introduce a mandatory product stewardship scheme for refrigerants.

1 For more on global warming potential see What are 'Global Warming Potentials' and 'CO_2 equivalent emissions'?

A safe transition away from high-GWP fluorinated gases will support the global phase-down

Moving away from F-gases with high global warming potentials will support our domestic transition to a low-emissions future and the global phase-down of F-gases agreed under the Kigali Amendment to the Montreal Protocol (Kigali Amendment).[2]

To achieve this transition, the Government will encourage and support New Zealanders to increasingly replace F-gases with alternatives that have lower GWPs. While some low-GWP alternatives pose risks to health and safety, the Government will promote good industry practice through training, regulated product stewardship schemes and other initiatives.

2 The Kigali Amendment to the Montreal Protocol was ratified by Aotearoa New Zealand in 2019. It introduces the worldwide phase-down of bulk HFCs. For more information, see Ministry for the Environment. Kigali Amendment to the Montreal Protocol. Retrieved from https://environment.govt.nz/what-government-is-doing/international-action/vienna-convention-and-montreal-protocol/kigali-amendment-to-the-montreal-protocol/ (accessed 22 April 2022).

Fluorinated gases have a disproportionate impact on the climate

While only a small proportion of our emissions profile, F-gases have a disproportionate impact on the climate due to their GWP. In 2019, F-gases represented 2 per cent of Aotearoa New Zealand's total emissions.

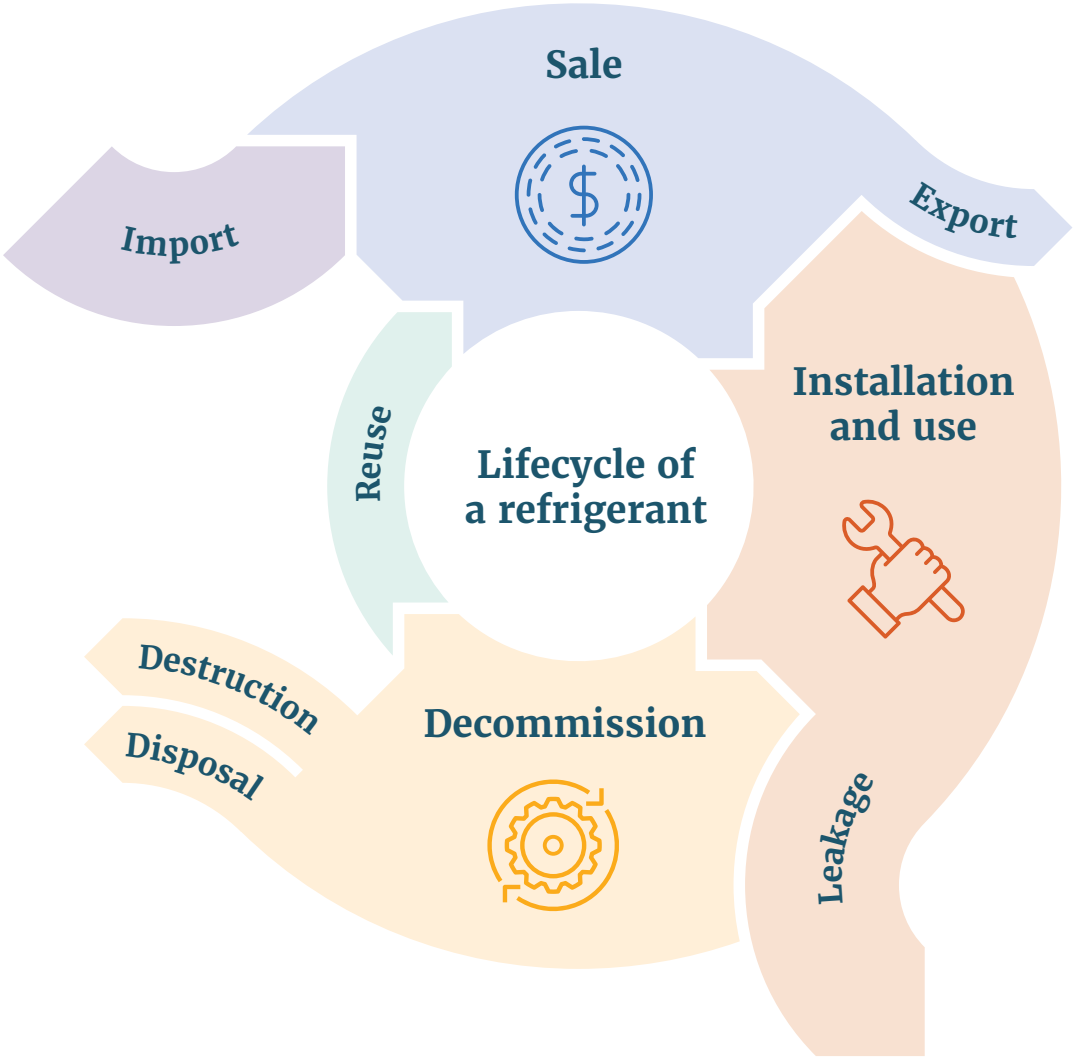
Most of Aotearoa New Zealand's F-gas emissions are from hydrofluorocarbons (HFCs) (94 per cent), which are primarily used as refrigerants for heating and cooling. Refrigerants are an essential part of our daily life – they are used keep our food cold and used in heat pumps to heat and cool our houses. Refrigerants are also used in storage and transport of temperature-sensitive goods.[3]

