New Zealand's first Biennial Transparency Report under the Paris Agreement

Tā Aotearoa Pūrongo Pūrangiaho ā-Rua Tau tuatahi i raro i te Whakaaetanga o Parī

Ministry for the Environment
Manatū Mō Te Taiao

Te Kāwanatanga o Aotearoa
New Zealand Government

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Ministry for the Environment project team

Alice Ryan, Frances Barnett (Lead compilers)

Charissa Billings (Common reporting tables lead, compilation)

Dr Daniel Boczniewicz (Quality control lead)

Adrianne Hermans, Peter Baillie (Project management)

Joanne Butcher (Communications)

Lisette du Plessis (Publishing)

Dr Alice Cleland, Jon Ryan (Overall oversight)

Chapter leads

Executive summary – Joanne Butcher

Chapter 1 – Frances Barnett

Chapter 2.1– Josh Jamieson

Chapter 2.2 – Katie Lund

Chapter 2.3 – Katie Lund, Dr Andrea Brandon

Chapter 2.4 – Charlotte Pihigia, Lauren Smith, Alice Ryan, Frances Barnett

Chapter 2.5 – Joe Val Alipin, Prof Heather McLeod, Dr Nick Hitt

Chapter 2.6 – Dr Andrea Brandon, Prof Heather McLeod, Joe Val Alipin

Chapter 3 – Dr Tidavadee Tongdethsri, Dr Hannah Chorley, Charissa Billings

Chapter 4 – Alex Lamb (Ministry of Foreign Affairs and Trade)

Annex 1 – Charissa Billings

Annex 2 – Dr Carla Gomez, Deborah Burgess

Other contributors

Ministry for the Environment – Dr Ivan Chirino-Valle, Roderick Boys, Miranda Cross, Cassandra Moll, Tyler Northern, Brett Longley, Tom Womack, Mark Vink, Melissa Berry, Emma Corbett, Meredith Davis, Stephen Goodman, Robyn Crisford, Hemi Smiler, Katherine Wilson, Manon Julien, Juliet Nelson, Audrey Lustig, Diana De Alwis, Eric Goodwin, Izzy Hart, Joyce Ormond, Samuel Roper

Ministry for Primary Industries – Joel Gibbs, Catherine Sangster, Josephine Dawson, Craig Elvidge, Robbie McCrae, Jamie Higgison

Ministry of Transport – Jackie Sowry, Haobo Wang

Energy Efficiency and Conservation Authority – Melanie Joan Lloyd, Anand Krishnan

Ministry of Business, Innovation and Employment – Lorenz Magaard-Romano, Hannah Overton-Holmes, Luke Searle, Maria Botes, Amelie Goldberg, Michael Smith

Ministry of Foreign Affairs and Trade – Anna Broadhurst, Todd Croad

The New Zealand Treasury – Carly Soo

Editors

Jenny Heine, Tanya Tremewan

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Abbreviations

ADOPT	Adoption and Diffusion Outcome Prediction Tool
ASEAN	Association of Southeast Asian Nations
BTR	Biennial Transparency Report
CCRA	Climate Change Response Act 2002
CCUS	carbon capture, utilisation and storage
CEF	carbon equivalent forest
CH_4	methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CNGP	Carbon Neutral Government Programme
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COP	Conference of the Parties
CRA	Calculation and Reporting Application
CRT	common reporting table
CTF	common tabular format
DAC	Development Assistance Committee
EECA	Energy Efficiency and Conservation Authority
ENZ	Emissions in New Zealand
ERP1	first emissions reduction plan
ERP2	second emissions reduction plan
ERPs	emissions reduction plans
EV	electric vehicle
F-gases	fluorinated gases
FRL	forest reference level
GDP	gross domestic product
GEM	Generation Expansion Model
GHG	greenhouse gas
GIDI	Government Investment in Decarbonising Industry
GRA	Global Research Alliance on Agricultural Greenhouse Gases
ha	hectare(s)
HFCs	hydrofluorocarbons
HIP	Heat, Industry and Power module

HWP	harvested wood products
ICAO	International Civil Aviation Organization
ICE	internal combustion engine
IDC	International Development Cooperation
IE	included elsewhere
IMO	International Maritime Organization
INDC	intended NDC
Inventory	New Zealand Greenhouse Gas Inventory
Inventory 2024	*New Zealand Greenhouse Gas Inventory 1990–2022*
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
kg	kilogram(s)
Kha	kilohectare(s)
KP	Kyoto Protocol
kt	kilotonne(s)
kt CO_2e	kilotonnes of carbon dioxide equivalent
LETF	Low Emissions Transport Fund
LFG	landfill gas capture
LiDAR	light detection and ranging
LnW	Land and Waste module
LTA	long-term average
LUCAS	Land Use and Carbon Analysis System
LULUCF	Land Use, Land-Use Change and Forestry
MBIE	Ministry of Business, Innovation and Employment
MFAT	Ministry of Foreign Affairs and Trade
MfE	Ministry for the Environment
MPGs	modalities, procedures and guidelines
Mt	million tonne(s)
Mt CO_2e	million tonnes of carbon dioxide equivalent
N_2O	nitrous oxide
NA	not available
NABERSNZ™	National Australian Built Environment Rating System – New Zealand
NAP1	First national adaptation plan
N-cap	nitrogen fertiliser cap
NCCRA	National Climate Change Risk Assessment
NCCRA1	National Climate Change Risk Assessment
NDC	Nationally Determined Contribution

NDC1	first Nationally Determined Contribution
NE	not estimated
NEFD	National Exotic Forest Description
NF_3	nitrogen trifluoride
NIWA	National Institute of Water and Atmospheric Research
NZAGRC	New Zealand Agricultural Greenhouse Gas Research Centre
NZ ETS	New Zealand Emissions Trading Scheme
NZGIF	New Zealand Green Investment Finance Limited
NZU	New Zealand emissions unit
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
PFCs	perfluorocarbons
PFSI	Permanent Forest Sink Initiative
PJ	petajoule
PSRM	Pastoral Supply Response Model
RMA	Resource Management Act 1991
SADEM	Supply and Demand Energy Model
SF_6	sulphur hexafluoride
SFF	Sustainable Food and Fibre Futures
SSDF	State Sector Decarbonisation Fund
TPES	total primary energy supply
UNFCCC	United Nations Framework Convention on Climate Change
VFM	Vehicle Fleet Model
WEM	with existing measures
WOM	without measures

Foreword from the Minister of Climate Change

This inaugural *Biennial Transparency Report* presents New Zealand's progress in fulfilling our obligations under the Paris Agreement, including implementing and achieving our first Nationally Determined Contribution. It is an opportunity to demonstrate our commitment and showcase the progress we've made in addressing climate change.

We know more work is required, and recognise all countries need to take effective action to keep global temperatures in check. New Zealand is committed to playing our part in the full and effective implementation of the Paris Agreement.

Domestically, New Zealand has published a climate strategy aimed at ensuring we reach our economic, social and environmental potential. We continue to implement New Zealand's first emissions reduction plan for 2022 to 2025 and have just released our second emissions reduction plan for 2026 to 2030.

Our plan sets New Zealand up to achieve our emissions targets and puts us on a sustainable path to net zero long-lived greenhouse gas emissions by 2050, focusing on our largest drivers of emissions and reductions, including in energy, transport, agriculture, forestry and waste.

Emissions projections updated in October were released alongside the plan, showing the additional reductions expected through our new policies, and other updates. These updates were not able to be included in this report due to a cut-off date in September needed to finalise this report. The next Biennial Transparency Report will include the impacts of this plan.

Our Emissions Trading Scheme continues to be our key tool to drive emissions reductions, with recent adjustments to ensure its effectiveness. Our transition will be cost effective, and market led.

As a proud farming nation, we are investing over $400 million in agricultural emissions research through the Centre for Climate Action on Agricultural Emissions over the next four years. By 2030, we aim to implement a fair and sustainable pricing system to reduce agricultural emissions without sending production overseas.

We are working to remove regulatory barriers to reduce emissions in our energy and industry sectors and enable the delivery of a network of 10,000 public EV charging points by 2030.

Regionally, our focus is on building Pacific resilience through our climate finance programme. We also champion the interests of the Pacific region and amplify Pacific countries' voices in global efforts to address the challenges of climate change.

At the global level, New Zealand is committed to sharing knowledge and promoting solutions. We encourage ambitious global climate action and are committed to meeting our international obligations. We are identifying new opportunities to step up our cooperation with international partners to help us all achieve our climate objectives.

New Zealand is making progress. Climate change will continue to bring us both challenges and opportunities, and we remain committed in our response.

Hon Simon Watts
Minister of Climate Change

Executive summary

New Zealand is committed to playing its part to respond to climate change challenges. It is taking action and making progress to meet its climate change targets and goals, including the collective goals under the Paris Agreement.

New Zealand's first Biennial Transparency Report details New Zealand's progress towards its Paris Agreement commitments. It also outlines New Zealand's policies and measures, current and projected emissions, adaptation action, and support provided to developing countries over 2021–22.

The report outlines progress towards New Zealand's first Nationally Determined Contribution (NDC1). The country is committed to its ambitious NDC1 target and is making progress by implementing measures in its first emissions reduction plan and is proposing further actions under the second plan.

As a Party to the Paris Agreement, New Zealand is required to submit its first Biennial Transparency Report by 31 December 2024, under Article 13 of the Paris Agreement and according to the modalities, procedures, and guidelines agreed by Parties. The report also helps keep New Zealanders informed about action on climate change, and how the country will meet its emissions reduction and climate finance targets.

New Zealand's climate approach

New Zealand has a climate change strategy focused on five pillars aimed at ensuring it reaches its economic, social and environmental potential.

New Zealand has a strong legislative framework to support its climate goals. The Climate Change Response Act 2002 sets the legal framework and processes, under the Zero Carbon Framework, for New Zealand to develop and implement clear and stable climate change policies and meet its mitigation and adaptation commitments under the Paris Agreement.

New Zealand is founded on a partnership between the Crown and indigenous New Zealanders, Māori, through Te Tiriti o Waitangi (the Treaty of Waitangi). The Climate Change Response Act requires the Crown to give effect to the principles of Te Tiriti, including specific expectations to adequately consult and take into account the effects of climate change on iwi and Māori.

Domestic emissions reductions

The Climate Change Response Act established targets for reducing domestic emissions for New Zealand including net zero emissions (except biogenic methane) by 2050, and a 24 to 47 per cent reduction of biogenic methane by 2050.

These split gas targets recognise New Zealand's national circumstances and unusual emissions profile. The Agriculture sector plays a fundamental role in the country's economy and was New Zealand's biggest contributing sector to greenhouse gas emissions in 2022 (53 per cent, followed by energy at 37 per cent). New Zealand continues to promote agricultural research to create economically viable and effective technologies to reduce emissions from this sector.

New Zealand has a system of domestic emission budgets to step towards its 2050 targets. The country's first emissions reduction plan was released in May 2022. This plan sets out the policies and strategies to meet the first emissions budget from 2022–25.

New Zealand's second emissions reduction plan was published at the end of 2024. It sets out actions and strategies to reduce emissions between 2026 and 2030 and sets New Zealand up for longer-term climate progress.

The New Zealand Emissions Trading Scheme is New Zealand's key policy tool underpinning domestic emissions reduction action. It is a cap-and-trade system that requires emitters to report on their emissions and surrender units that correspond to their obligations. It helps to encourage afforestation and reduce deforestation. In 2022, 25 per cent of New Zealand's gross emissions were offset by the Land Use, Land-Use Change and Forestry sector.

Impacts and adaptation

Climate change is already having observable impacts in New Zealand and is expected to cause new and compounding risks in the future. The country's average temperature is projected to increase in coming decades, and changes are projected to sea-level rise, ocean warming and rainfall patterns.

The Government is working to strengthen New Zealand against further impacts of climate change. This involves providing better risk information and clarifying roles and responsibilities for adaptation action, including how costs are shared.

New Zealand's first national adaptation plan was released in August 2022 and outlines the country's approach to addressing climate risks, to help New Zealanders reduce the potential harm of climate change and seize the opportunities that arise.

Progress towards New Zealand's first Nationally Determined Contribution

New Zealand's NDC1 sets a headline target of a 50 per cent reduction of net emissions below gross 2005 levels by 2030.

This is managed as a multi-year emissions budget. The budget is the total net emissions New Zealand will be responsible for between 2021 and 2030, with a provisional budget of 579 Mt CO_2e.

Since the intended NDC was set in 2015, modelling indicates the abatement gap — the gap between the NDC1 provisional budget and projected domestic emissions for the period — has narrowed. This is despite New Zealand strengthening the NDC1 target to reflect higher ambition. The modelling updates include improvements to methodologies and additional government actions.

New Zealand's net target accounting emissions are projected to be 668.2 Mt CO_2e across 2021–2030, 89.2 Mt CO_2e higher than the NDC1 provisional budget. This does not include the impact of second emissions reduction plan policies and updated data, which are projected to reduce this gap further to 84.0 Mt CO_2e. These updates were unable to be included as the Biennial Transparency Report applied an earlier cut-off date for modelling assumptions compared with the second emissions reduction plan. The second Biennial Transparency Report will include the impacts of the second emissions reduction plan.

In addition to domestic actions, New Zealand is exploring options for international cooperation under Article 6 of the Paris Agreement. Efforts to date include exploring opportunities with partner governments, market intermediaries and entities that could enable New Zealand to undertake cooperative mitigation action in future.

New Zealand is developing arrangements that establish frameworks for collaboration. For example, New Zealand has joined the Asian Development Bank Climate Action Catalyst Fund as an observer to gain insight into Article 6 operations and transactions, and to support the Asian Development Bank's efforts to build Article 6 readiness in developing member countries.

Support for developing countries

New Zealand contributes to the global goal of enabling developing countries to take meaningful action to address climate change.

In 2021, New Zealand made a NZ$1.3 billion climate finance commitment for 2022–25 and during 2021–22 contributed nearly NZ$235.69 million in climate-specific support to developing countries through the International Development Cooperation programme. This included support on agriculture, food security, disaster preparedness, ecosystem strengthening, renewable energy, infrastructure and water security.

New Zealand continues to support various multilateral financial institutions, including regional development banks, contributing NZ$11.77 million in 2021–22.

New Zealand is committed to strengthening the capability and capacity of development partners to respond to climate change and supports renewable energy projects, education in smart horticulture practices, and provides governance advice for climate change policy development and implementation.

Chapter 1

National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases

Key messages

In 2022, New Zealand's gross emissions were 78.4 million tonnes of carbon dioxide equivalent (Mt CO_2e).

The two biggest contributing sectors in 2022 were Agriculture (53 per cent) and Energy (37 per cent).

Together, methane and nitrous oxide, largely from agricultural sources, made up over half of New Zealand's gross emissions (49 and 9 per cent, respectively) in 2022. The remaining emissions consisted mostly of carbon dioxide (40 per cent), largely from the Energy and Industrial Processes and Product Use sectors.

Gross emissions increased by 14 per cent since 1990 (the base year for United Nations Framework Convention on Climate Change reporting).

New Zealand's gross emissions peaked in 2006, then steadied, and have been declining since 2019. Between 2006 and 2022, emissions have decreased by 8.4 per cent.

In 2022, New Zealand's net emissions were 59.2 Mt CO_2e. Net removals from the Land Use, Land-Use Change and Forestry (LULUCF) sector offset 25 per cent of gross emissions.

Net emission trends are influenced by forest planting cycles. However, since 1990, the LULUCF sector has remained a net carbon sink.

1.1 Introduction

This section summarises New Zealand's emissions profile and trends since 1990, based on *New Zealand's Greenhouse Gas Inventory* (the Inventory).

The Inventory is the official annual estimate of all anthropogenic (human-induced) emissions and removals of greenhouse gases (GHGs) in New Zealand. It provides the official basis for measuring New Zealand's progress under the United Nations Framework Convention on Climate Change and the Paris Agreement, and for tracking towards its emissions reduction targets.

New Zealand's GHGs are reported under five sectors: Energy; Industrial Processes and Product Use (IPPU); Agriculture; Land Use, Land-Use Change and Forestry (LULUCF); and Waste. Tokelau's emissions are reported separately in the 'Other' sector.[1]

Inventory reporting covers seven direct GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3[2]). These are the most important GHGs that human activity directly emits. New Zealand also includes estimates of indirect GHGs in the Inventory; however, estimates of total national emissions include only emissions and removals of the seven direct GHGs listed above.

For more information, see *New Zealand's Greenhouse Gas Inventory 1990–2022*.[3]

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1 New Zealand's ratification of the United Nations Framework Convention on Climate Change and the Paris Agreement was extended to include Tokelau, a non-self-governing territory of New Zealand, on 13 November 2017. For this reason, New Zealand has included GHG emissions and removals estimates from Tokelau in the Inventory since its 2019 submission.

2 NF_3 emissions do not occur in New Zealand.

3 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

1.2 National greenhouse gas emissions and removals

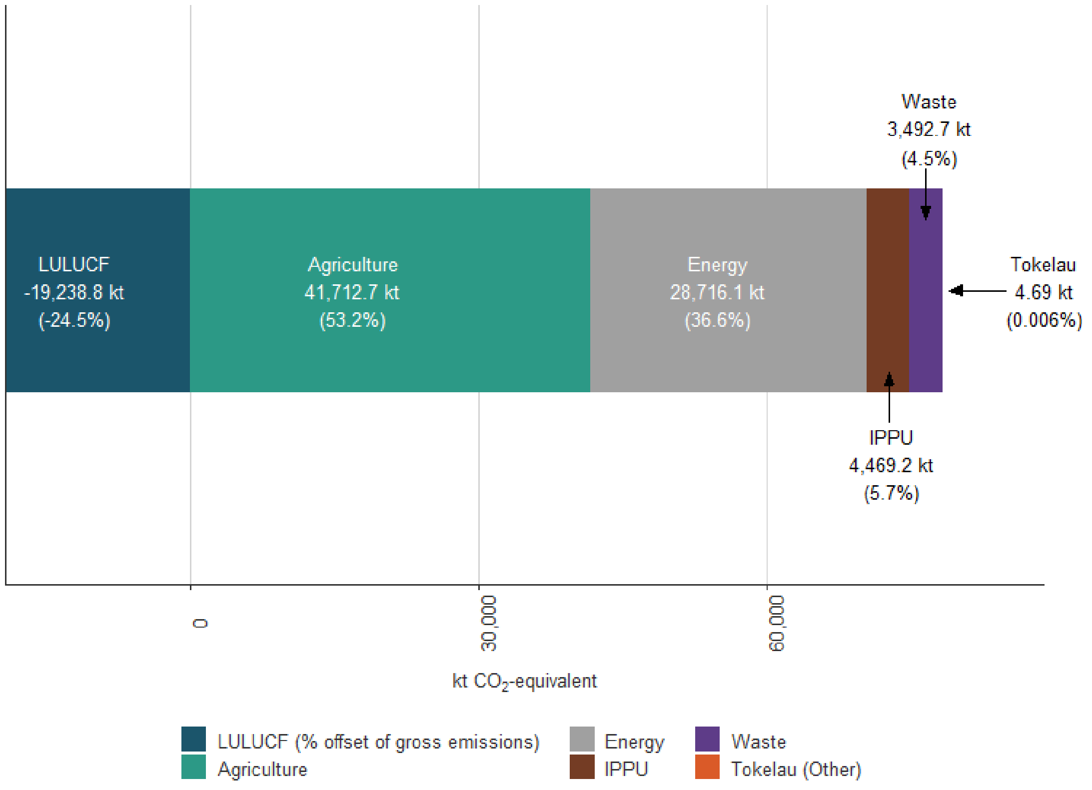
1.2.1 Emissions in 2022

In 2022, New Zealand's gross emissions were 78,395.4 kilotonnes of carbon dioxide equivalent (kt CO_2e). Gross emissions are total emissions from the Agriculture, Energy, IPPU and Waste sectors, as well as emissions from Tokelau.