Emissions from refrigerants do not occur as part of the day-to-day running of products such as fridges or heat pumps, as they are usually safely sealed inside the product. Rather, they typically result from leakage or improper disposal at a product's end of life.

Product stewardship of refrigerants is important, as it will target the points in the lifecycle when F-gases are released into the environment. Expanding proposed technician training and accreditation schemes to include F-gas management will support this. The remainder of the proposals in this chapter affect the manufacture, sale and import points of the refrigerant lifecycle.

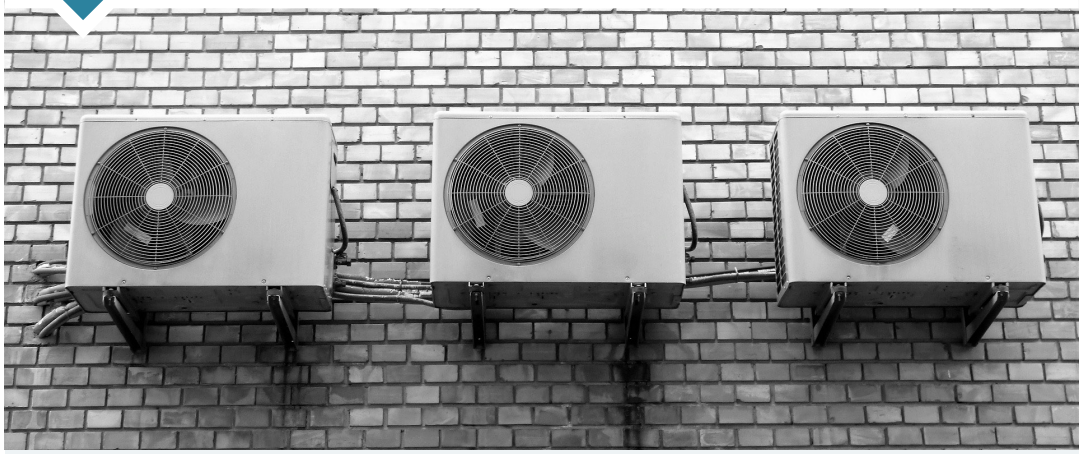
3 This involves a network of refrigerated warehouses, trucks, and shipping containers known as the 'cold chain'.

Figure 16.1. Lifecycle of a refrigerant



As the effects of a changing climate are felt, there will be a greater demand to artificially regulate temperatures by using refrigerants. However, increased use of high-GWP refrigerants could make matters worse and could lead to an ever-increasing need for refrigerants. Transitioning to low-GWP refrigerants is vital to avoid this cycle.

CASE STUDY



NATURAL REFRIGERANT ALTERNATIVES

Natural refrigerants are an alternative to hydrofluorocarbon (HFC) refrigerants and have many benefits. Unlike HFCs, natural refrigerants are non-synthetic and have considerably lower global warming potentials (GWPs).

Of the range of natural refrigerants available, hydrocarbon-based refrigerants are the most viable alternative for use in air conditioning (AC). Hydrocarbons have the additional benefit of being produced from commonly used gases such as propane and butane.

Hydrocarbon-based refrigerants have also been seen to provide greater energy efficiency than HFC refrigerants, with lowering operating costs. In a Bali case study, use of non-HFC refrigerants for AC led to a fall in power consumption of around 33 per cent, with little effect on AC performance.

While hydrocarbon refrigerants have low GWPs, their use requires suitable equipment and technicians require appropriate training and skills. Improper use may result in significant risks to people and property.

Actions we are taking to reduce emissions from fluorinated gases

A number of actions are already underway to reduce emissions from F-gases.

- **Aotearoa has made commitments under the Kigali Amendment to the Montreal Protocol** – The Kigali Amendment seeks to significantly cut the global consumption of HFCs over the next 30 years. By 2036, the global use of HFCs will have reduced by 81 per cent (below the average consumption between 2011 and 2015).
- **Emissions pricing** – Manufacturers and importers of bulk HFCs have obligations under the New Zealand Emissions Trading Scheme (see chapter 5: Emissions pricing for further detail). Importers of pre-charged products (such as heat pumps and air conditioning units in vehicles filled with HFCs overseas) are subject to the Synthetic Greenhouse Gas Levy.

The Government is also working on new proposals focusing on four key areas. These proposals – outlined below – have been developed alongside principles to ensure that the transition away from high-emissions refrigerants is equitable.[4]

These proposals will be developed following consultation, including with Māori. This will be important in ensuring that the shift towards low-GWP refrigerants is equitable, recognises kaitiakitanga and Māori interests, and mitigates any specific impacts.

4 These principles are: (a) preserving effective F-gas-reliant infrastructure (eg, the cold chain infrastructure used by the health and industrial sectors); (b) supporting access to affordable heating and cooling, particularly for low-income households; (c) maintaining health and safety standards.

Focus area 1: Build the capability to shift to low-GWP fluorinated gases

The Government will continue to identify additional opportunities to reduce emissions through whole-of-life management and design options, considering ways to combine efforts to reduce HFC emissions with increasing energy efficiency, and how we can work towards a vision of low-emissions heating and cooling in Aotearoa.

Examples of approaches to improving energy efficiency, which would in turn reduce the reliance on refrigerants in Aotearoa, can be found in chapter 11: Energy and industry and chapter 12: Building and construction.

Action 16.1: Develop training and accreditation for handling alternative gases

The transition away from high-GWP F-gas refrigerants will rely in part on the adoption of low-GWP refrigerants. It is important to ensure that those handling alternative gases do so in a safe manner, noting concerns about potentially increased risks presented by some alternatives (such as toxicity, flammability and high pressure systems).

- To support the shift to alternative refrigerants, the Government will work with WorkSafe to develop and implement their training and accreditation proposals. These will ensure the safety of workers installing, servicing and decommissioning equipment that contains natural or alternative gases.

These will build on existing proposals to address the increased health and safety risks associated with alternative refrigerants, and on recommendations from the final report of the Synthetic Greenhouse Gas Regulated Product Stewardship Working Group.

Further consultation will be undertaken on the proposed model before regulations are implemented. Policy outcomes are expected during the first emissions budget.

Focus area 2: Control imports of pre-charged equipment containing high-GWP fluorinated gases

Action 16.2: Prohibit imports of pre-charged equipment

Currently, products containing high-GWP F-gases can be imported and sold in Aotearoa. In many cases, however, alternatives are available.

To address this, the Government proposes to:

- prohibit the import and sale of pre-charged equipment containing high-GWP F-gases in cases where alternatives are available. This approach will build on the existing Kigali Amendment phase-down and:
  - prohibit the import of pre-charged equipment containing high-GWP F-gases
  - reduce the risk that Aotearoa becomes a 'dumping ground' for technologies containing high-GWP F-gases as other countries introduce similar regulations
  - improve the energy efficiency of heating and cooling appliances.
- consider targeted support and incentive schemes for small- and medium-sized enterprises reliant on heating, cooling and refrigeration equipment that may find the costs of shifting to alternative refrigerants prohibitive
- help consumers purchase equipment that contains low-GWP refrigerants. For example, the Government is expanding the Energy Efficiency and Conservation Authority's Warmer Kiwi Homes initiative and there may be scope to expand existing energy efficiency programmes to include consideration of consumer costs and the need for support
- additional work and consultation will be needed to determine implementation timelines and the technical criteria for applicable products and the refrigerants they contain. Policy outcomes are expected during the first emissions budget.