New Zealand's gross emissions by sector reflect the relative contribution of each sector to the national economy. The Agriculture sector contributed 53.2 per cent of New Zealand's gross emissions in 2022. The Energy sector contributed 36.6 per cent of the national gross emissions, while the IPPU sector contributed 5.7 per cent and the Waste sector 4.5 per cent (figure 1.1). Emissions from Tokelau contributed 0.006 per cent of the national gross emissions.

The LULUCF sector currently represents a sink, with a net emissions value of –19,238.8 kt CO_2e in 2022. This net value offset 24.5 per cent of New Zealand's gross emissions in 2022, bringing net emissions down to 59,156.6 kt CO_2e.

Figure 1.1: New Zealand's greenhouse gas emissions by sector, 2022

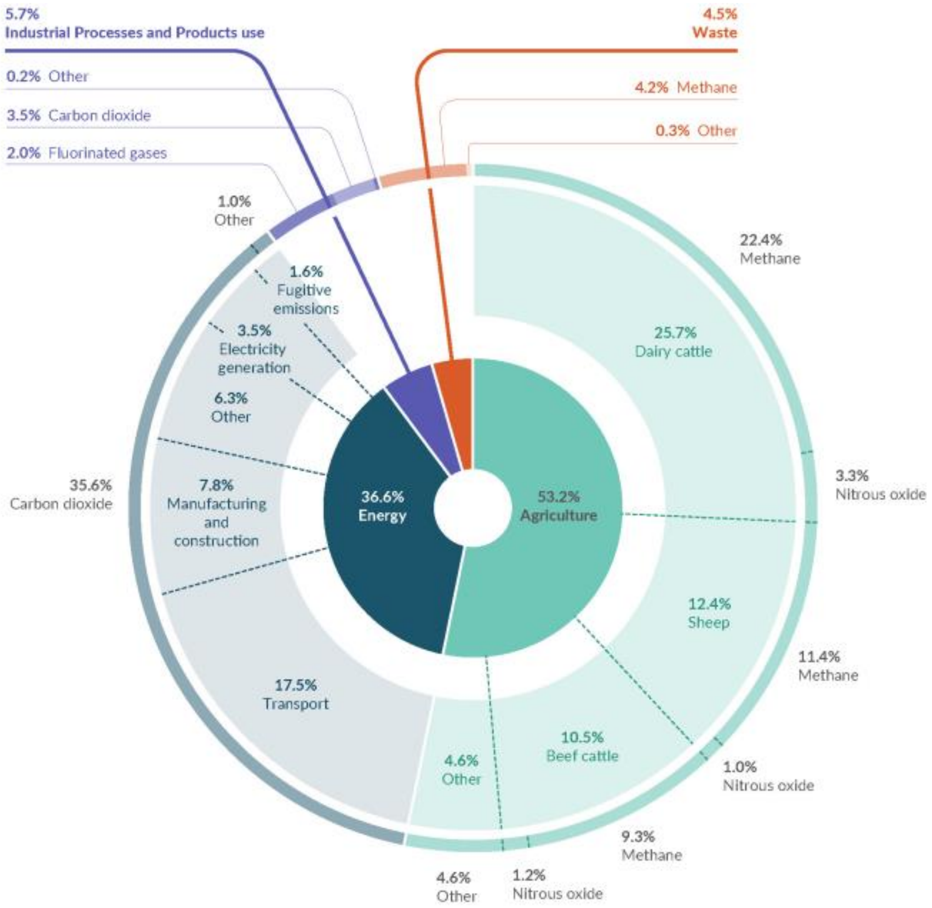


Note: IPPU = Industrial Processes and Product Use; kt CO_2equivalent = kilotonnes of carbon dioxide equivalent; LULUCF = Land Use, Land-Use Change and Forestry. The percentages may not add up to 100 per cent due to rounding. The LULUCF sector, which is not a part of gross emissions, is included here as a negative value. The Tokelau sector is not visible due to its small contribution (4.7 kt CO_2e or 0.006 per cent of New Zealand's gross GHG emissions).

Source: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

Among the GHGs contributing to gross emissions in 2022, CH_4 (48.9 per cent) and N_2O (8.8 per cent) together made up over half of gross emissions, largely coming from agricultural sources (figure 1.2). Most of the remaining emissions consisted of CO_2 (40.3 per cent), largely coming from the Energy and IPPU sectors. Combined fluorinated gases, largely from the IPPU sector, made up 2.0 per cent of emissions.

Figure 1.2: Percentage of New Zealand's gross greenhouse gas emissions by sector, category and gas type, 2022



Source: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022: Snapshot.* Wellington: Ministry for the Environment.

1.2.2 Trends in gross and net emissions between 1990 and 2022

1.2.2.1 Gross emissions

In 1990, New Zealand's gross GHG emissions were 68,958.2 kt CO_2e. Between 1990 and 2022, New Zealand's gross greenhouse gas emissions increased by 13.7 per cent. The average annual growth in emissions was 0.6 per cent. Table 1.1 shows the emissions by sector across the time series 1990–2022.

The five emission sources that contributed most to the increase since 1990 were:

- enteric fermentation from dairy cattle, largely due to an increase in the dairy cattle population (CH_4) (an increase of 9,018.2 kt CO_2e)
- road transportation, due to traffic growth (CO_2) (an increase of 5,694.1 kt CO_2e)

- agricultural soils, due to increased fertiliser use (N_2O) (an increase of 1,653.5 kt CO_2e)
- increasing use of fluorinated alternatives mainly in refrigeration and air-conditioning systems that replaced ozone-depleting substances (HFCs) (an increase of 1,498.3 kt CO_2e)
- fuel use in manufacturing and construction, because greater economic activity led to increased production (CO_2) (an increase of 1,342.4 kt CO_2e).

Between 1990 and 2022, emissions from all GHGs have increased: CO_2 (24.0 per cent), CH_4 (2.2 per cent), N_2O (34.8 per cent) and combined fluorinated gases (87.1 per cent) (table 1.2). For CO_2, the greatest increase occurred between 1990 and 2008; the following period was relatively stable and since then, from 2019, emissions of CO_2 have been largely tracking downwards. For CH_4, emissions increased between 1990 and 2006, and since then have been declining slightly.

New Zealand's gross emissions peaked in 2006 and were relatively stable through to 2019 (figure 1.3). However, since 2019, emissions have successively declined year on year. Between 2006 and 2022, emissions have decreased by 8.4 per cent.

Table 1.1: New Zealand's emissions by sector, 1990 and 2022

Sector	1990	2022	Change from 1990 (kt CO_2e)	Change from 1990 (%)
Energy	23,998.3	28,716.1	4,717.8	19.7
IPPU	3,478.2	4,469.2	990.9	28.5
Agriculture	37,121.5	41,712.7	4,591.2	12.4
Waste	4,356.7	3,492.7	–864.0	–19.8
Tokelau	3.4	4.7	1.3	38.9
Gross	**68,958.2**	**78,395.4**	**9,437.2**	**13.7**
LULUCF	–24,324.6	–19,238.8	5,085.8	20.9
Net	**44,633.6**	**59,156.6**	**14,523.0**	**32.5**

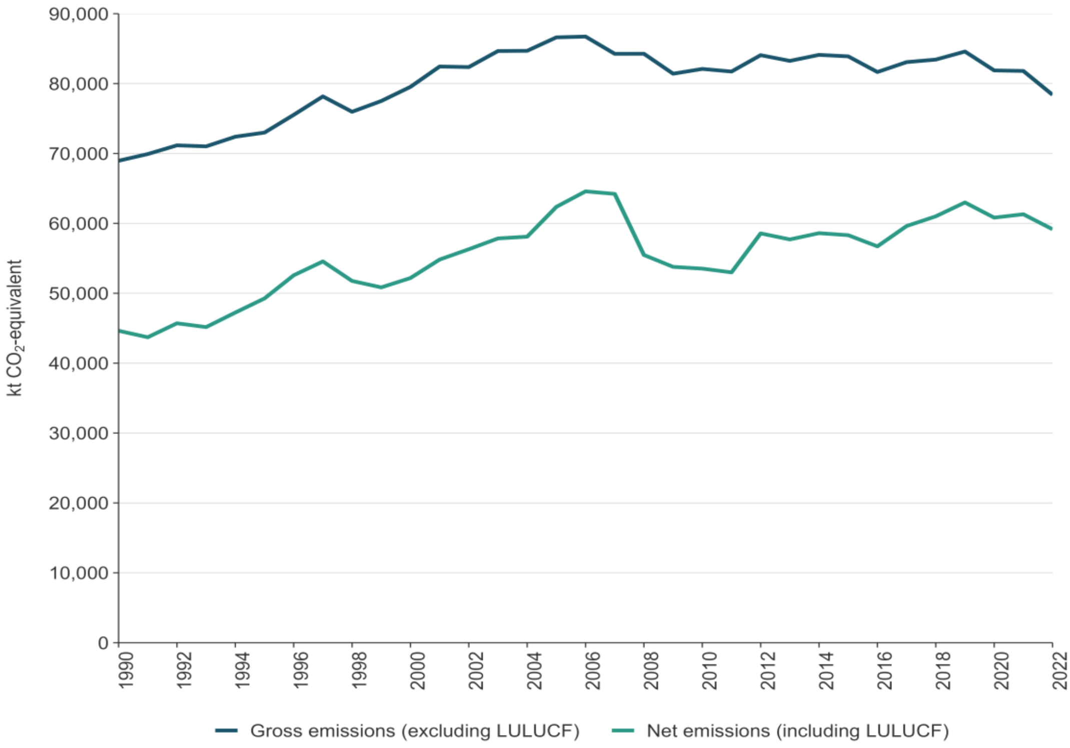
Note: IPPU = Industrial Processes and Product Use; kt CO_2e = kilotonnes of carbon dioxide equivalent; LULUCF = Land Use, Land-Use Change and Forestry. Net emissions from the LULUCF sector are reported as a negative number because the sector removes more CO_2 from the atmosphere than it emits. Columns may not total due to rounding. Percentages presented are calculated from unrounded values.

Table 1.2: New Zealand's gross emissions by gas, 1990 and 2022

Direct greenhouse gas emissions	1990	2022	Change from 1990 (kt CO_2e)	Change from 1990 (%)
CO_2	25,497.2	31,610.1	6,112.9	24.0
CH_4	37,519.7	38,339.3	819.6	2.2
N_2O	5,102.7	6,877.1	1,774.4	34.8
HFCs	Not occurring	1,498.5	1,498.5	NA
PFCs	818.0	50.9	–767.1	–93.8
SF_6	20.6	19.4	–1.2	–5.7
Gross, all gases	**68,958.2**	**78,395.4**	**9,437.2**	**13.7**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; kt CO_2e = kilotonnes of carbon dioxide equivalent; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride. Gross emissions exclude net emissions from the LULUCF sector. The percentage change for HFCs is not applicable (NA) because no emissions of HFCs occurred in 1990. Columns may not total due to rounding. Percentages presented are calculated from unrounded values.

Figure 1.3: New Zealand's gross and net emissions, 1990–2022



Note: kt CO_2 equivalent = kilotonnes of carbon dioxide equivalent; LULUCF = Land Use, Land-Use Change and Forestry.

Source: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

1.2.2.2 Net emissions

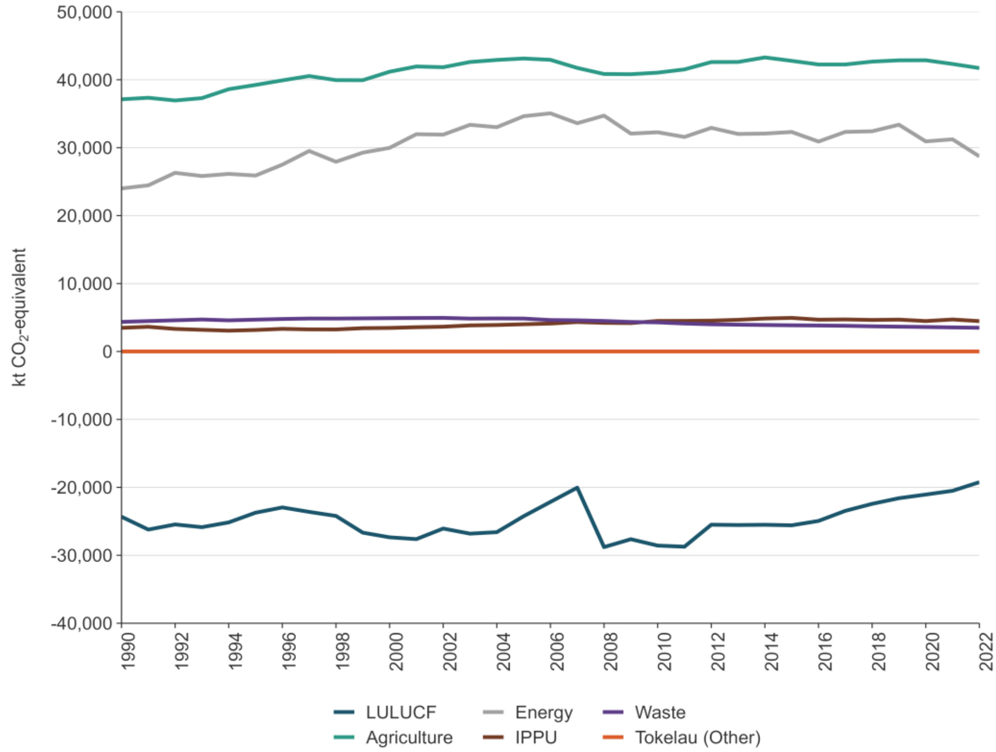
In 1990, New Zealand's net emissions were 44,633.6 kt CO_2e. Between 1990 and 2022, net GHG emissions increased by 32.5 per cent (14,523.0 kt CO_2e) to 59,156.6 kt CO_2e.

The main reasons for the increase in net emissions were the underlying increase in gross emissions, and the impact of harvesting cycles on emissions from the LULUCF sector.

New Zealand's net emissions trends are heavily influenced by forest planting and harvest cycles that affect the LULUCF sector. Net emissions in the LULUCF sector have been generally increasing over the past decade. Current harvest rates are close to historically high levels due to the establishment of significant plantation forests from the 1980s and into the early 1990s. The forests that were established during this period have progressively been reaching maturity, and will continue to do so throughout the 2020s. While harvesting rates remain high and harvested forests are replanted, the average age of the planted forest estate is reduced each year. Young stands have low growth rates compared with older, faster-growing stands. In the future, as the harvest rate declines and growth rates of replanted forest stands increase, net removals are likely to increase.

Figure 1.4 shows the contribution to net emissions that each Inventory sector has made since 1990. The Agriculture and Energy sectors dominated New Zealand's gross emissions. Together, these sectors produced 89.5 per cent of New Zealand's annual gross GHG emissions from 1990 to 2022. The IPPU and Waste sectors produced relatively small amounts of GHGs, contributing between 4 per cent and 7 per cent of the annual gross emissions for the entire time series. Conversely, the LULUCF sector was a net sink of GHG emissions between 1990 and 2022.

Figure 1.4: Trends in New Zealand's greenhouse gas emissions by sector, 1990–2022



Note: IPPU = Industrial Processes and Product Use; kt CO_2 equivalent = kilotonnes of carbon dioxide equivalent; LULUCF = Land Use, Land-Use Change and Forestry.

Source: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

Chapter 2

Information necessary to track progress made in implementing and achieving nationally determined contributions under Article 4 of Paris Agreement

2.1 National circumstances and institutional arrangements

Key messages

New Zealand is a long, mountainous country in the southwest Pacific Ocean with a temperate, oceanic climate.

Due to New Zealand's widely distributed population of 5.3 million people, road transport is the main form of transport.

Since 1990, New Zealand has experienced high population growth. New Zealand's economy has been growing faster than its emissions, showing some signs that economic growth is decoupling from emissions. Gross emissions peaked in 2006 and have consistently declined since 2019, while emissions intensity has been improving from 2010.

In 2023, 88 per cent of electricity generation came from renewable sources – primarily hydro, geothermal and wind – contributing to relatively low emissions from the energy sector.

New Zealand's agricultural sector is largely pastoral. It is fundamental to the economy, with products exported to countries all over the world. This means New Zealand has an unusual emissions profile, with over 50 per cent of gross emissions from agriculture, and nearly 50 per cent from methane.

Greenhouse gas emissions are susceptible to year-to-year variation due to localised events, such as droughts and earthquakes.

The Climate Change Response Act 2002 is New Zealand's primary climate change legislation. It sets the legal framework, the Zero Carbon Framework, for New Zealand to meet its obligations under the United Nations Framework Convention on Climate Change and the Paris Agreement.

The Zero Carbon Framework sets out the main framework by which New Zealand can develop and implement clear and stable climate change policies that:

- contribute to the global effort under the Paris Agreement
- allow New Zealand to set and meet domestic emissions reduction targets, and to prepare for, and adapt to, the effects of climate change.

2.1.1 Government structure

2.1.1.1 Central government

New Zealand's central government is formed from a democratically elected House of Representatives. The Government advises New Zealand's head of state, King Charles III (the Sovereign). The Sovereign is the source of all executive legal authority in New Zealand but acts on the advice of the Government in all but the most exceptional circumstances. This system is known as a constitutional monarchy. The Sovereign is represented in New Zealand by a Governor-General, currently Her Excellency The Right Honourable Dame Cindy Kiro. The Governor-General carries out the King's constitutional and ceremonial duties.