Focus area 3: Investigate prohibiting fluorinated gases where low-GWP alternatives are available

Action 16.3: Investigate prohibiting F-gases with high GWPs

Currently, refrigerant technology in Aotearoa tends to include high GWP F-gases. Servicing and maintenance requires the use of F-gases imported in bulk. Low-GWP alternatives are available, but there are several barriers, including health and safety and compatibility concerns.

To address these barriers and encourage the uptake of low-GWP refrigerants, the Government will:

- explore regulatory proposals to prohibit the use of high-GWP F-gases used for installation, maintenance, and product servicing where low-GWP alternatives are available and appropriate training and accreditation schemes are in place
- consider targeted support and incentive schemes for small- and medium-sized enterprises that rely on heating, cooling and refrigeration equipment.

Additional work and consultation will be needed to determine implementation timelines and the technical criteria for applicable refrigerants. Investigative work will be completed during the first emissions budget period.

Focus area 4: Regulated product stewardship for refrigerants

Action 16.4: Introduce a mandatory product stewardship scheme for refrigerants

Refrigerants have been classified as a priority product under the Waste Minimisation Act 2008. A mandatory product stewardship scheme will be developed to reduce environmental harm when they reach end of life.

The Government will:

- develop a mandatory product stewardship scheme in collaboration with the Synthetic Greenhouse Gas Regulated Product Stewardship Working Group. This will enable all refrigerant gases to be safely collected and disposed of
- contribute to training and qualification development for all refrigerant handlers.

What this means for the emissions budgets

F-gas emissions are expected to reduce, with significant reductions likely in later emissions budget periods.

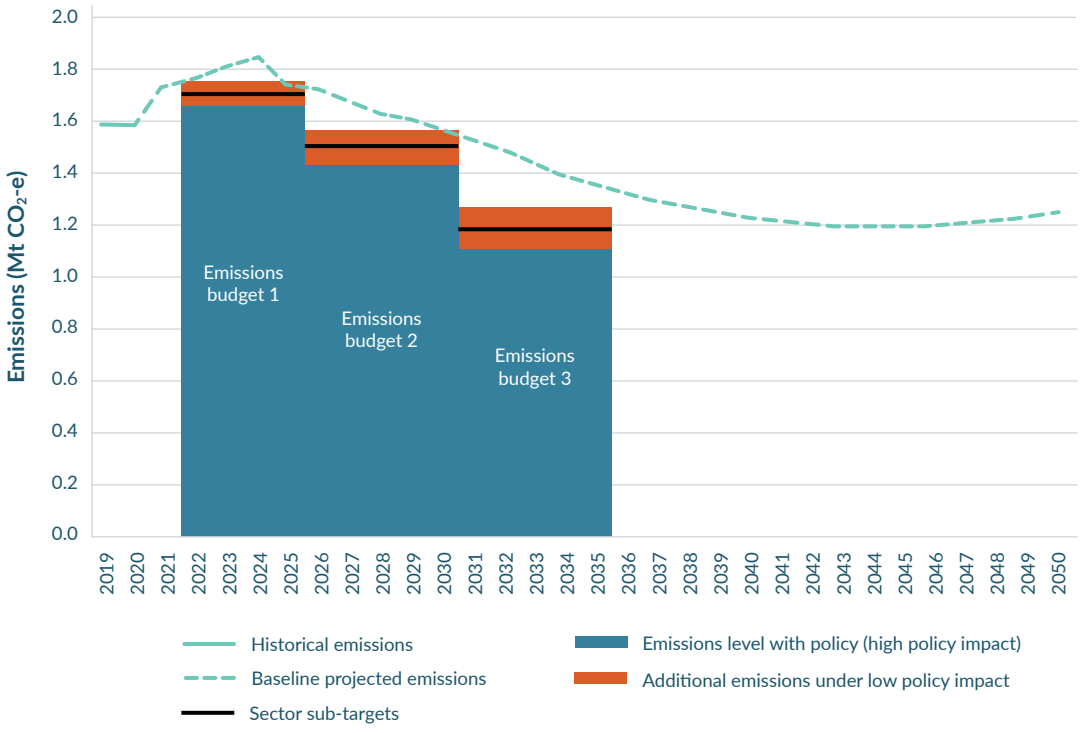
It is estimated that initiatives in the F-gas sector – including the Kigali Amendment phase-down, the Synthetic Greenhouse Gas Levy, and regulated product stewardship – could reduce emissions by:

- 0.1 to 0.5 Mt CO_2-e in the first emissions budget
- 1.3 to 3.2 Mt CO_2-e by 2035.

The reduction or removal impact of the three new initiatives in this chapter will support further emissions reductions; however these have not yet been quantified.

Accumulated emissions reductions are expected to continue to increase in later emissions budget periods (3.5 to 7.9 Mt CO_2-e by 2050).

Figure 16.2. Fluorinated gases sector emissions reductions



Note: Figure 16.2 shows the emissions projected from HFCs. The modelled emission reduction plan policies will not achieve net-zero emissions from HFCs. New proposed initiatives will provide additional emissions reductions. Indirect activities, such as those included in collaborative cross-agency work, may further reduce these emissions, as might advances in heating and cooling technology.

We need to work together to reduce fluorinated gas emissions

We need to work together to reduce high-GWP F-gases while safeguarding activities that currently rely on F-gases.

Local government can introduce initiatives that help reduce emissions from F-gases, especially in relation to inorganic collections. Incorrect disposal or kerbside scavenging of refrigerators and other equipment can result in F-gases being released into the environment. For example, Auckland Council funded community organisations to degas whiteware in the resource recovery process.

Other initiatives could include updating retrofitting homes programmes, where heat pumps are installed to help with heating and cooling, to use only low-GWP F-gases (or alternative heating options that do not rely on F-gases at all).

The private sector can help reduce F-gas refrigerants by switching to alternative refrigerants. Many large businesses that rely on cold chains and refrigerated plants to operate are leading this transition and have already made the switch. Smaller businesses also need to make the switch even though it may carry a high capital cost. The Government may need to consider support for these businesses.

Helping the fluorinated gases sector adapt to the effects of climate change

As the impacts of climate change increase, there will be a growing demand for effective cooling and storage options that enable food, vaccines and vital supply chains to remain accessible and functional. It is critical that policies to reduce F-gas emissions do not have adverse effects on this infrastructure.

The best way to reduce these emissions is to phase out F-gas refrigerants and, where necessary, replace them with low-GWP refrigerants. Legislative changes may already reduce reliance on refrigerants.

For example, insulation requirements introduced by the Healthy Homes legislation are intended to result in warmer, drier homes that do not require as much artificial heating, and therefore use of refrigerants. In this way, the proposals included in this chapter build on the positive changes that are already happening in the sector.

Despite these shifts, policies in other fields will not displace the need for refrigerants entirely. It is important to signal the move away from F-gas refrigerants early and keep stakeholders informed. This will signal the transformation that will occur and reduce potential market volatility.

The proposals under consideration will also improve the ability of the heating and cooling sector to adapt by:

- ensuring alternative and safe disposal pathways for refrigerants (eg, through product stewardship)
- ensuring that there are educational resources and training to improve the handling of refrigerants at an application's end of life
- enacting legislative changes to facilitate an equitable transition away from F-gas refrigerants.

Notes

How we present emissions

This section provides information on how emissions and removals have been presented throughout the emissions reduction plan.

Gross and net emissions

Throughout the emissions reduction plan, we have presented both gross and net emissions amounts.

Gross emissions include emissions from the following key emitting sectors:

- transport
- energy and industry
- agriculture
- waste
- fluorinated gases.

Net emissions refers to the overall balance of emissions and carbon dioxide removals. It is the sum of gross emissions combined with emissions and removals from the land use and land-use change and forestry sector (land sector). In Aotearoa New Zealand, emissions are mainly removed by forests, which absorb carbon dioxide from the atmosphere that gets stored as carbon as they grow.

Accounting approach

There are specific accounting rules used to assess and track Aotearoa New Zealand's progress towards meeting the emissions budgets and the 2050 target. In the emissions reduction plan, net emissions have been calculated on a target accounting basis. This uses gross emissions estimates aligned to the national GHG inventory but accounts for the land sector differently. The removals used for target accounting are a subset of net removals from the land sector, which are also published in the National Greenhouse Gas Inventory (GHG Inventory).

Carbon dioxide equivalent

In order to aggregate and compare the different types of greenhouse gases – which have different levels of global warming potential – emissions and removals are largely expressed in megatonnes of carbon dioxide equivalent (Mt CO_2-e). Where appropriate, other measurements like tonnes of carbon dioxide equivalent (t CO_2-e) or gigatonnes of carbon dioxide equivalent (Gt CO_2-e) have been used. The carbon dioxide equivalent is calculated by multiplying the quantity of a greenhouse gas by the relevant global warming potential.