Parliament consists of the House of Representatives and the Sovereign. The principal functions of Parliament are to enact laws and to hold the Government to account over its policies, actions and spending. Since 1996, members of Parliament have been elected using a mixed member proportional representation system. There are six parliamentary parties in the current 54th Parliament.

2.1.1.2 Te Tiriti o Waitangi – New Zealand's founding document

New Zealand is founded on a partnership between the Crown and indigenous New Zealanders, Māori, through te Tiriti o Waitangi (the Treaty of Waitangi) signed in 1840. The relationship between the Crown and Māori is governed by te Tiriti o Waitangi. The Waitangi Tribunal and the courts have derived guiding principles from te Tiriti, including the key principles of partnership, participation and protection.

The Climate Change Response Act 2002 is New Zealand's primary climate change legislation, administered by the Ministry for the Environment | Manatū Mō Te Taiao (MfE). It contains clauses requiring the Crown to take into account the principles of te Tiriti. Te Tiriti o Waitangi has significant implications for climate change policy because the Crown has a duty to actively protect Māori lands, estates, forests, fisheries and other taonga (treasures), and must enable Māori to protect these taonga.[4]

In 1989, the Crown established the Office of Treaty Settlements (now Te Kāhui Whakatau within the Office for Māori Crown Relations | Te Arawhiti). Treaty settlements are intended to address the historical grievances of iwi (tribe) and hapū (subtribe) groups that resulted from the Crown's breaches of te Tiriti.[5]

Enacted settlements establish legal rights and obligations that the Crown must be aware of when developing new policy to ensure it does not inadvertently breach these rights. Policies that do not consider Treaty settlements have the potential to undermine the relationship between settled groups and the Crown.

Climate change will affect Māori as tangata whenua (people of the land) and kaitiaki (guardians) of their ancestral and cultural landscape. Certain whānau (families), hapū and iwi will be disproportionately affected, as will Māori interests, values, practices and wellbeing.[6] Many Māori communities are located in rural and remote areas, and are particularly vulnerable to the effects of climate change on their homes, infrastructure and sites of cultural significance to Māori – including marae (courtyard), urupā (burial grounds), wāhi tapu (sacred sites) and mahinga kai (food-gathering places). In accordance with the principles of te Tiriti, the Government and Māori will together need to make climate change decisions in a way that balances kāwanatanga (the Government's right to govern) with rangatiratanga (the Māori right to make decisions for Māori).[7]

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4 Jones C. 2016. *New Treaty New Tradition: Reconciling New Zealand and Māori Law*. Wellington: Victoria University Press.

5 An iwi is one of the largest kinship groupings and is generally made up of several hapū that are all descended from a common ancestor. Hapū are clusters of whānau, where the whānau is usually an extended family grouping consisting of children, parents, often grandparents and other closely related kin.

6 Ministry for the Environment. 2022. *Climate action for Māori: The national adaptation plan.* Wellington: Ministry for the Environment.

7 Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington: Ministry for the Environment.

2.1.1.3 Central government roles and responsibilities in relation to climate change

New Zealand's response to climate change is led by the Government, with portfolio responsibilities at the ministerial level resting with the Minister for Climate Change. However, the breadth of climate-related activities and policy means that many other ministers play a significant role – notably the Ministers for Agriculture, Energy, Transport and the Environment.

The Ministry for the Environment (MfE) is the primary agency providing advice to the Minister for Climate Change on climate issues and policy. MfE is also responsible for reporting on climate change. However, various other agencies are also significantly involved in providing advice and reporting related to climate change.

Managing New Zealand's response to climate change is a cross-government effort with other agencies having major roles alongside MfE.[8] The Climate Change Chief Executives Board was established in 2022 to provide a coordinated approach to achieving New Zealand's climate goals and targets (see section 2.1.8.3 for further details).

2.1.1.4 Local government

New Zealand has 78 local authorities, comprising 11 regional councils, 61 territorial authorities and 6 unitary councils (which are territorial authorities with regional council responsibilities). Due to devolved decision-making, local authorities are largely independent of the central executive government. They have their own sources of income independent of central government, including from council-owned enterprises and taxes on land and property.

Local government has functions and responsibilities relating to managing natural hazard and climate change effects under the Local Government Act 2022, the Resource Management Act 1991 and other legislation. These include a requirement to plan for the future in terms of managing the effects of land use, avoiding and mitigating natural hazards, and having particular regard to the effects of climate change. In particular, regional councils have responsibility for: managing water, air and land resources where there are regionally significant management issues; biosecurity; natural hazards; emergencies; and regional land transport. For city and district councils, responsibilities include: land-use planning; building control; emergency management; waste management and minimisation; and the provision of local infrastructure and community services.

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8 For more detail on the roles of individual agencies, see Public Service Commission. *Central government organisations*. Retrieved 12 November 2024.

2.1.2 Population profile

New Zealand's resident population – the population living in New Zealand – was just over 5.3 million at March 2024.[9] The majority of the population is urbanised and around 76 per cent live in the North Island;[10] the largest city is Auckland and 33.3 per cent of the total population live within the greater Auckland area (as of June 2023).[11] Population density is relatively low, with an average of just under 20 people per square kilometre (km^2).[12]

New Zealand's population is growing. It has increased by an average of 1.3 per cent per year between 1990 and 2023.[13] New Zealand's population growth rate peaked at 2.2 per cent as of July 2015 but reduced significantly to 0.7 per cent in 2020 and 0.5 per cent in 2021. More recently the annual growth rate has increased to 0.8 per cent as of July 2023.

COVID-19 had a significant impact on international travel and migration from 2020, which accounts for some of the decrease in population growth rate. The population growth rate is projected to increase in the 2020s, before slowing in the long term out to 2073. The long-term trend is driven by the narrowing gap between births and deaths (natural increase).[14]

Net migration (migrants entering New Zealand minus those leaving) has varied greatly over the years as a result of economic factors, labour market conditions and immigration policy in New Zealand and other countries. As noted, the COVID-19 pandemic also had a significant impact. Between 2020 and 2022, border restrictions as a result of the pandemic caused New Zealand to experience net migration losses for the years 2020–22 inclusive. Since border restrictions ended, New Zealand has experienced a significant net migration loss of over 50,000 New Zealand citizens in the year ended March 2024.[15] Despite this, a strong increase in migration of people who are not New Zealand citizens into New Zealand has resulted in an overall increase in net migration.[16]

2.1.3 Geographical profile

New Zealand is a long, narrow and mountainous country. It consists of two large islands, the North Island and the South Island, and a number of smaller islands. The two main islands are located in the southwest Pacific Ocean between 33 and 47 degrees latitude south. The nearest large land mass, Australia, is more than 2,000 km away.

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9 Stats NZ. 2024. *Table Reference: DPE055AA*.

10 Stats NZ. 2023. *Table Reference: DPE051AA*.

11 Stats NZ. 2024. *Table Reference: DPE051AA*.

12 Calculated by taking estimated resident population as of June 2023 and dividing by the combined area of the North and South Islands, as provided by Walrond C. 2005. Natural environment: Geography and geology. *Te Ara – the Encyclopedia of New Zealand.*

13 United Nations. Department of Economic and Social Affairs, Population Division. 2024. *World population prospects 2024*.

14 Stats NZ. 2022. *National population projections: 2022(base)–2073*.

15 Stats NZ. 2024. *Net migration loss of New Zealand citizens exceeds 50,000*.

16 Stats NZ. 2024. *Net migration remains near record level*.

New Zealand has a combined land area of around 27 million hectares (ha) and is similar in size to Japan or the United Kingdom. It has approximately 15,000 km of coastline and its Exclusive Economic Zone (EEZ) is the fourth largest in the world.[17] Combined, New Zealand's EEZ and territorial sea cover 4.4 million km^2.

New Zealand straddles the boundary of the Pacific and Australian tectonic plates. The resulting earth movements have produced hilly and mountainous terrain over two-thirds of the land. Earthquakes occur frequently in most parts of the country. There is also a zone of volcanic and geothermal activity in the central North Island. The diverse topography and climate have created a wide variety of ecosystems ranging from high alpine to warm temperate forests, including 72 types of naturally uncommon ecosystems.[18]

After New Zealand's land mass broke away from the Gondwana supercontinent around 80 million years ago, plants and animals evolved in isolation for millions of years almost entirely without the presence of terrestrial mammals. As a result, many of the country's estimated 80,000 species of native animals, plants and fungi are found nowhere else in the world.[19]

Today, grassland for agriculture, natural forest and planted forestry form New Zealand's main land covers. Around one-third of the land area is protected for conservation purposes.

2.1.4 Economic profile

New Zealand has an export-dependent economy that operates on free market principles. In the year ended March 2024, nominal gross domestic product (GDP) was NZ$410.0 billion.[20] Between 1990 and 2024, the economy has grown at an average annual rate of 2.6 per cent.[21]

The COVID-19 pandemic and associated responses generated unprecedented changes in the measured GDP. New Zealand's economic activity was significantly impacted by nationwide lockdowns in 2020 and 2021. As restrictions eased, New Zealand experienced large increases in economic activity as indicated by record increases in GDP in the September 2020 quarter and December 2021 quarter following respective lockdown periods in 2020 and 2021.[22]

Since December 2021, GDP growth has fluctuated between growth and decrease over different quarterly periods. Most recently, New Zealand's GDP rose 0.2 per cent in the March 2024 quarter following 2023 decreases of 0.1 per cent in the December quarter and 0.3 per cent in the September quarter.[23]

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17 Ministry for the Environment and Stats NZ. 2022. *New Zealand's Environmental Reporting Series: Our marine environment 2022.* Wellington: Ministry for the Environment and Stats NZ.

18 Williams PA, Wiser A, Clarkson B, Stanley MC. 2007. New Zealand's historically rare terrestrial ecosystems set in a physical and physiognomic framework. *New Zealand Journal of Ecology* 31(2): 119–128.

19 Convention on Biological Diversity. *New Zealand – main details.* Retrieved 28 August 2024.

20 Stats NZ. 2024. *Gross domestic product (GDP).*

21 Annual average calculated based on percentage change from same quarter previous year, ie 2021, Q1 vs 2022, Q1. Stats NZ. 2024. *Table Reference: SNE181AA.*

22 Stats NZ. 2022. *Gross domestic product: March 2022 quarter.*

23 Stats NZ. 2024. *Gross domestic product: March 2024.*

The economy is based on the provision of services, which make up roughly two-thirds of the total GDP, and the manufacturing and primary sectors. The primary sector (agricultural, horticultural, forestry, mining and fishing industries) plays a fundamental role in the export sector and in employment. The primary sector directly accounts for around 7.8 per cent of GDP[24] and contributed over half of New Zealand's total export earnings in the year ended March 2024.[25] In 2023, the primary sector employed 164,700 people, accounting for 5.7 per cent of all employed people.[26]

The relationship between emissions and GDP over time depends on several factors, including the composition of the economy and the emissions intensities of industries.[27] Gross emissions peaked in 2006 and have consistently declined since 2019; however, emissions intensity has been improving since at least 2010. The overall emissions intensity of the New Zealand economy (ie, industry emissions/GDP) is 35.0 per cent lower in the March 2024 quarter compared with the March 2010 quarter.[28]

2.1.4.1 Exports

New Zealand's total exports of goods and services were valued at NZ$96.1 billion for the year ended March 2024. China was its main export market, accounting for 21.8 per cent of total exports (NZ$20.9 billion), followed by the United States (15.2 per cent, NZ$14.6 billion), Australia (15.2 per cent, NZ$14.6 billion) and Japan (4.4 per cent, NZ$4.2 billion).[29]

New Zealand is the world's 15th-largest agricultural exporter by value in 2022 according to the World Trade Organisation, and the largest single country exporter of dairy products. For New Zealand's major primary sectors – meat, dairy, fisheries, wine, forestry and some horticulture products – between 70 per cent and 95 per cent of the output they produce is exported.[30]

Dairy products were New Zealand's largest export earner in the year ending March 2024, accounting for 20.8 per cent of exports at NZ$20 billion.[31] In the same year, the next largest groups of export goods were meat products at 9 per cent of total exports, and wood products at 5 per cent. The largest service export was the travel service, which contributed NZ$13.5 billion (14.1 per cent) of total export goods and services.

Before 2021, international tourism was a significant export earner for New Zealand, compared with traditional export products in the primary sector. Following border closures due to the COVID-19 pandemic, international tourism expenditure fell substantially from $17.7 billion in the year ended March 2020 to $1.5 billion in the year ended March 2021. However, since border restrictions ended, international tourism has increased. In the year ended March 2023, international tourism expenditure was estimated to be NZ$10.8 billion,

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24 Stats NZ. 2023. *National accounts (industry production and investment): Year ended March 2022*.

25 Stats NZ. *New Zealand Trade Dashboard*. Retrieved 12 November 2024.

26 Stats NZ. 2024. *Table Reference: HLF137AA*.

27 Energy intensity is calculated as energy use divided by GDP and tells us the amount of energy required to produce each dollar of GDP.

28 Stats NZ. 2024. *Greenhouse gas emissions (industry and household): March 2024 quarter*.

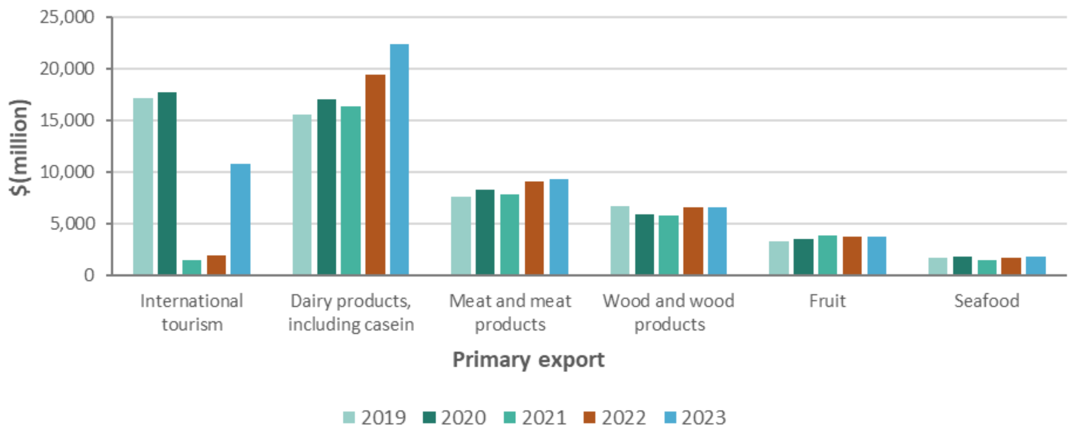
29 Stats NZ. *New Zealand Trade Dashboard*. Retrieved 12 November 2024.

30 Ministry of Foreign Affairs and Trade. *NZ trade policy*. Retrieved 29 August 2024.

31 Stats NZ. *New Zealand Trade Dashboard*. Retrieved 12 November 2024.

an increase of 456.9 per cent from the previous year but still $6.9 billion below pre-pandemic levels (figure 2.1.1).[32]

Figure 2.1.1: International tourism expenditure compared with value of selected primary exports (NZ$ million), year ended March 2019–2023



Source: Stats NZ. 2024. *Tourism satellite account: Year ended March 2023*.

2.1.4.2 Imports

New Zealand's goods and services imports were valued at NZ$105.3 billion in the year ending March 2024.[33] China was the source of the country's highest proportion of imports, accounting for 16.2 per cent ($17.1 billion) of the total, followed by Australia (15.7 per cent, $16.49 billion) and the United States (10.6 per cent, $11.14 billion).

In the same year, the mechanical machinery category contributed the most to New Zealand's total imports at 9.9 per cent ($10.45 billion), closely followed by the vehicles category at 9.7 per cent ($10.21 billion). The mineral fuels and oils category was the next largest import at 9.6 per cent ($10.14 billion) of total imports.

2.1.5 Climate profile

2.1.5.1 Current climate

New Zealand has climate zones ranging from subtropical to subantarctic. The climate is heavily influenced by the country's location in a latitudinal zone with prevailing westerly winds, and by the surrounding ocean. It is also influenced by mountain chains that modify the weather systems as they sweep eastward. This leads to more rainfall in the west and drier conditions in the east. The average rainfall in most areas is between 600 and 1,600 millimetres (mm) a year. In the mountain ranges, annual rainfall often exceeds 5,000 mm, and in the Southern Alps it can be more than 10,000 mm. However, areas to the east of the main ranges have an average rainfall of less than 600 mm a year.[34, 35]

32 Stats NZ. 2024. *Tourism satellite account: Year ended March 2023*. Wellington: Stats NZ.

33 Stats NZ. *New Zealand Trade Dashboard*. Retrieved 12 November 2024.

34 National Institute of Water and Atmospheric Research. 2017. *Overview of New Zealand's Climate*.

35 National Institute of Water and Atmospheric Research. 2024. *Aotearoa New Zealand Climate Summary: 2023*.

Average annual temperatures range from 10 degrees Celsius in the southern part of New Zealand to 16 degrees Celsius in the north.[36] In areas inland and to the east of the main ranges, temperatures fluctuate by up to 14 degrees Celsius between seasons, but generally the changes between summer and winter temperatures are small. On average, most of the country receives between 1,700 and 2,100 sunshine hours annually.[37]

New Zealand is already experiencing changes in climate due to climate change, with an increase in average annual temperature of 1.1 degrees Celsius over the past 100 years.[38] 2022 was the warmest year on record, surpassing previous records set in 2021 and 2016, while 2023 was the second-warmest year on record.[39]

Sea-level rise is accelerating globally, rising by an average rate of 3.7 mm per year between 2006 and 2018.[40] New Zealand's long-term records show rising sea levels (relative to land) of 1.88 mm per year, or 0.21 metres on average around New Zealand, from the start of its records in 1901 to 2020.[41] The rate of sea-level rise has also increased. Between 1961 and 2020, the mean rate of sea-level rise was 2.20 mm per year. This rate is almost double the mean rate in the 60 years before this time period, which was 1.27 mm per year between the start of New Zealand's records and 1960.[42]

2.1.5.2 Projected changes in climate

Climate change projections for New Zealand show further warming by 2090, with more hot days and fewer cold days across the country over the next decades. Because of the different possible scenarios for the concentrations of greenhouse gases in the atmosphere, as well as the differences in climate response to those pathways, possible projections for future warming span a wide range: 0.3–1.2 degrees Celsius by 2030, 0.6–2.2 degrees Celsius by 2050 and 0.7–4.7 degrees Celsius by 2090.[43] Further detail on projected climate in New Zealand can be found in section 3.3, chapter 3.

Projected changes in rainfall show a marked seasonality and variability across regions. It is very likely that in winter and spring, rainfall will increase in the west of both the North and South Islands, while the east and north will have drier conditions, caused by a projected increase in the westerly winds over New Zealand during these seasons. For summer, conditions are likely to be wetter in the east of both islands and drier in the west and central North Island. Extreme weather events, such as storms, heatwaves and heavy rainfall, are likely to be more frequent and intense. Tropical cyclones are likely to increase wind intensity and rain rates, and to be

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36 National Institute of Water and Atmospheric Research. 2017. *Overview of New Zealand's Climate*.

37 Stats NZ. 2017. *Sunshine Hours*.

38 Bodeker G, Cullen N, Katurji M, McDonald A, Morgenstern O, Noone D, Renwick J, Revell, L, Tait A. 2022. *Aotearoa New Zealand Climate Change Projections Guidance: Interpreting the Latest IPCC WG1 Findings.* Prepared for the Ministry for the Environment.

39 National Institute of Water and Atmospheric Research. 2024. *Aotearoa New Zealand Climate Summary: 2023*.

40 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*. Cambridge: Intergovernmental Panel on Climate Change.

41 This occurred, on average, across the four main port records. See Stats NZ. 2022. *Coastal sea-level rise*.

42 Stats NZ. 2022. *Coastal sea-level rise*.

43 Ministry for the Environment. 2024. *Climate Projections Dataset.*

stronger and cause more damage. Drought severity is projected to increase in most areas of the country, except for Taranaki–Manawatū, West Coast and Southland.[44]

2.1.6 Sector details

2.1.6.1 Energy

The energy sector (including transport) is the second-largest contributor to New Zealand's gross greenhouse gas emissions at 36.6 per cent in 2022.[45] Since 1990, energy intensity has fallen as economic activity shifts to less energy-intensive sectors (such as the commercial sector), which need less energy to produce each dollar of GDP. As a result, the overall energy intensity of the economy has improved by 1.7 per cent on average between the years 1990 and 2023.[46] In 2023, energy intensity decreased by 0.6 per cent compared with 2022.

New Zealand's total primary energy supply (TPES) was 851 petajoules (PJ) in 2023.[47] TPES is a measure of the amount of energy available for use in New Zealand.[48] Renewable energy contributed 43 per cent to the 2023 TPES. The majority of the remainder of the TPES was oil (35 per cent) and natural gas (18 per cent). Primary energy supply increased from 1990 to 2014, driven by geothermal energy and fossil oil; however, it has been declining since 2017.

New Zealand's energy self-sufficiency, a measure of how well the country can meet its own energy needs with domestic production, was 73 per cent in 2023.[49] Energy self-sufficiency peaked in 2010 at 92.5 per cent due to historically high oil, natural gas and coal production. Some coal and oil products are currently imported, while New Zealand currently meets all its natural gas needs through indigenous production. However, domestic gas production capacity is projected to fall below demand from 2024, and so future demand may fall unless alternative supply sources are found. Additional sources may include expanded domestic gas production, imports of liquefied natural gas, or renewable gas production.

2.1.6.1.1 Electricity

New Zealand has abundant renewable energy resources and a long history of renewable energy development. As a result, the majority of New Zealand's electricity generation comes from renewable sources (88.1 per cent in 2023). For the 2023 calendar year, hydro generation provided 60.5 per cent of New Zealand's electricity. A further 17.8 per cent came from geothermal, 7.4 per cent from wind, 0.9 per cent from wood, 0.6 per cent from biogas and 0.8 per cent from solar. The remaining 11.9 per cent came from non-renewable sources – namely natural gas, coal, oil and waste heat.[50]

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44 Ministry for the Environment. 2024. *Climate Projections Dataset.*

45 All greenhouse gas emissions data in this section are from: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

46 Unless otherwise specified, all information in this section comes from: Ministry of Business, Innovation and Employment. *Energy in New Zealand 2024.* Wellington: MBIE.

47 1 petajoule = 10^{15} joules.

48 TPES is calculated as domestic production plus imports, less exports and energy used for international transport.

49 Energy self-sufficiency is calculated as domestic energy production divided by total primary energy supply.

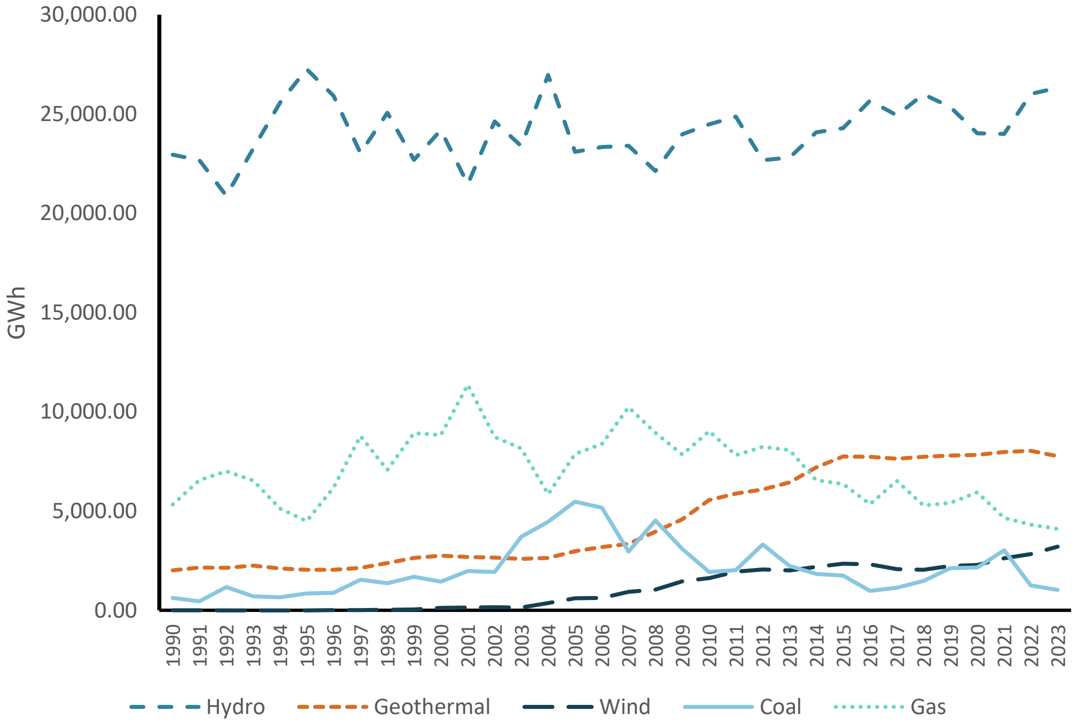
50 Ministry of Business, Innovation and Employment. *Energy in New Zealand 2023.* Wellington: MBIE.

Electricity consumption decreased by 0.2 per cent between 2022 and 2023. The industrial, commercial and residential sectors are the main contributors towards national consumption. In 2022, the public electricity and heat production category contributed 3.5 per cent of New Zealand's gross greenhouse gas emissions, an increase of 22.5 per cent since 1990.[51] However, New Zealand's electricity generation emissions per capita are low compared with many other countries because of the high share of renewable energy.[52] This was especially the case in 2022 when New Zealand was having one of its warmest and wettest years on record, allowing greater hydro-electricity generation.

The proportion of electricity that is generated by hydro power each year changes depending on rainfall. In a dry year, low rainfall can affect hydro inflows, leading to less electricity generation from hydro power. During these years, the shortfall in supply tends to be made up by electricity generation from non-renewable sources, such as coal and natural gas. Figure 2.1.2 shows the close inverse relationship between non-renewable (coal and natural gas) and hydro generation. This relationship has historically influenced the yearly fluctuations seen in the country's total energy generation and gross greenhouse gas emissions.

Figure 2.1.2 also shows that the amount of electricity generated by renewable sources other than hydro has more than tripled since 1990.

Figure 2.1.2: New Zealand's electricity generation by main source (gigawatt hours), 1990–2023



Source: Ministry of Business, Innovation and Employment. 2024. *Electricity Statistics*.

The electricity industry has gone through a long process of reform. Competition in the generation sector was introduced in 1996 with the establishment of a wholesale electricity

51 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

52 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022: Snapshot*. Wellington: Ministry for the Environment.

market. Wholesale electricity is sold by generators and bought by retailers and large industrial users under rules that the Electricity Authority, an independent Crown entity, administers.[53]

The state-owned enterprise Transpower operates the national transmission grid, which conveys electricity from most of the major power stations around the country to local distribution lines. It also conveys electricity directly to major users, such as the New Zealand Aluminium Smelter. There are 27 local distribution network companies in New Zealand, which have a variety of ownership models. Electricity consumers can choose between competing retailers of electricity. There are currently four major generation companies.

2.1.6.1.2 Natural gas

Natural gas is produced in the Taranaki region and is transmitted by pipelines across the North Island to various distribution networks. In 2023, New Zealand produced 148.1 PJ of gas. The majority of this (99.5 per cent) was from 10 gas fields. Further, of the country's total energy consumption (68.7 PJ), 76.7 per cent was used by the industrial sector. The remainder was consumed by the commercial and residential sectors, and the agriculture, forestry and fishing industries. Combustion of natural gas contributed approximately 10 per cent of New Zealand's gross greenhouse gas emissions.[54]

2.1.6.1.3 Oil

All crude oil extraction (crude, condensate, naphtha and natural gas liquids) occurs in the Taranaki region, with the Maari and Pohokura oil fields making up over half of domestic production. In 2023, New Zealand produced 37.7 PJ of crude oil. Oil production peaked in 2008, with an annual production of 128.2 PJ.[55] However, historically almost all of the crude oil produced in New Zealand has been exported, while imports have served domestic petroleum needs.[56] The country's energy emissions are dominated by liquid fuels that are used for transport. Emissions from liquid fuels account for over half of all energy sector emissions in 2022 and have been steadily increasing since 1990.

In 2020, the COVID-19 pandemic reduced transport demand and caused changes in the mix of transport activity (most significantly lowering aviation use). This reduced the need for New Zealand to refine crude oil into oil products, leading to a 15 per cent fall in the import of crude oil and oil products. The month of July 2020 saw no crude oil imports for the first time in 34 years.[57] In 2021, Refining NZ decided to cease oil-refining activities at Marsden Point (New Zealand's only oil refinery) in response to declining margins resulting from international competition. In April 2022, the refinery operations stopped and the site was switched to an import-only terminal, with Refining NZ renaming itself Channel Infrastructure as it pivoted to focus on terminal operations. In 2023, increased transport demand, particularly in aviation, has led to an increase in oil consumption.

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53 For a detailed account, see: Ministry of Business, Innovation and Employment. 2015. *Chronology of New Zealand Electricity Reform*. Wellington: MBIE.

54 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

55 Ministry of Business, Innovation and Employment. 2021. *Data Tables for Oil*.

56 Ministry of Business, Innovation and Employment. 2024. *Energy in New Zealand 2024*. Wellington: MBIE.

57 Ministry of Business, Innovation and Employment. *Energy in New Zealand 2021*. Wellington: MBIE.

2.1.6.1.4 Coal

New Zealand's coal resources are distributed widely on both main islands: in the Waikato and Taranaki regions of the North Island; and in the West Coast, Otago and Southland regions of the South Island. As at the end of 2023, there were 13 operating coal mines. The estimated in-ground resources for all coal types are over 15 billion tonnes. Approximately 80 per cent of this is lignite (low grade) and is used domestically for industrial heat applications.

The volume of bituminous and sub-bituminous in-ground resources is around 4 billion tonnes. Most of the country's bituminous coal production is exported, primarily for metallurgical purposes, accounting for 98.1 per cent of total coal exports in 2023. In total in that year, New Zealand exported 1.2 million tonnes (36.7 PJ) of coal. In 2023, it produced 2.6 million tonnes of coal, a decrease of 1.4 per cent on the previous year. Sub-bituminous coal is used for several purposes in New Zealand, including for electricity generation at the Genesis-owned Huntly power plant. Coal use for electricity is higher in years of low rainfall, as it makes up for shortfalls in electricity production at hydro-electric plants, and high coal use for electricity production can often drive an increase in coal imports.

In 2023, New Zealand consumed 0.9 million tonnes of coal, a decrease of 10.1 per cent from the previous year. Favourable hydrological conditions caused a decrease in coal use for electricity generation in the same year, when electricity generated from coal made up 2.4 per cent of all electricity used.

2.1.6.2 Transport

International aviation and shipping are critical to New Zealand due to its isolated location in the Pacific Ocean and the importance of primary industries exports and tourism to the economy. Domestically, road transport is the central element of the country's transport system, reflecting the small but widely distributed population and long, narrow geography.

Because of New Zealand's sparse population and rural-based economy, its domestic transportation emissions per capita are high compared with many other developed countries. New Zealand has one of the highest rates of car ownership globally, with 822 light vehicles per 1,000 people in 2022.[58] As a result, transport is energy intensive and relies on fossil fuels. In 2022, transport contributed 17.5 per cent of gross domestic greenhouse gas emissions, an increase of 68.5 per cent from 1990.[59] The great majority (90.9 per cent) of these emissions are from road transport (figure 2.1.3).

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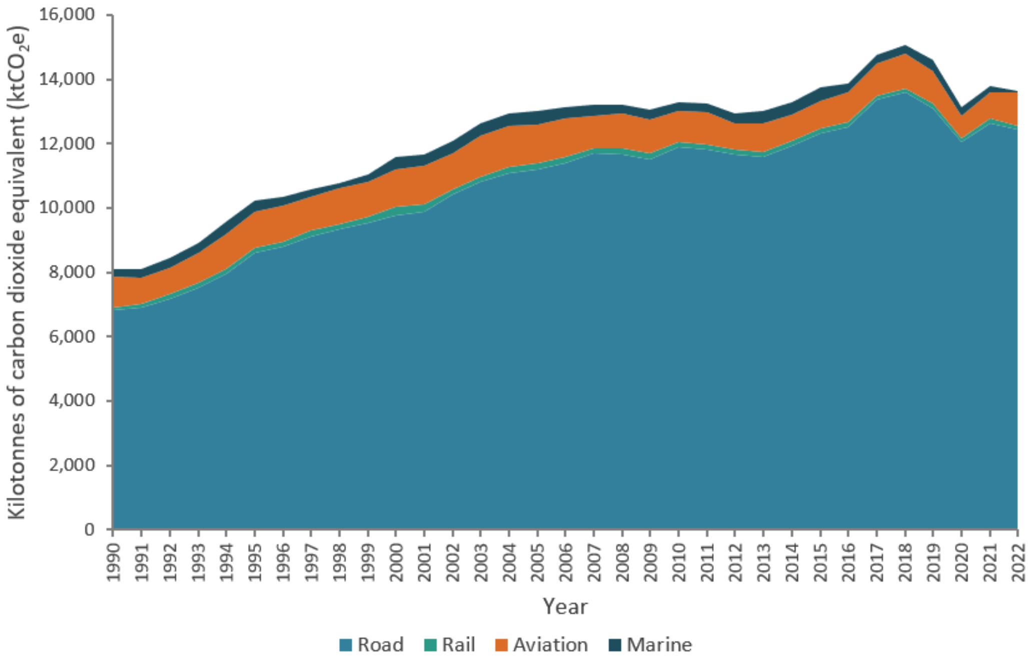
58 Unless otherwise specified, all data in this section are from: Ministry of Transport. 2023. *New Zealand Vehicle Fleet Annual Statistics*.

59 All greenhouse gas emissions data in this section are from: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

Figure 2.1.3: Domestic transport emissions by mode (kt CO_2e), 1990–2022



Source: Ministry of Business, Innovation and Employment. *New Zealand Energy Sector Greenhouse Gas Emissions*.

2.1.6.2.1 Road transport

Road transportation is a significant contributor to New Zealand's gross emissions. In 2022, road transportation contributed 90.9 per cent of New Zealand's total transport emissions, and 15.9 per cent of its gross emissions.

New Zealand has 94,000 km of roads and over 4,200 bridges on the state highway network. The majority of its vehicles (90.9 per cent in 2022) are light vehicles (those that have a gross vehicle mass of less than 3.5 tonnes). In 2022, 78 per cent were petrol based (including petrol, petrol hybrid, petrol electric hybrid and plug-in petrol hybrid), while 1.1 per cent were fully electric vehicles. Heavy vehicles represent only 4 per cent of New Zealand's vehicle fleet but deliver around 93 per cent of freight volume and contribute around 30 per cent of total transport emissions.

The country has a relatively old vehicle fleet. In 2022, the average age of the light vehicles fleet was 14.4 years and the average age of the truck fleet was 17.8 years. New Zealand's light vehicle fleet is older than the fleets in other Organisation of Economic Co-operation and Development (OECD) countries that have similarly high levels of motorisation and similar patterns of development, including the United States (11.8 years for light vehicles in 2019), Australia (10.4 years for all vehicles in 2019) and Canada (9.7 years for light vehicles in 2017).

In 2022, there were a little over 4.0 million light vehicles in New Zealand, which is the equivalent of 822 light vehicles for every 1,000 people. This number increased between the years 2000 and 2007 due to the entry of a large number of used vehicles from Japan. The number of light vehicles per person decreased after the 2007 peak until 2011 due to the global financial crisis, but the number has been increasing significantly since 2011. Although 2020 saw a slight decrease in ownership, likely caused by the COVID-19 pandemic, since then ownership has continued to trend upwards.[60]

2.1.6.2.2 Aviation

Domestic and international aviation has been increasing, in part due to a reduction in the real cost of airfares. Before the COVID-19 pandemic and associated border restrictions, international flights had been increasing at a rate of 5 per cent per year since 1990. At the same time, the fuel efficiency of air travel increased due to higher load factors, advances in aircraft design and improvement in air traffic management for aircraft approaches to airports.

Almost all passenger travel to and from New Zealand is by air. There were 6,198,269 air passenger arrivals into the country in the year ended March 2024, representing an increase of 21.4 per cent in 10 years (since the year ended March 2014). International traveller numbers decreased significantly in 2021 and 2022 due to border restrictions from COVID-19. Since the restrictions ended, arrival numbers have increased to reach similar levels seen before the pandemic.[61]

Aviation is also important for exporting and importing time-sensitive goods and high-value goods. Freight exports by air made up 15.1 per cent of exports by value in the year ending June 2023; however, they contributed only 0.2 per cent by tonne.[62] Freight imports by air made up 22.2 per cent of imports by value and 0.4 per cent by tonne.[63] In 2022, domestic aviation contributed 7.5 per cent of New Zealand's total transport emissions.[64]

2.1.6.2.3 Maritime

New Zealand relies on domestic shipping for transporting a small percentage of freight within the country, including across the Cook Strait between the North and South Islands. Coastal shipping transports 1.6 per cent of domestic freight volumes. The domestic coastal shipping fleet consists of about 13 vessels, of which only one is a container ship. Cargo moved by coastal shipping includes bulk commodities like cement, grain, fertiliser and aggregate. Containerised cargo includes domestic goods, and export and import transshipments, as well as empty containers. Two competing companies operate daily ferry services across the Cook Strait. These ferries transport passengers and freight. A small number of passenger ferries operate in coastal cities (mainly Auckland and Wellington), which provide commuter and recreational services.