Presenting emissions using global warming potential over 100 years (GWP100)

When presenting emissions in Mt CO_2-e, these emissions are based on the GWP100 metric values from the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5). The AR5 report sets out the most up-to-date GWP.

Comparisons to the New Zealand Greenhouse Gas Inventory

Comparisons using the GHG Inventory, such as descriptions of emissions per sector, are based on the 2019 figures from latest GHG Inventory published in April 2022 and converted to CO_2-e using AR5 GWP100 metric values. We have chosen to compare to the year 2019 and not the latest available inventory year (2020) due to the distortive impact that the COVID-19 pandemic had on some sectors during 2020. We have chosen to convert the GHG inventory GWP100 metric values from AR4 to AR5 as this is how emissions will be reported in the GHG inventory from the 2023 year onwards.

Glossary

TERM	MEANING
2050 target	Set in the Climate Change Response Act 2002, this target requires: ▶ emissions of all greenhouse gases (except biogenic methane) to be net zero by 2050 ▶ emissions of biogenic methane emissions to be 24–47 per cent below 2017 levels by 2050 (and 10 per cent by 2030).
abatement	The reduction or removal of greenhouse gas emissions.
adaptation	Actions to respond to the effects of a changing climate.
anthropogenic	Originating in human activity.
awa	River, stream, creek.
baseline projections	Compiled annual estimates of emissions that represent the expected level of emissions in Aotearoa New Zealand between now and 2050. Baseline emissions are calculated on the basis of existing policies and measures only and include an assumed carbon price of NZ$35 per tonne of CO_2-e in the New Zealand Emissions Trading Scheme. The baseline projections referred to in the emissions reduction plan were published in March 2022 and are available on the Ministry for the Environment's website.
bioeconomy	The parts of the economy that use renewable biological resources to produce food, products, and energy.
bioenergy	Energy produced by living organisms.
biofuel	Fuel produced from organic material – often plants or animal waste.
biogenic methane	All methane emissions produced from the agriculture and waste sectors (as reported in the New Zealand Greenhouse Gas Inventory).
carbon sequestration or carbon sink	Any reservoir that absorbs more carbon than it releases, thereby lowering the overall concentration of carbon dioxide in the atmosphere. Examples include forests, vegetation, peatland and the ocean.
circular economy	An economic system based on designing out waste and pollution, reusing products and materials, and regenerating natural systems.

TERM	MEANING
Climate Change Commission	A Crown entity that gives independent, expert advice to the Government on climate change matters and monitors progress towards the Government's mitigation and adaptation goals.
climate resilience	The capacity of social, economic and environmental systems to cope with a hazardous event, effect, trend or disturbance caused by climate change, including by responding or reorganising in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.
CO_2	Carbon dioxide.
decarbonise	Reduce greenhouse gas emissions, for example, through the use of low-emissions power sources and electrification.
embodied emissions	Emissions associated with the production of materials and construction processes throughout the lifespan of a building, including during construction, renovation, ongoing use and demolition.
emissions	Greenhouse gases released into the atmosphere, where they trap heat or radiation.
emissions budget	The cumulative amount of greenhouse gases that can be emitted in New Zealand over five-year periods prescribed in the Climate Change Response Act 2002. Three successive emissions budgets must be in place at any given time.
emissions reduction plan	A plan that sets out the policies and strategies to meet emissions budgets by reducing emissions and increasing removals. A new emissions reduction plan must be in place before the beginning of each emissions budget period.
F-gases	Fluorinated gases; mainly used as refrigerants for heating and cooling.
fossil fuels	Natural fuels formed in the geological past from the remains of living organisms, for example, coal and natural gas. When used as fuel, these emit greenhouse gases.