International shipping is crucial to New Zealand's trading. Sea freight carries 99.7 per cent of the country's trade by volume and 81 per cent by value. New Zealand is serviced by international container shipping lines and other bulk ships. In the year to June 2023, it exported 39.4 million tonnes (with a real value of NZ$65.7 billion) by sea.[65] In the same year, imports by sea totalled

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60 Ministry of Transport. 2021. *New Zealand Vehicle Fleet Annual Statistics*.

61 Stats NZ. 2024. *Table Reference: ITM051AA*.

62 Stats NZ. 2024. *Table Reference: OSC004AA*.

63 Stats NZ. 2024. *Table Reference: OSC008AA.*

64 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

65 Stats NZ. 2024. *Table Reference: OSC004AA*.

22.7 million tonnes, worth NZ$70.7 billion.[66] International shipping is responsible for about 3 per cent of the world's carbon emissions and this proportion is expected to grow.[67, 68]

New Zealand has 15 ports, varying in their size and stage of development, through which most of its imports and exports flow. Nine of them are international container ports. The majority of imports arrive through the ports of Auckland and Tauranga, and are bound for main centres in the upper North Island. Exports are more evenly spread across the North and South Islands, although the port of Tauranga is the largest export port. The biggest container ports are Tauranga (39 per cent of container volumes), Auckland (22 per cent) and Lyttelton (14 per cent). In 2020, containerised exports made up 29 per cent of New Zealand's sea export tonnage but 83 per cent of the value.[69] In 2022, coastal shipping contributed 0.4 per cent of New Zealand's total transport emissions.[70]

2.1.6.2.4 Rail

The total length of the national rail network is approximately 3,700 km, which includes more than 1,300 bridges and almost 100 tunnels.[71] The Government, through the state-owned enterprise KiwiRail, owns and controls the rail infrastructure and the majority of the rolling stock. There are urban rail networks in both Wellington and Auckland, which together provide approximately 35.7 million passenger trips annually: approximately 14.3 million trips in Wellington and 21.4 million trips in Auckland. Within the country, 5.6 per cent of freight volumes are transported by rail. Rail carried 16.9 million tonnes of domestic freight in 2023.[72] In 2022, rail contributed 0.9 per cent of New Zealand's total transport emissions.

2.1.6.3 Industrial Processes and Product Use

New Zealand's Industrial Processes and Product Use (IPPU) sector is relatively small, contributing 5.7 per cent of New Zealand's gross emissions in 2022. This sector covers emissions as by-products of chemical, metal and mineral productions, and emissions from synthetic greenhouse gases used in products such as refrigerators, air conditioners and aerosols.[73] New Zealand has a relatively small number of processing plants emitting greenhouse gases not related to energy.

Emissions from eight distinct industrial processes in New Zealand are reported under the IPPU sector. These are:

- calcination of limestone in cement production
- calcination of limestone in burnt and slaked lime production
- production of ammonia, which is further processed into urea

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66 Stats NZ. 2024. *Table Reference: OSC008AA*.

67 International Transport Forum. 2018. *Decarbonising Maritime Transport: Pathways to Zero-carbon Shipping by 2035*. Paris: OECD Publishing.

68 International Maritime Organization. 2020. *Fourth IMO Greenhouse Gas Study (2020).*

69 Ministry of Transport. 2022. *New Zealand Supply Chain Issues Paper.*

70 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

71 Ministry of Transport. 2021. *The New Zealand Rail Plan.* Wellington: Ministry of Transport.

72 Ministry of Transport. *Freight and Logistics: FIGS: Rail.* Retrieved 13 November 2024.

73 Unless otherwise specified, all information in this section comes from: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

- production of methanol
- production of hydrogen in oil refining and for making hydrogen peroxide
- production of steel, from iron sand and scrap steel
- oxidation of anodes in aluminium smelting
- use of soda ash in glass making.

Hydrofluorocarbons and perfluorocarbons are used in many products, including refrigeration and air-conditioning equipment. Sulphur hexafluoride is used in the electricity distribution sector and for small-scale medical and scientific applications. No fluorinated chemicals are produced in New Zealand; they are all imported.

In 2022, emissions from the IPPU sector largely consisted of carbon dioxide (3.5 per cent) and fluorinated gases (2.0 per cent). Emissions in this sector decreased by 5 per cent from 2021, mainly due to decreased steel production and decreased emissions from refrigeration and air conditioning, and the end to hydrocarbon production from the Marsden Point Oil Refinery, which was shut in March 2022.

Emissions from the IPPU sector increased by 28 per cent between 1990 and 2022. The increase was driven by phasing out ozone-depleting substances under the Montreal Protocol and replacing them with fluorinated gases in refrigeration and air conditioning. The increased use of household and commercial air conditioning in New Zealand also contributed to this increase.

2.1.6.4 Agriculture

New Zealand's agriculture sector is one of the largest sources of emissions in the country, covering 53.2 per cent of New Zealand's gross emissions in 2022. Agriculture in New Zealand is dominated by pastoral farming of dairy cattle, beef cattle, sheep and deer. As at June 2022, the country had 6.1 million dairy cattle, 3.9 million beef cattle, 25.3 million sheep and 0.8 million deer. The country also produces a number of different horticultural products, including kiwifruit, pip fruit, wine, and fresh and processed vegetables.

Because of the temperate climate, the majority of animals are fed on grass outside all year round and are rarely housed inside. Pastures have four primary sources of nitrogen: nitrogen fixed by legumes, nitrogen fertiliser, nitrogen from external supplementary feeds and nitrogen from atmospheric sources. The use of synthetic nitrogen-containing fertiliser on agricultural soils increased by 465 per cent between 1990 and 2022.

The impacts of climate change are already being felt across New Zealand's agriculture sector. Across all regions, the incidence and severity of drought (including in regions that have not previously experienced drought) and flooding and extreme weather events have increased. Increased rainfall events are projected to increase in almost all regions. Droughts can result in reduced pasture production, lower livestock performance and the need to reduce livestock numbers, which in turn leads to lower greenhouse gas emissions.

2.1.6.4.1 Agricultural exports

The agriculture sector (including dairy, meat, wool, horticulture and arable, but excluding forestry, seafood and processed foods) contributed 64 per cent of New Zealand's merchandise exports in the year ended March 2024. The highest-earning export sectors were dairy (NZ$23.7 billion), meat and wool (NZ$11.4 billion) and horticulture (NZ$6.7 billion). The top five export destinations for the year to 30 March 2024, by value for dairy products, were China, the United States, Australia, Algeria and Indonesia.

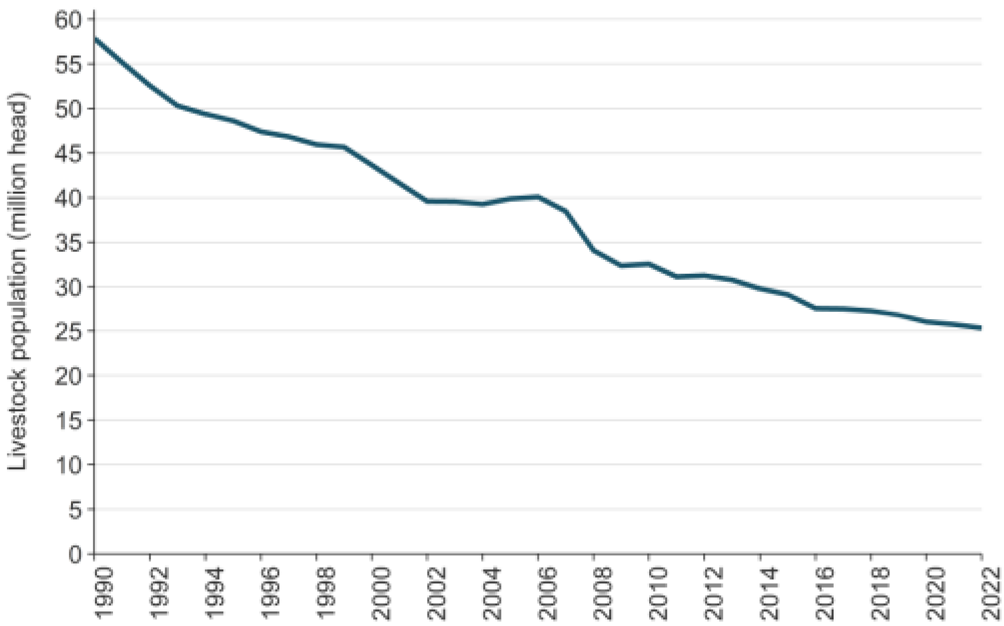
Global dairy prices were lower and more volatile over the 2023/24 financial year. Lower consumption growth and increased Chinese milk supply resulted in downward pressure on global dairy prices. New Zealand's dairy export revenue is expected to decrease 7 per cent to $24.2 billion in the year to 30 June 2024, despite an expected 6 per cent increase in export volumes. The drop in export revenue is mainly because global demand has weakened, resulting in lower global dairy prices.[74]

2.1.6.4.2 Changes in the agricultural industry

Triggered by the removal of agricultural subsidies in 1984, New Zealand's agriculture sector transformed to become highly competitive and efficient. It is now the least subsidised agriculture sector in the OECD. Agricultural productivity has increased due to advances in technology, farm management and animal breeding; the expansion of the average size of farms; and improved animal health, animal fertility and plant nutrition.

The proportions of the main livestock species farmed in New Zealand have also changed. From the early 1990s to the present, sheep numbers have declined steadily (figure 2.1.4) due to low sheep meat and wool prices, while sheep farms have converted to dairying, viticulture, cropping and forestry. The dairy cattle herd grew significantly between 1990 and 2016. The growth was due to the increasing profitability of dairy products compared with sheep and beef products over that period. However, there has been a slight but steady decline in dairy cow numbers over the last six years due to varying product prices (figure 2.1.5).

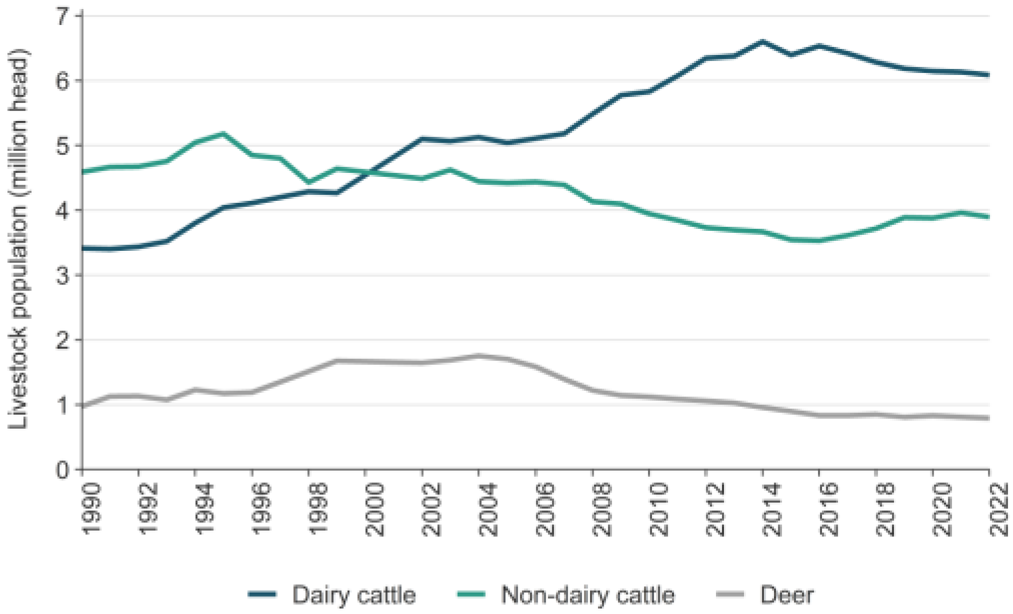
Figure 2.1.4: Changes in New Zealand's sheep population (million head), year ended 30 June 1990–2022



Source: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

74 Ministry for Primary Industries. 2024. *Situation and Outlook for Primary Industries.*

Figure 2.1.5: Changes in New Zealand's dairy, beef and deer population (million head), year ended 30 June 1990–2022



Source: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment.

2.1.6.4.3 Emissions

High levels of agricultural activity mean over half of New Zealand's gross greenhouse gas emissions come from agriculture, compared with an average of 13 per cent in other developed countries.[75] Most of those emissions (78.2 per cent of agricultural emissions in 2022) come from methane (CH_4) from enteric fermentation.

Livestock numbers are a significant determinant of New Zealand's gross primary sector emissions. Greenhouse gas emissions from the agriculture sector increased by 15.6 per cent between 1990 and 2006. The increase was mainly due to an 80 per cent increase in the national dairy herd population within that period and a 423 per cent increase in the application of synthetic nitrogen fertiliser. These increases in emissions have been partially offset by decreases in the populations of sheep (by 55 per cent), beef cattle (by 15 per cent) and deer (by 15 per cent) since 1990. Since 2006, emissions from the primary sector have been relatively stable, with some variations from year to year based on product prices and seasonal climate events, for example drought.

In 2022, emissions from the agriculture sector decreased by 1.4 per cent from 2021 because of a decline in production. This decrease was mainly due to long-term reductions in sheep and beef cattle populations, as well as decreases in the use of synthetic nitrogen fertiliser application. Emissions from other sources rose, such as from the application of lime and dolomite and from dairy cattle, but these increases were not enough to offset the overall decrease in agricultural emissions between 2021 and 2022.[76]

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75 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022: Snapshot*.

76 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*.

2.1.6.5 Fisheries

New Zealand uses a range of tools and management procedures supported by fisheries legislation to enable the effective management of fisheries. Commercially harvested fish stocks are regulated through a quota management system that controls harvest levels for each fish species by fisher and area. Each year, the Ministry for Primary Industries reviews the total allowable catch for fish stocks and sets limits for the next year to ensure fisheries are sustainable.

Approximately 396,000 tonnes[77] of seafood (excluding aquaculture) is harvested from New Zealand waters each year. The seafood industry employs over 16,000 people.[78] Seafood exports (excluding freshwater products) earned NZ$1.84 billion in the year ending 30 March 2024.[79]

Like the rest of the world, New Zealand is experiencing the impact of climate change. This is making the management of fisheries and development of sustainable aquaculture more complex, creating further uncertainty in the fisheries system and affecting New Zealand's ability to respond. The following drivers and trends are of note.

- Climate and oceanographic conditions play an important role in driving the productivity of the oceans and the abundance and distribution of New Zealand's fish stocks and fisheries.
- The ocean surrounding New Zealand plays a major role in moderating the climate on land. Evidence indicates that the chemistry of seawater is changing (eg, through ocean acidification) in line with other parts of the globe.
- New Zealand trends of increasing air and sea temperatures, as well as ocean acidification, are consistent with observed global trends.[80] Long-term measurements off the Otago coast show an increase of 8.6 per cent in ocean acidity between January 1998 and December 2020.
- Marine heatwaves are becoming more persistent, which is having major impacts on fisheries and associated habitats.

Climate change and more extreme weather events can affect the abundance and distribution of marine life, impacting how and what New Zealand grows and harvests from the sea. As a result, the Ministry for Primary Industries is building its knowledge base to understand the challenges fisheries and aquaculture face from climate change now and in the future and how the sectors might need to change to ensure they are resilient.

2.1.6.6 Forestry

New Zealand has one of the highest rates of exotic forest growth among developed countries, due to its favourable climate and fertile soils combined with intensive forest management. Forestry is economically important to the country as it is the fourth-biggest export earner at

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77 Ten-year average from 2013 to 2023.

78 Seafood New Zealand (industry body). *About Seafood New Zealand*. Retrieved 14 November 2024.

79 Ministry for Primary Industries. 2024. *Situation and Outlook for Primary Industries June 2024 (MPI)*. Wellington: Ministry for Primary Industries.

80 Fisheries New Zealand. 2021. NZ climate and oceanic setting. In *Aquatic Environment and Biodiversity Annual Review* (*AEBAR*). Wellington: Fisheries New Zealand. Chapter 12.

5.2 per cent of total exports.[81] An estimated 37,800 people work in the forestry and wood processing sector.[82]

New Zealand has 10.0 million ha of forest, covering approximately 37 per cent of land.[83] Of this, 7.8 million ha are natural (indigenous) forest. Two-thirds of this natural forest is protected within public conservation land. The two main types of natural forest are beech and podocarp/broadleaf forest. In addition, shrublands (mainly kānuka and mānuka) and retired grasslands are classified as forests when they meet New Zealand's forest definition.[84]

Planted production forests account for 1.79 million ha of land in New Zealand as of 1 April 2023.[85] New Zealand's forestry industry is largely based around plantation forests. Approximately 90 per cent of plantation forests is radiata pine (*Pinus radiata*), followed by Douglas fir (*Pseudotsuga menziesii*) at 6 per cent. There are smaller proportions of eucalyptus, and other softwood and hardwood species.[86]

New Zealand's forests are currently a net carbon sink. In 2022, the Land Use, Land-Use Change and Forestry sector contributed removals equivalent to 25 per cent of New Zealand's gross emissions, as reported in *New Zealand's Greenhouse Gas Inventory*.[87] In 2022, over 86,000 ha of new forest were planted and approximately 4,200 ha were deforested.[88]

Net emissions from the Land Use, Land-Use Change and Forestry sector have increased by 21 per cent since 1990. This increase has occurred because current forest-harvest rates in New Zealand's planted forests are comparatively high.[89] Yearly fluctuations in emissions and removals from forestry are mainly driven by variations in rates of harvesting and deforestation in production forests, due to historically variable rates of new forest plantings. Historical planting peaks and the resulting harvest and replanting cycles will affect New Zealand's plantation forestry emissions and removals profile far into the future.

Forest planting rates were particularly high in the 1980s and 1990s (figure 2.1.6). This followed on from a change in the taxation regime; an unprecedented price spike for forest products and subsequent favourable publicity; a Government focus on forestry as an instrument for regional development; and the conclusion of the state forest assets sale. The removal of agricultural subsidies and generally poor performance of the New Zealand and international share markets

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81 Stats NZ. *New Zealand Trade Dashboard*. Retrieved 13 November 2024. The percentage represents data from year ended June 2023.

82 NZIER. 2021. *Forestry and Wood Processing Labour Force Survey*. Report prepared for Ministry for Primary Industries.

83 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

84 Under the UNFCCC, the figures collected for planted and natural forest area equate to the area of 'forest land'. 'Forest land' is defined as: an area of at least 1 ha and 30 m in width that is expected to have at least 30 per cent canopy cover and the potential to exceed 5 m in height.

85 Ministry for Primary Industries. *National Exotic Forest Description 2023*. Retrieved 13 November 2024.

86 Ministry for Primary Industries. *About New Zealand's Forests*. Retrieved 13 November 2024.

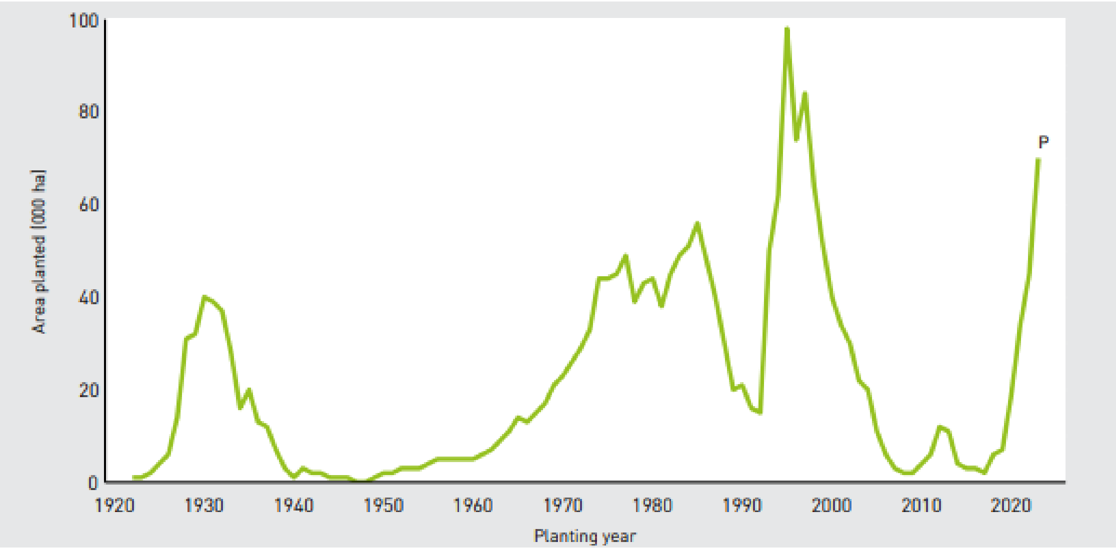
87 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

88 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022: Snapshot*. Wellington: Ministry for the Environment.

89 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

also encouraged investors to seek alternative sectors for investment.[90] After the late 1990s, the rate of planting declined. The increase in planting between 2008 and 2012 is largely due to the first Afforestation Grant Scheme and market-based measures for forest carbon (the New Zealand Emissions Trading Scheme (NZ ETS) and the Permanent Forest Sink Initiative), which were introduced by the New Zealand Government to encourage the planting of new forests and the regeneration of natural forests.

Figure 2.1.6: New Zealand's historical new production forest planting (thousand hectares), 1920–2022



Note: ha = hectares, P = provisional

Source: Ministry for Primary Industries. *National Exotic Forest Description as at 1 April 2023.* Wellington: Ministry for Primary Industries. p 15.

Between 2013 and 2018, new forest planting rates dropped back to pre-2008 levels.[91] This is likely due in part to a significant drop in the price of carbon in the NZ ETS and the increase in profitability of other non-forest land uses. In 2019 and 2020, afforestation and reforestation activities significantly increased again, with 27,070 ha of new planting occurring in 2019 and 40,887 ha in 2020. The probable reasons for this increase are the planting of seedlings funded by the One Billion Trees Fund and the higher carbon prices in the NZ ETS that resulted from the announcements leading up to the Climate Change Response (Emissions Trading Reform) Amendment Bill and its passing in June 2020. Since these amendments were enacted, rapidly rising carbon prices have increased the financial incentive to plant exotic forests. High rates of afforestation and reforestation activities have continued into the early 2020s.

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90 Rhodes D, Novis J. 2002. *The Impact of Incentives on the Development of Plantation Forest Resources in New Zealand.* MAF Information Paper No 45. Wellington: MAF Policy Division.

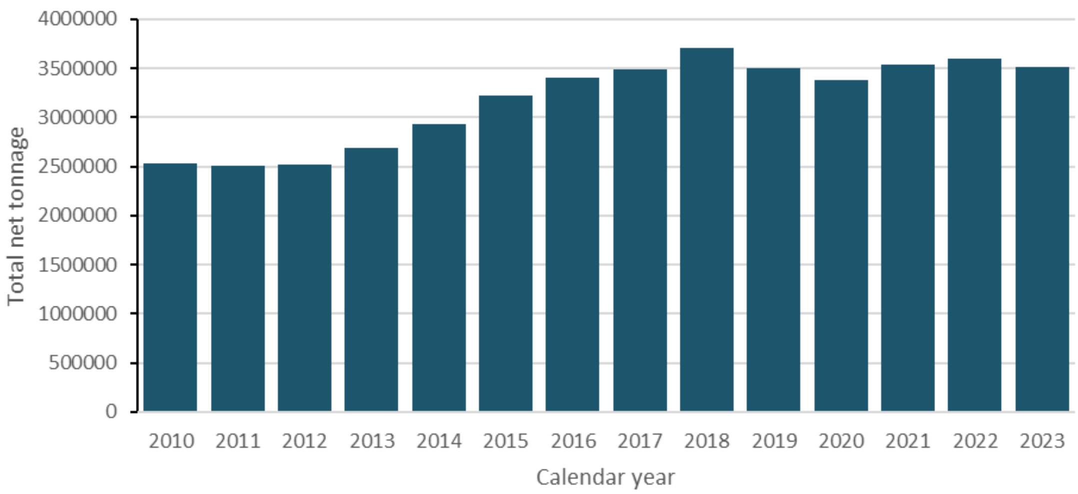
91 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

2.1.6.7 Waste

New Zealand's Waste sector is relatively small, contributing 4.5 per cent of the country's gross emissions in 2022. New Zealand generates an estimated 17.5 million tonnes of waste per year, of which an estimated 12.6 million tonnes are sent to landfill.[92]

Waste sent to Class 1 landfills (landfills that accept household waste) increased by 39 per cent from 2.5 million tonnes in 2010 to 3.5 million tonnes in 2023.[93] There was a decrease in waste sent to Class 1 landfills in 2019 and 2020, likely influenced in part by the COVID-19 pandemic and the associated economic recession, as waste volumes often correlate with GDP trends. Since then, in 2021 and 2022, waste sent to landfill increased to 3.6 million tonnes, before decreasing slightly again to 3.5 million tonnes in 2023 (figure 2.1.7). The per capita generation of municipal waste sent to Class 1 landfills follows the trend observed in total waste disposal. It peaked at 755 kilograms (kg) per capita in 2018, decreased to 665 kg per capita in 2020, and rose slightly to 668 kg per capita in 2023.[94]

Figure 2.1.7: Total tonnage of waste to Class 1 landfills, 2010–2023



Source: Ministry for the Environment. 2024. *Download Waste Data*.

Solid waste management in New Zealand can follow different pathways, including disposal to landfills, diversion to compost and anaerobic digestion facilities, and recycling. No incineration of municipal waste occurs at landfill facilities, and incineration is only used on a very small scale for hazardous and clinical waste. The majority of the solid waste disposed of at municipal landfill consists of inert waste (57 per cent) and wood waste (13 per cent) (figure 2.1.8).

The Waste Minimisation Act 2008 introduced a levy on all waste disposed of in municipal landfills. Changes made in 2021 have progressively applied the levy to a wider range of landfill types. The funding from this levy helps local government, communities and businesses to reduce waste. The Waste Minimisation Act 2008 also contains requirements for reporting of waste tonnage and accreditation for product stewardship schemes, as well as clarifying the roles and responsibilities of territorial authorities.

92 This estimate includes waste disposed of to Classes 1, 2, 3 and 4 landfills, clean fills and farm dumps. It also includes both the materials recycled here in New Zealand and those sent offshore for recycling.

93 Ministry for the Environment. 2024. *Download Waste Data*.

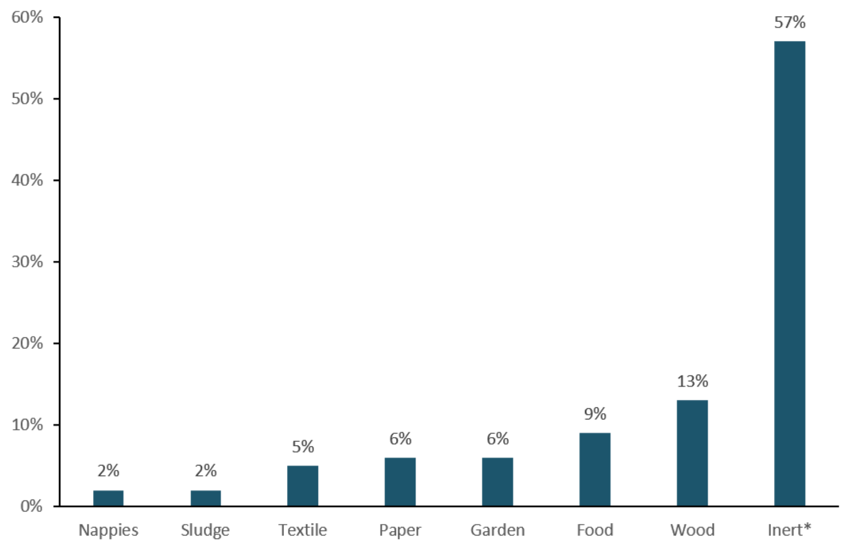
94 Ministry for the Environment. 2024. *Waste Facilities and Disposal*.

Wastewater from almost every town in New Zealand with a population over 1,000 is collected and treated in community wastewater treatment plants. The country has approximately 317 wastewater treatment plants.[95] Most of the treatment processes are aerobic, but a significant number of plants use partially anaerobic processes such as oxidation ponds or septic tanks. Small communities and rural dwellings are generally served by simple septic tanks followed by ground soakage trenches.[96]

Between 1990 and 2022, emissions from the Waste sector declined by 19.8 per cent overall. This was the only gross emissions sector to have a decrease in emissions between 1990 and 2022. The reduction in emissions is primarily the result of increased CH_4 emission recovery through the installation of landfill gas capture infrastructure at large municipal landfills. This was driven by the National Environmental Standards for Air Quality in 2004, and by the NZ ETS since 2013.

During the period 1990–2022, despite an overall decline, there was a peak in annual emissions from the Waste sector because of the ongoing growth in population and economic activity. Since 2005, annual emissions have steadily declined. This is mainly due to ongoing improvements in managing solid waste disposal at municipal landfills, particularly in landfill gas recovery.[97] This decline in emissions has occurred despite ongoing population growth and the resulting increases in the amount of municipal waste generated. Emissions in the Waste sector were from solid waste disposal (81.3 per cent), wastewater (11.3 per cent), incineration (5.2 per cent) and composting (2.2 per cent).[98]

Figure 2.1.8: Estimated composition of New Zealand's municipal waste, 2018–2022



Note: *Waste that neither produces greenhouse gases nor decomposes.

Source: Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022.* Wellington: Ministry for the Environment. Estimates based on surveys conducted in 2012.

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95 SCS Wetherill Environmental. 2002. Unpublished. National Greenhouse Gas Inventory from the Waste Sector 1990–2020. Report commissioned by the Ministry for the Environment in 2002.

96 Ministry for the Environment. 2020. *The New Zealand Wastewater Sector*. Report prepared for the Ministry for the Environment.

97 Resource Management (National Environmental Standards for Air Quality) Regulations 2004.

98 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

2.1.6.8 Buildings and urban structure

The 2018[99] New Zealand Census of Population and Dwellings (census) recorded New Zealand has almost 1.7 million occupied dwellings (of which about 9,600 were non-private dwellings) and approximately 191,600 unoccupied private dwellings.[100, 101] The majority (83.6 per cent) of occupied private and non-private dwellings were separate houses, 15.1 per cent were two or more flats or apartments joined together, and the remaining 1.2 per cent were a mixture of other types of dwellings, including holiday homes, mobile homes, improvised dwellings and non-private occupied dwellings.[102] The number of private dwellings was estimated to be over 2 million at 30 June 2023.[103]

At the time of the 2018 census, New Zealand's homeownership rates were at their lowest since the 1950s.[104] Homeownership peaked in the 1990s, at 73.8 per cent of households, but by 2018 it had decreased to 64.5 per cent of households. The proportion of households who rent their dwelling increased from 22.9 per cent in 1991 to 31.9 per cent in 2018. The 2018 census showed a 16.5 per cent increase in the number of households renting since 2013 (from 453,135 in 2013 to 527,853 in 2018). This apparent increase, however, may partly reflect improved data quality due to the use of administrative data.[105]

2.1.7 Tokelau

Tokelau has been a dependent territory of New Zealand since 1926 and is considered 'part of New Zealand' for certain purposes under the Tokelau Act 1948 (NZ). The extension of New Zealand's ratification of the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement to Tokelau was announced on 13 November 2017. The Government will continue to work with Tokelau to meet reporting obligations under the UNFCCC and the Paris Agreement.

2.1.7.1 National circumstances

In formal terms, Tokelau is administered by New Zealand, but in practice it is substantially self-governing, with strong links to New Zealand. Tokelau's national legislative and executive body, the General Fono, governs Tokelau's national matters. An Administrator, appointed by the New Zealand Government, is charged with the administration of the executive government of Tokelau and Tokelau's EEZ. The New Zealand Government is responsible for Tokelau's international relations. Nevertheless, Tokelau engages autonomously on climate change and

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99 The majority of the information in this section is based off of the 2018 census conducted by Stats NZ. These censuses are conducted every five years, most recently completed in 2023. However, the data on housing and infrastructure from the most recent census was published in October 2024, not allowing sufficient time for meaningful analysis for inclusion in this report.

100 Stats NZ. 2021. *2018 Census Urban Accessibility Dataset*.

101 Stats NZ. 2019. *2018 Census Population and Dwelling Counts*.

102 Stats NZ. 2021. *2018 Census Urban Accessibility Dataset*.

103 Stats NZ. 2023. *Dwelling and Household Estimates: June 2023 Quarter*.

104 Stats NZ. 2020. *Housing in Aotearoa: 2020*.

105 Administrative data include data collected by government agencies on private organisations in the course of conducting their business or services. They are not data collected primarily for statistical purposes.

Pacific fisheries matters where possible. New Zealand statute law does not apply to Tokelau unless it is expressly extended to Tokelau and agreed to by Tokelau.

Tokelau’s population is spread over three small coral atolls (Atafu, Fakaofo and Nukunonu), which lie some 500 km to the north of Samoa. The total population of Tokelau is 1,485 (2022): Atafu 499, Nukunonu 447 and Fakaofo 539. Tokelau has a common language, and the three atolls share similar social structures, but each atoll has unique historical influences. Tokelauans are New Zealand citizens. In addition to the citizens living in Tokelau, approximately 8,600 Tokelauans live in New Zealand.

Tokelau’s two principal sources of revenue are economic assistance from New Zealand and fisheries revenue (the latter amounting to NZ$50.8 million from 2021 to 2023). New Zealand provides general budget support ($15 million per year) to assist the delivery of essential services, consistent with its constitutional and United Nations Charter obligations.

General budget support is complemented by support for wellbeing and human development outcomes including through investments in health and education, and through major investments in information and communications technology connectivity, and renewable energy. Planning is underway for new projects to enhance Tokelau’s climate change resilience. New Zealand’s total development assistance to Tokelau for the period 2021/22–2023/24 was NZ$60.6 million.

Tokelau’s low-lying atolls are extremely vulnerable to the impacts of climate change and related hazards. The principal hazard induced by climate change that Tokelau faces is inundation of coastal waters during severe weather events. Climate change scenarios for Tokelau modelled out to the year 2100 suggest that while the frequency of cyclones is likely to remain largely unchanged, their intensity will increase. Combined with scenarios of rising sea levels, the consequences of such events intensify as larger areas of the atolls experience inundation by coastal waters during severe weather events.

New Zealand supports a range of climate-related projects in Tokelau. During the report period, this support related to climate change has included funding for the following projects.

- Develop an initial concept for a Coastal Protection Activity to build Tokelau’s resilience to the impacts of climate change. This project would protect land on each atoll from coastal erosion and rising sea levels, and promote natural accretion. The exact modality and extent of the coastal protections are still to be determined.
- Undertake design work to upgrade the main bridge in Nukunonu. The current bridge is past its design life and engineers have concluded it is at risk of failure during a storm event.
- Undertake design work for emergency shelters. This project would create sufficient and robust emergency structures to provide safe refuge for Tokelau’s population during extreme weather events.
- Increase access to reliable clean energy for the people of Tokelau by expanding each village’s solar photovoltaic (PV) capacity and improving renewable energy asset management processes.
- Increase understanding of climate mobility issues facing Pacific Island countries. This activity supports Pacific Island countries to address the complex challenge of climate mobility (for situations where climate change and environmental factors motivate people to move, and for situations where people decide to stay in place). Field research was undertaken in Tokelau and a country summary has been developed.

- Support Tokelau to scale up the delivery of its climate change priorities through increasing its access to personnel and other support that can assist it to plan for, access, deliver and report on climate finance. The programme operates in 15 Pacific countries and territories and is responsive to the unique needs and priorities of these countries.
- Support Tokelau (through the Climate and Oceans Support Program in the Pacific) to make better use of climate and meteorological data in decision-making and, in that way, to increase its resilience.
- Support drinking water scarcity initiatives in Tokelau. This activity has developed water scarcity investment plans; installed, rehabilitated and repaired essential water capture and storage infrastructure; developed and implemented water monitoring, assessment and management systems; delivered training on sustainable management of water infrastructure and resources; and procured and delivered 48 rainwater tanks and associated rainwater harvesting and storage infrastructure, such as pipes, gutters and supplies.
- Enhance Pacific resilience by reducing the impact of invasive species on natural and agricultural ecosystems. The focus of this activity in Tokelau was to develop a feasibility study to eradicate rats and feral pigs, and deliver on this programme on several islets.

2.1.7.2 Tokelau's climate change strategy

Strengthening Tokelau's climate change resilience is a national priority under Tokelau's National Strategic Plan 2021–26. *Living with Change: An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017–30* (LivC)[106] and its companion the *LivC Implementation Plan, 2017–2022*[107] which are Tokelau's response to the challenges posed by climate change and related hazards, officially launched in April 2017. These documents convey Tokelau's vision of the future, the issues that must be addressed, the specific outcomes Tokelau aims to achieve, and the actions that must be taken to manage the impacts of climate change.

As the administering power for Tokelau, New Zealand is responsible for assisting the Tokelau Government to meet the needs of the people of Tokelau. The New Zealand Government is working closely with Tokelau to help it achieve its LivC vision where possible. The *LivC Implementation Plan, 2017–2022* remains current as many of its concept projects are ongoing or yet to be implemented.