TERM	MEANING
greenhouse gases	Atmospheric gases that trap or absorb heat and contribute to climate change. The gases covered by the Climate Change Response Act 2002 are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).
hapū	Kinship group, clan, subtribe.
hydrofluorocarbons	A category of human-made greenhouse gases often used in refrigeration, air conditioning and other processes.
iwi	Tribe, large group descended from a common ancestor.
kaiako	Teacher, instructor.
kaitiaki	Guardian, caretaker, manager, trustee.
kaitiakitanga	Guardian or guardianship, stewardship, for example, of natural resources.
kaupapa Māori	Māori approach, Māori topic, Māori customary practice, Māori institution, Māori agenda, Māori principles, Māori ideology – a philosophical doctrine, incorporating the knowledge, skills, attitudes and values of Māori society.
kawa	Protocol.
kōhanga reo	Māori language preschool.
linear economy	The predominant economic system globally, following the model of 'take-make-use-dispose'.
low-emissions, low-carbon	An economic and social system that has moved away from the use of fossil fuels and adopted low-emissions energy sources and processes, and consequently produces minimal greenhouse gas emissions.
LULUCF	Land use, land-use change and forestry (LULUCF) is a sector that covers emissions and removals of greenhouse gases resulting from direct human-induced land use, land-use change and forestry activities. Activities associated with LULUCF can impact the global carbon cycle by contributing to the addition or removal of greenhouse gases to and from the atmosphere.
mahinga kai	Garden, cultivation, food-gathering place.

TERM	MEANING
mana	Prestige, authority, control, power, influence, status, spiritual power, charisma.
manaakitanga	Hospitality, kindness, generosity, support – the process of showing respect, generosity and care for others.
mana ōrite mō te mātauranga Māori	Equal status for Māori knowledge.
māramatanga	Enlightenment, clarity, understanding.
marau ā-kura	Localised curriculum.
mātauranga Māori	Māori knowledge systems and worldviews, including traditional concepts.
mauri	Life principle, life force, vital essence, special nature, a material symbol of a life principle, source of emotions.
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, 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.
NDC	Nationally Determined Contribution. Each Party to the Paris Agreement must define its contribution to the long-term temperature goals set out in the agreement, in the form of an NDC.
net zero	A target of completely negating the greenhouse gas emissions produced by human activity. This can be done by balancing emissions and removals or by eliminating the production of emissions in the first place.
offshore mitigation	Emissions reductions and removals that occur outside New Zealand, or overseas-based incentives to reduce or remove emissions (eg, by the pricing of emissions through participation in an overseas emissions trading scheme).
operational emissions	Emissions from operating a building.

TERM	MEANING
organic waste	Wastes containing carbon compounds that are capable of being readily biologically degraded, including by natural processes, such as paper, food residuals, wood wastes, garden and plant wastes, but not inorganic materials such as metals and glass or plastic. Organic wastes can be decomposed by microorganisms into methane, carbon dioxide, nitrous oxide, and simple organic molecules (plastic contains carbon compounds and is theoretically organic in nature, but generally is not readily biodegradable).
papakāinga	Original home, home base, village, communal Māori land.
Papatūānuku	Earth mother.
Paris Agreement	A legally binding international treaty on climate change, which includes provisions on mitigation, adaptation and climate finance among other things. It was adopted by 196 Parties in Paris in 2015 and entered into force in 2016. One of the goals of the Paris Agreement is "holding the increase in global average temperature to 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels".
perfluorocarbons (PFCs)	These are organofluorine compounds containing only carbon and fluorine. Some of them are potent greenhouse gases.
product stewardship	A scheme in which a producer, importer, retailer or consumer takes responsibility for reducing a product's environmental impact.
rohe	Boundary, district, region.
tangata whaikaha	People with disabilities.
tangata whenua	The people of the land, local indigenous people. Māori are tangata whenua.
taonga	Treasure, anything prized – applied to anything considered to be of value, including socially or culturally valuable objects, resources, phenomenon, ideas and techniques.
te ao Māori	The Māori world.
te ao tūroa	The natural world, the enduring world.
te taiao	World around us, earth, natural world, environment, nature.

TERM	MEANING
Te Tiriti o Waitangi or Te Tiriti	The Treaty of Waitangi. Note: While these terms are used interchangeably, we acknowledge that the English version and te reo Māori translation are separate documents and differ in a number of respects.
tikanga	Correct procedure, custom, habit.
transition	The shift to a low-emissions, sustainable economy and way of life.
tūpuna	Ancestors, grandparents.
tūrangawaewae	Domicile, standing, place where one has the right to stand.
wairua	Spirit, soul.
whakapapa	Genealogy, genealogical table, lineage, descent.
whānau	Extended family, family group.
whanaungatanga	Relationship, kinship, sense of family connection.
whenua	Country, land, nation, state.

Ministry for the
Environment
Manatū Mō Te Taiao

Te Kāwanatanga o Aotearoa
New Zealand Government