The strategy identifies three inter-related climate-resilient pathways:

- mitigation – decarbonisation development
- adaptation – strengthened risk reduction and adaptation to enhance resilience in the face of climate change and disaster resilience
- human development – capacity building, education, training, public awareness and outreach.

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[106] Lefale PF, Faiva P, Anderson CL. 2017. *Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017–30*. Wellington: Government of Tokelau and LeA International Consultants.

[107] Lefale PF, Faiva P, Anderson CL. 2017. *Living with Change (LivC): An Integrated National Strategy for Enhancing the Resilience of Tokelau to Climate Change and Related Hazards, 2017–30: Implementation Plan, 2017–2022*. Wellington: Government of Tokelau and LeA International Consultants.

A number of the project concepts in the *LivC Implementation Plan* have been progressed, and several are ongoing. Table 2.1.1 summarises these concepts.

Table 2.1.1: Climate change and related hazards projects

Climate Resilience Investment Pathway (CRIP) #	Outputs	Outcomes
CRIP 1-2: The Tokelau Renewable Energy Programme	• Solar photovoltaic (PV) generation systems on each village installed (completed) • Solar PV generation systems on each village upgraded (ongoing)	• Reduction in greenhouse gas emissions • Reduced reliance on costly imported diesel
CRIP 2-1: Reducing the risks of inundation in Tokelau	• Coastal hazard risk reduction plans for each village • Preliminary and detailed designs for coastal infrastructure and measures • Construction and quality assurance services outsourced where necessary to implement the plan • Coastal Resilience Programme approved	• Effective coastal protection for public safety and community infrastructure • Strengthening integration of climate change and disaster risk into capital development planning and decision-making • Increased awareness and knowledge of coastal management and risk reduction
CRIP 2-2: Tokelau restoration of climate, weather, water and ocean services	• Technical assistance with weather monitoring equipment (partnership with National Emergency Management Agency and MetService, New Zealand) • Weather, climate, water, ocean and related environmental conditions monitoring and infrastructure plans for each village and a national plan identifying human resources and contracted services needed to support villages and implement their plans	• Effective climate, weather, water and related environmental conditions monitoring programme for public safety and community infrastructure • Strengthening integration of weather, climate change and disaster risk into capital development plans to protect lives and property • Increased awareness and knowledge of weather, climate, water, ocean and related environmental hazards
CRIP 3-1: Tokelau Climate Change, Resilience, Readiness and Emergency Services Office	• Expert assistance • Report outlining options for a new Tokelau Climate Change, Resilience, Readiness and Emergency Services Office (TCR2O) and/or similar arrangement. • Identification of human and financial resources and contracted services needed to establish Tokelau's new TCR2O and/or similar institution • Village emergency response trainings conducted • Tokelau disaster management rules currently in consultation alongside the review of disaster management plan	• A fully functional national institution (office/department) tasked with managing Tokelau's climate change and related hazards programmes • The Ministry of Climate, Oceans and Resilience (MiCORE) is now fully operational, housing the Climate Change Programme, Ocean Programme, and Disaster Management (Resilience) Programme • Strengthening integration of climate change and disaster risk into the Government's and villages' development planning, decision-making and human resource development plans to reduce the accumulation of existing risks and prevent creation of additional risks • Increased capacity among groups in the villages to respond to disaster,

Climate Resilience Investment Pathway (CRIP) #	Outputs	Outcomes
		considering the remoteness of Tokelau
CRIP 3-2: Increase resilience to climate change and ocean acidification	• Identification and implementation of practical adaptation actions • Ecosystem and social resilience assessment and mapping (ESRAM) study completed • Research and monitoring programmes established • Capacity building and awareness raising at the village level completed • Table coral nurseries established on two of the atolls • Capacity building through education systems utilising awareness programmes and competitions • Coral Point Count with Excel extensions (CPCe) training conducted	• Increased awareness and knowledge of local communities from each of the three villages about climate change and ocean acidification • Improved understanding of resilience and capacity that can be integrated into climate change strategies • Improved ability to reduce risks and to plan with knowledge of more effective methods for resource allocation • Increased number of coral colonies in the area • Improved capacity amongst the people, especially youth • Increased capacity to identify coral and their state of health amongst staff and stakeholders

LivC was formulated with the understanding that Tokelau and development partners would support its financing and implementation. New Zealand is the primary partner supporting Tokelau's climate change and related programmes.

2.1.8 Institutional arrangements

2.1.8.1 New Zealand climate legislation

The Climate Change Response Act 2002 (CCRA) is New Zealand's primary climate change legislation. The CCRA provides the legal framework to enable New Zealand to meet its domestic and international obligations, including those under the UNFCCC and the Paris Agreement. It also includes the framework for the NZ ETS.

In 2019, the CCRA was amended to introduce the Zero Carbon Framework (figure 2.1.9). This framework was developed to enable New Zealand to develop and implement climate change policies that:

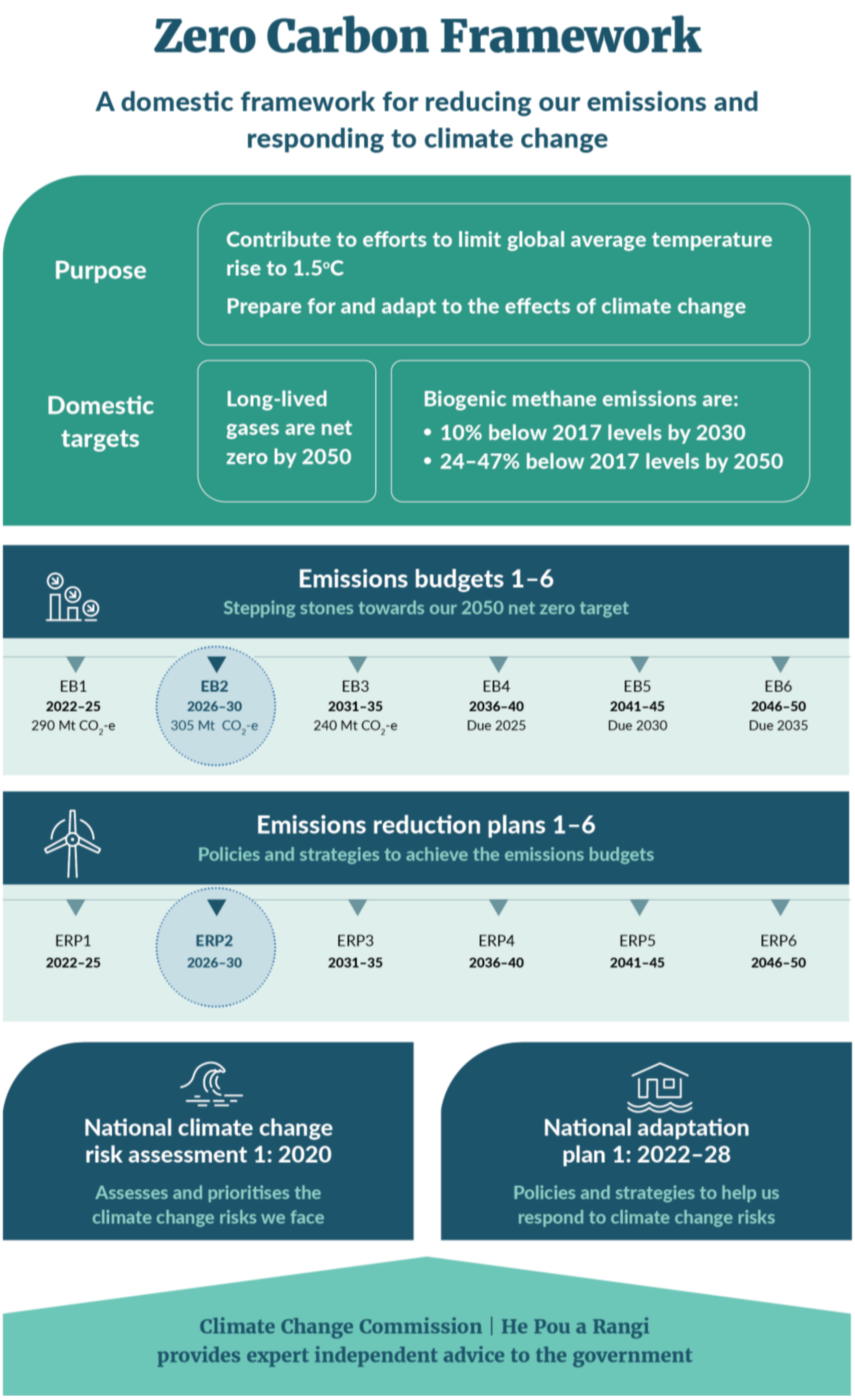
- contribute to global efforts under the Paris Agreement to limit the global average temperature increase to 1.5 degrees Celsius above pre-industrial levels
- allow New Zealand to prepare for, and adapt to, the impacts of climate change.

The 2019 amendments specifically:

- established the Climate Change Commission | He Pou a Rangi (the Commission)
- set new domestic emissions reduction targets for 2050
- established a system of emissions budgets to step New Zealand towards these 2050 targets

- required the development of an emissions reduction plan for each budget period, which is to set out the policies and strategies for achieving the emissions budget
- required the Commission to prepare a national climate change risk assessment every six years
- required the Government to develop a national adaptation plan that responds to the Commission's risk assessment.

Figure 2.1.9: New Zealand's Zero Carbon Framework



Note: EB = emissions budget; ERP = emissions reduction plan.

2.1.8.2 Key targets

2.1.8.2.1 Domestic target

In 2019, the CCRA was amended to include the 2050 domestic emissions reduction targets. These legislated targets include:

- the 2050 target as a split-gases target, where all greenhouse gas emissions, other than biogenic methane, reach net zero by 2050
- for biogenic methane, a 24 to 47 per cent reduction by 2050, compared with 2017 levels, including a 10 per cent reduction below 2017 levels by 2030.

2.1.8.2.2 International targets

The Nationally Determined Contribution for the period 1 January 2021 through to 31 December 2030 is to reduce net greenhouse gas emissions to 50 per cent below gross 2005 levels by 2030.

New Zealand met the 2020 target by applying the Kyoto Protocol accounting framework. The 2020 target for the period 1 January 2013 through to 31 December 2020 was to reduce gross greenhouse gas emissions to 5 per cent below 1990 levels.

2.1.8.2.3 Emissions budgets

In 2022, the Minister of Climate Change set New Zealand's first three emissions budgets covering the period from 2022 through to 2035 (table 2.1.2). These emissions budgets were established with a view to helping to meet the 2050 target under the CCRA and contributing to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5 degrees Celsius.

Table 2.1.2: New Zealand's first three emissions budgets, 2022–35

Budget period	2022–25	2026–30	2031–35
All gases, net (AR5)	290 Mt CO_2e	305 Mt CO_2e	240 Mt CO_2e
Annual average	72.5 Mt CO_2e	61 Mt CO_2e	48 Mt CO_2e

Note: AR5 = Intergovernmental Panel on Climate Change Fifth Assessment Report; Mt CO_2e = million tonnes of carbon dioxide equivalent.

Emissions budgets specify the amount of greenhouse gas emissions that is permitted during an emissions budget period. The purpose of this approach is to enable New Zealand to step progressively towards the 2050 target. Emissions budgets essentially act as stepping stones that will get progressively smaller over time. By achieving emissions budgets set from 2022 until 2050, New Zealand can reach and sustain net zero emissions by 2050.

Each emissions budget covers a period of five years, except for the first emissions budget, which covers a four-year period.

2.1.8.2.4 Government Target 9

In April 2024, the Government announced a suite of nine targets to achieve better results in areas that matter to New Zealanders. Target 9 of this suite aims to put New Zealand on track to meet its 2050 net zero climate change targets with total net emissions of no more than

290 million tonnes (Mt) from 2022 to 2025 and 305 Mt from 2026 to 2030. This aligns with the first and second emissions budgets and the 2050 net zero target as set out in the CCRA.

2.1.8.3 Climate Change Chief Executives Board

The Climate Change Chief Executives Board (the Board) was established in 2022 to oversee the Government's climate change response and provide a coordinated approach to achieving New Zealand's climate goals. The Board is responsible to the Minister of Climate Change and advises the Climate Priorities Ministerial Group. It is made up of the chief executives of New Zealand government agencies that have key roles in mitigating and/or adapting to climate change. The Board is supported by an independent Secretariat Unit and an Executive Director, hosted by the Ministry for the Environment.

The Board monitors across more than 25 agencies on the overall implementation of the emissions reduction plan and national adaptation plan, and the delivery of Government climate priorities. In this way, it provides visibility across the climate system, and accountability for the implementation of policies that each agency is responsible for.

The Board provides quarterly progress reports to the Climate Priorities Ministerial Group on delivery progress, and on progress against climate change goals and targets. These reports are intended to inform ministerial decisions on any responses required to ensure New Zealand remains on track to meet its climate change goals and targets.

2.1.8.4 Climate Priorities Ministerial Group

The Climate Priorities Ministerial Group (formerly the Climate Response Ministerial Group) is chaired by the Minister of Climate Change. This group meets quarterly to drive delivery across the Government's climate change work programme and ensure New Zealand achieves its international and domestic mitigation commitments and adaptation goals.

While the Minister of Climate Change has the statutory responsibility to meet climate change goals, this responsibility is held on behalf of the Executive (ie, Cabinet and ministers) and many actions that impact this responsibility sit within other portfolios. A cross-ministerial governance approach is therefore vital to the overall success of meeting New Zealand's climate change goals and targets.

2.1.8.5 Role of Climate Change Commission | He Pou a Rangi

The Climate Change Commission (the Commission) is an independent Crown entity that delivers evidence-based advice to the Government to guide the climate change action for New Zealand. The Commission was established in 2019 under the Zero Carbon Framework for the following purposes.

- Provide independent advice to the Government on climate change mitigation and adaptation.
  - For mitigation, the Commission provides advice to the Minister of Climate Change on the policy direction of emissions reduction plans and advice to enable the preparation of emissions budgets. It also recommends any necessary amendments to emissions budgets.

  - For adaptation, the Commission is responsible for preparing national climate change risk assessments on a six-yearly cycle.
- Monitor and review the Government's progress towards meeting the emissions budgets and 2050 target.
- Report on the implementation of emissions reduction plans and national adaptation plans.

In November 2024, the Commission released the first review of New Zealand's 2050 emissions reduction target, and provided advice on the fourth emissions budget (for the period 2036–40), and on the inclusion of emissions from international shipping and aviation within New Zealand's emissions budgets.[108] In October 2024 the Commission also provided a report on the potential domestic contribution to New Zealand's second nationally determined contribution.[109]

2.1.8.6 Other relevant legislation

In addition to the CCRA as the primary climate legislation, the Resource Management Act 1991 (RMA) is the primary legislation governing the use of New Zealand's land, water and air resources. It is also administered by the Ministry for the Environment.

The RMA currently requires anyone exercising functions and powers under it to have particular regard to the effects of climate change, the efficiency and end use of energy, and the benefits to be derived from the use and development of renewable energy.

Other RMA provisions that are relevant to climate change include that:

- when local authorities are making resource use decisions, they are enabled to consider the climate change effects of greenhouse gas emissions from discharges to air
- when making or changing planning documents, local authorities are required to have regard to the national adaptation plan and emissions reduction plan. This provides an explicit statutory link between those climate-related plans and the resource management planning system, to help achieve New Zealand's long-term climate strategies and goals.

The Government has announced a phased approach to reforming the resource management system. Targeted amendments to the RMA are to be made, along with changes to environmental policies and standards (through national direction). A further phase beginning in 2025 will involve development of new legislation to replace the RMA.

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108 Climate Change Commission. *Advice to Government*. Retrieved 18 December 2024.

109 Climate Change Commission. 2024. Report on the potential domestic contribution to Aotearoa New Zealand's second nationally determined contribution. Wellington: Climate Change Commission.

2.1.9 Legal, institutional, administrative and procedural arrangements for domestic implementation, monitoring, reporting, archiving of information and stakeholder engagement related to the implementation and achievement of its nationally determined contribution

2.1.9.1 Monitoring, reporting and archiving of information

As noted in sections 2.1.8.3 and 2.1.8.5, the Climate Change Chief Executives Board and the Climate Change Commission play an important role in regularly monitoring and reporting on the implementation of New Zealand's emissions reduction plans and progress towards meeting domestic emissions budgets. Domestic emissions reductions and removals make a significant contribution towards our Nationally Determined Contribution (NDC).

As part of its monitoring and reporting role, the Climate Change Chief Executives Board periodically reports progress towards New Zealand's first Nationally Determined Contribution (NDC1).

2.1.9.2 Stakeholder engagement

2.1.9.2.1 Engagement on New Zealand's NDC and international negotiations

2015 New Zealand's Climate Change Target – Our contribution to the new international agreement. In 2015, ahead of the 21st Conference of Parties (COP21) in Paris, the Government consulted on what international target New Zealand would contribute to the new international climate change agreement as part of its "intended nationally determined contribution".[110] The Government wanted to understand what was most important to the public when it made decisions on our contribution.

2021 Climate Change Commission – Ināia tonu nei: A low emissions future for Aotearoa. In 2021, the Commission consulted on the first three emissions budgets, direction and policies for the first emissions reduction plan, and the NDC1.[111] The consultation discussed how New Zealand could meet the NDC, the contribution to wider climate efforts, the need for a plan to meet the NDC, the scale and cost of offshore mitigation, and key principles and approaches to inform decisions around a fair contribution. For more information on the Commission, see section 2.1.8.5.

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110 Ministry for the Environment. 2015. *New Zealand's climate change target: Our contribution to the new international climate change agreement: Discussion document*. Wellington: Ministry for the Environment.

111 Climate Change Commission. 2021. *Ināia Tonu Nei: A Low Emissions Future for Aotearoa*. Wellington: Climate Change Commission.

2023 Updating Aotearoa New Zealand's Approach to International Climate Change Negotiations. In 2023, the Government consulted on New Zealand's approach to international climate change negotiations, including questions on the NDC.[112] The feedback informed and updated the negotiating mandate that guided New Zealand's participation in United Nations climate negotiations and related international fora. The views helped set our priorities, the principles that guided our approach, and our positions on negotiating issues.

2.1.9.2.2 New Zealand's second emissions reduction plan 2024

New Zealand produces an emissions reduction plan every five years. The second emissions reduction plan (ERP2), covering the emissions budget for 2026–30, was developed during 2024. Consultation concluded in August 2024[113] and the plan was published in December 2024.[114]

ERP2 outlines the strategy and actions New Zealand will take across all sectors of the economy to meet emissions budgets. The plan will also set out the Government's current plans for the domestic contribution to NDC1.

2.1.9.2.3 Annual updates to the New Zealand Emissions Trading Scheme unit limits and price control settings

Since 2021, the NZ ETS unit limits and price control settings have been updated annually as mandated by the CCRA. NZ ETS settings are reviewed to establish that they continue to align with the NDC, emissions budgets and the 2050 target (see section 2.4.2.2 for more information on the NZ ETS). The latest consultation concluded in June 2024. It resulted in support to tighten unit limits and maintain price control settings that are in general accordance with New Zealand climate targets.[115]

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112 Ministry of Foreign Affairs and Trade. 2023. *Updating Aotearoa New Zealand's Approach to International Climate Change Negotiations: Public Consultation*. Wellington: Ministry of Foreign Affairs and Trade.

113 Ministry for the Environment. 2024. *New Zealand's second emissions reduction plan (2026–30): Discussion document*. Wellington: Ministry for the Environment.

114 Ministry for the Environment. 2025. *New Zealand's second emissions plan: 2026–30*. Wellington: Ministry for the Environment.

115 Ministry for the Environment. 2024. *Annual updates to New Zealand Emissions Trading Scheme limits and price control settings for units 2024: Consultation document*. Wellington: Ministry for the Environment.

2.2 Description of a Party's nationally determined contribution

Key messages

New Zealand is committed to its obligations under the Paris Agreement, including preparing, communicating and maintaining successive Nationally Determined Contributions (NDCs).

NDC1 sets a headline target of a 50 per cent reduction of net emissions below gross 2005 levels by 2030.

New Zealand's NDC1 is managed as a multi-year emissions budget. This Biennial Transparency Report provides updated information on the provisional budget, which equates to 579 million tonnes carbon dioxide equivalent over 2021 to 2030.

2.2.1 Introduction

2.2.1.1 New Zealand's Nationally Determined Contribution

New Zealand is committed to its obligations under the Paris Agreement, including preparing, communicating and maintaining successive Nationally Determined Contributions (NDCs), including a contribution toward:

- keeping the global average temperature well below 2 degrees Celsius above pre-industrial levels, while pursuing efforts to limit the temperature increase to 1.5 degrees Celsius
- strengthening the ability of countries to respond to the impacts of climate change
- ensuring that financial flows support the development of low-carbon and climate-resilient economies.

New Zealand's intended NDC (INDC) was first tabled in 2015 setting out a commitment to reduce net emissions by 30 per cent below gross 2005 levels by 2030. New Zealand's INDC was provisional, pending confirmation of the approaches to be taken in accounting for the land sector and confirmation of access to international carbon markets.

In 2016, the Paris Agreement was ratified and the INDC was converted into New Zealand's first NDC. As part of the ratification process, the Government established work on domestic mitigation, including launching an inquiry by the New Zealand Productivity Commission.[116] The Government also began, and funded, work to build and develop links with international carbon markets.

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[116] New Zealand Productivity Commission. 2018. *Low emissions economy: Final report*. Wellington: New Zealand Productivity Commission.

NDC1 was updated in 2021 to better align with the 1.5 degrees Celsius temperature goal. This followed the Intergovernmental Panel on Climate Change (IPCC) landmark 2018 Special Report on Global Warming of 1.5°C,[117] and advice from the Climate Change Commission | He Pou a Rangi[118] that greater ambition was needed to limit harmful warming.

2.2.1.2 Description of New Zealand's NDC1 as submitted under the Paris Agreement

New Zealand's first NDC under the Paris Agreement, dated 4 November 2021, is described in the box below.[119]

In its updated NDC1 submission under the Paris Agreement in 2021, New Zealand communicated that it would provide further information on how ongoing technical improvements to New Zealand's Greenhouse Gas Inventory would be treated in the first Biennial Transparency Report. Under the Paris Agreement, each Party should, as applicable, update its NDC description to include any updates and clarifications of previously reported information, including recalculation of previously reported inventory data.

This Biennial Transparency Report provides updated information on the NDC1 provisional budget, reflecting updates to New Zealand's Greenhouse Gas Inventory and Land Use, Land-Use Change and Forestry (LULUCF) target accounting quantities. The updated provisional budget equates to 579 Mt CO_2e over 2021 to 2030, starting with New Zealand's net target accounting emissions in 2020 and ending at the 50 per cent point year target. The updated NDC1 provisional budget corresponds to a reduction of 40.4 per cent when managed using a multi-year emissions budget starting from New Zealand's 2020 emissions target.

Updated information on New Zealand's approach to accounting for the LULUCF sector is provided in section 2.3 and annex 2.

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117 IPCC. 2018. *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Masson-Delmotte V, Zhai P, Pörtner H-O, Roberts D, Skea J, Shukla PR, Pirani A, Moufouma-Okia W, Péan C, Pidcock R, Connors S, Matthews JBR, Chen Y, Zhou X, Gomis MI, Lonnoy E, Maycock T, Tignor M, Waterfield T (eds). Cambridge, UK and New York, NY, USA: Cambridge University Press.

118 Climate Change Commission | He Pou a Rangi. 2021. *Ināia tonu nei: A low emissions future for Aotearoa*. Wellington: Climate Change Commission | He Pou a Rangi.

119 Submission under the Paris Agreement New Zealand's first Nationally Determined Contribution Updated 4 November 2021. Retrieved 13 November 2024.

As submitted verbatim under the Paris Agreement, 4 November 2021

The Nationally Determined Contribution of New Zealand is:

To reduce net greenhouse gas emissions to 50 per cent below gross 2005 levels by 2030.

This corresponds to 41 per cent when managed using a multi-year emissions budget starting from New Zealand's 2020 emissions target.

Based on New Zealand's most recent greenhouse gas inventory, this budget provisionally equates to 571 Mt CO_2e over 2021–2030. This constitutes a significant progression in ambition from New Zealand's initial first NDC, which implied a provisional emissions budget over 2021–2030 of 623 Mt CO_2e.

As communicated in the submission New Zealand made on 20 April 2020, this update is informed by the advice on the NDC from New Zealand's Climate Change Commission.

The NDC is contextualised by New Zealand's aims under the Paris Agreement to hold the increase in the global average temperature to well below 2°C and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

New Zealand intends to separately communicate its action on climate finance in its biennial reports; and its adaptation efforts in its 8th national communication and then in successive biennial transparency reports under the Paris Agreement.

Time period	2021 to 2030
Type of commitment	A point year target managed using a carbon budget across the NDC period.
Target reference year	2005
Reduction level	Emissions will be reduced by 50 per cent below gross 2005 levels by 2030, which corresponds to a 41 per cent reduction when managed using a multi-year emissions budget.
Scope and coverage	This responsibility target is economy-wide covering all sectors: • Energy • Industrial processes and product use • Agriculture • Forestry and other land use • Waste and all greenhouse gases: • CO_2 • HFCs • N_2O • CH_4 • PFCs • NF_3 • SF_6
Methodological approaches for estimating anthropogenic greenhouse gas emissions and removals	This NDC applies 100 year Global Warming Potentials (GWPs) from the IPCC 5th assessment report, and methodologies from the IPCC 2006 greenhouse gas inventory guidelines and the 2013 IPCC KP Supplement.
Use of market mechanisms and cooperative approaches In meeting its target New Zealand intends to use international market mechanisms, cooperative approaches and carbon markets that enable trading and use of a wide variety of units/emission reductions/mitigation outcomes that meet reasonable standards and guidelines to: • ensure the environmental integrity of emissions reductions generated or purchased • guard against double-claiming/double-counting, and • ensure transparency in accounting and governance.	

Approach to accounting for forestry and other land use	
New Zealand's preferred approach for accounting for forestry and other land use sector is described below (as per its INDC). This approach sets out core assumptions. We reserve the right to adjust our selection of methodologies, without reducing ambition. New Zealand's approach to forestry and other land use accounting will be fully described in its first communication under the Paris Agreement.[1]	
Methodologies	New Zealand's assumed accounting for the forestry and other land use sector will be based on a combination of the 2006 IPCC Guidance and the 2013 IPCC Kyoto Protocol Supplement, providing for Kyoto Protocol accounting approaches to be applied to the greenhouse gas inventory land-based categories. New Zealand looks forward to considering methodologies introduced by the 2013 IPCC Wetlands Supplement and the 2019 Refinement to the 2006 IPCC Guidelines in the future. New Zealand's existing activity start year of 1990 will continue to apply, ensuring continuity of action with previous commitments. New Zealand's forestry and other land use approach assumes accounting will be either land or activity based, and will apply existing IPCC methodologies to distinguish areas subject to direct human-induced change from those under pre-existing management, as follows: a. Forests established from the activity start year will continue to be accounted for as they would under the Kyoto Protocol, but once they attain their long-term average carbon stock, taking into account all carbon pools and activities, the forest will transfer to the Forest management/Forest remaining forest category, where it will be accounted for under a business-as-usual reference level. New Zealand will continue to account for all deforestation emissions. b. Forests established before the activity start year will continue to be accounted for under a business-as-usual reference level, as per the Kyoto Protocol, to address the dynamic effects of age structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal, sustainable forest management in production forests. c. Accounting provisions to address natural disturbances on managed lands, non-anthropogenic effects and additionality since the activity start year will also continue to apply, building on existing guidance. Accounting for harvested wood products will be based on the production approach. New Zealand's forestry and other land use approach builds on experience with accounting under the Kyoto Protocol to recognise and focus on additional action, and will create incentives for the establishment of new forests, recognise permanent, long-term enhancements of carbon sinks resulting from management, and take responsibility for deforestation, while accommodating the long-term cycles in net emissions and removals that arise from sustainable forest management of production forests.

[1] The first communication being the submission of the first Biennial Transparency Report (BTR1) and national inventory report, as required under the Paris Agreement, at latest by 31 December 2024.

2.3 Information necessary to track progress made in implementing and achieving nationally determined contributions

Key messages

New Zealand's domestic legislation and policy frameworks enable the development of clear and stable climate change policies that contribute toward achieving the country's domestic targets and first Nationally Determined Contribution (NDC1).

New Zealand is making progress toward its ambitious NDC1 target by ensuring domestic legislation is fit for purpose, implementing measures in the first emissions reduction plan, outlining further actions in the second emissions reduction plan, and substantially investing in sustainable agriculture.

Since New Zealand's intended Nationally Determined Contribution (INDC) was set in 2015, modelling updates, which include improvements to methodologies and additional government actions, indicate that the abatement gap to achieving NDC1 has narrowed despite strengthening the NDC1 target to reflect higher ambition. The projections show that the gap is now 89.2 million tonnes of carbon dioxide equivalent (Mt CO_2e), in comparison to 149 Mt CO_2e when the NDC was enhanced in 2021. This does not include the impact of second emissions reduction plan policies and updated data, which are projected to reduce this gap further to 84.0 Mt CO_2e. These updates were unable to be included as the Biennial Transparency Report applied an earlier cut-off date for modelling assumptions compared with the second emissions reduction plan.

New Zealand's net target accounting emissions in 2021 and 2022 were 75.7 Mt CO_2e and 73.1 Mt CO_2e. This leaves an emissions budget of 430.1 Mt CO_2e for the remaining budget period until 2030.

New Zealand will continue to prioritise domestic action to achieve NDC1 but is also exploring cooperation opportunities under Article 6 of the Paris Agreement with partner governments, market intermediaries and other entities that could enable New Zealand to undertake cooperative mitigation action in future.

New Zealand participates in several initiatives to support engagement in Article 6 cooperation by developing partnerships, building partner countries' capacity, and working toward the development of standards and methodologies resulting in high integrity markets.

New Zealand is developing arrangements that establish frameworks for collaboration. For example, New Zealand has joined the Asian Development Bank Climate Action Catalyst Fund as an observer to gain insight into Article 6 operations and transactions, and to support Asian Development Bank efforts to build Article 6 readiness in developing member countries.

2.3.1 Introduction

This section outlines New Zealand's progress towards its first Nationally Determined Contribution (NDC1) under the Paris Agreement. It details actions taken towards achieving NDC1 and how New Zealand is tracking against its target. It also covers New Zealand's selected NDC1 indicator, methodologies and accounting approaches.

2.3.2 Progress towards NDC1

2.3.2.1 New Zealand's domestic legislation and policy frameworks support ambition to achieve NDC1

The Climate Change Response Act 2002 provides the legal framework to enable New Zealand to meet its domestic and international obligations including those under the United Nations Framework Convention on Climate Change and the Paris Agreement.

In 2019, amendments to the Climate Change Response Act 2002 introduced the Zero Carbon Framework, enabling New Zealand to develop and implement clear and stable climate change policies that contribute to the global effort to limit average temperature increase to 1.5 degrees Celsius above pre-industrial levels (see section 2.1.8).

The 2019 amendments to the Climate Change Response Act 2002 established:

- the Climate Change Commission
- 2050 targets
- a system of emissions budgets that step progressively towards the 2050 target by capping emissions in the relevant budget period
- the requirement to develop emissions reduction plans for each emissions budget that set out the policies and strategies for achieving the emissions budgets.

The Government published the first three emissions budgets (2022–2025, 2026–2030, 2031–2035) in May 2022. The emissions reduction plans (ERPs) set out policies and strategies for meeting successive emissions budgets. The first emissions reduction plan (ERP1) was released in 2022, covering the period 2022–2025. The second emissions reduction plan (ERP2) was released in December 2024, covering the period 2026–2030.

The approach in ERP2 is guided by the Government's recently published 2024 Climate Strategy,[120] and focuses on:

- a cost-effective approach through leveraging the New Zealand Emissions Trading Scheme to support innovation, emerging technologies that reduce emissions and investment across sectors to reduce emissions effectively
- reducing emissions and increasing carbon removals.

The Climate Strategy sets out the high-level approach for delivering on New Zealand's climate goals. ERP2 implements the mitigation part of this strategy, laying out the actions to reduce net greenhouse gas emissions throughout the budget period.

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[120] Ministry for the Environment. 2024. *Responding to a changing climate: The Government's climate strategy*. Retrieved 13 November 2024.

The strategy focuses on five pillars to help the Government meet its targets to reduce the impact of climate change and prepare for its future effects. The pillars are:

1. infrastructure is resilient and communities are well prepared
2. credible markets support the climate transition
3. clean energy is abundant and affordable
4. world-leading climate innovation boosts the economy
5. nature-based solutions address climate change.

The Climate Strategy, emissions budgets and their respective emissions reduction plans drive domestic progress toward achieving NDC1 and provide the pathway to net zero long-lived greenhouse gas emissions by 2050.

2.3.2.2 New Zealand has made progress, but continues to face challenges

New Zealand has an ambitious NDC1 target, which was updated in 2021 to better align with the latest science to limit harmful warming. Meaningful progress has been made toward NDC1 through domestic policies and measures that have been implemented or are underway as detailed in section 2.4.

Since the INDC was set in 2015, modelling updates, which include improvements to methodologies and additional government actions, indicate that the abatement gap to achieving NDC1 has narrowed despite strengthening the NDC1 target to reflect higher ambition.

The projections show that the gap is now 89.2 million tonnes of carbon dioxide equivalent (Mt CO_2e) compared with 149 Mt CO_2e when the NDC was enhanced in 2021.[121] This does not include the impact of second emissions reduction plan policies and updated data, which are projected to reduce this gap further to 84.0 Mt CO_2e. These updates were unable to be included as the Biennial Transparency Report applied an earlier cut-off date for modelling assumptions compared with the second emissions reduction plan. The second Biennial Transparency Report will include the impacts of the second emissions reduction plan.

The NDC1 abatement gap is the gap between the provisional NDC1 emissions budget of 579 Mt CO_2e and projected net target accounting emissions for the NDC1 budget period (2021 to 2030) of 668.2 Mt CO_2e.

Closing the gap still presents a significant challenge for New Zealand given our national circumstances, however there are also opportunities.

Over 80 per cent of New Zealand's stationary energy needs are met by renewables. New Zealand generates the second-highest percentage of renewable energy in the Organisation for Economic Co-operation and Development.[122] While the challenges are greatest in decarbonising the

[121] As stated in appendix one in Submission under the Paris Agreement New Zealand's first Nationally Determined Contribution Updated 4 November 2021. Retrieved 13 November 2024.

[122] Organisation for Economic Co-operation and Development. 2021. *Renewable energy*. Retrieved 13 November 2024.

transport sector, opportunities exist to expand renewable electricity sources that can support further substitution away from fossil fuels elsewhere in the economy.

New Zealand's emissions profile is such that over half of total emissions are from pastoral livestock and limited mitigation solutions are currently available that suit pasture-based farming systems.

New Zealand is committed to supporting its agriculture sector to remain a world leader in sustainable agriculture. New Zealand is taking a technology-led approach to managing agricultural emissions and is committed to ensuring producers have the tools and technologies to reduce emissions while maintaining productivity and profitability. The Government is making substantial investments in research and development in agricultural emissions reduction technologies and practices (see section 2.4.7).

The Government has an important role in getting the policy and regulatory settings right to reach net zero and maximise the opportunities that come from the transition to a net zero economy. However, transitioning to net zero by 2050 is a significant challenge that requires broad collective action from households, businesses, iwi and hapū, communities, non-governmental organisations, local government and other organisations.

2.3.2.3 Domestic action is driving progress

Significant progress has been made toward achieving NDC1 through domestic action. Since 2019, New Zealand's gross emissions have consistently decreased, while emissions intensity has been improving since at least 2010.[123] At the same time, New Zealand is continuing to see economic growth.

New Zealand's ERP1 is currently being implemented and contains strategies, policies and actions for achieving emissions budget one. The plan builds on the steps New Zealand has already taken to address climate change, and covers policies and measures for all sectors of the New Zealand economy.

In December 2024, the Government published the second emissions reduction plan (ERP2) to reduce emissions throughout emissions budget two, covering the period 2026–2030. The ERP2 details eight key policies that will have the greatest potential emissions savings over the next five years.

- Enabling more renewable energy projects through Electrify NZ.
- Recognising carbon capture, utilisation and storage in the NZ ETS.
- Targeting a network of 10,000 EV charging points by 2030.
- Introducing agricultural emissions pricing by 2030 and incentivising the uptake of new technologies.
- Exploring private-sector partnerships to plant trees on Crown-owned land which has low conservation value and low farming value.
- Introducing a regulated product stewardship scheme for refrigerants from 2025.

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[123] Emissions intensity is the ratio of greenhouse gas emissions to economic output (gross domestic product). Emissions intensity has decreased because the economy has increased production with fewer emissions. Further information can be found here: Stats NZ. 2024. *Greenhouse gas emissions (industry and household): December 2023 quarter*. Retrieved 14 November 2024.

- Leveraging the Waste Minimisation Fund to enable resource recovery systems and infrastructure to process organic waste.
- Improving organic waste management and landfill gas capture to increase landfill gas recovery rates.

Projections indicate that New Zealand will reduce net emissions over the next five years to 2030. Modelling developed for ERP2 shows that New Zealand is on track to meet emissions budget one and emissions budget two.[124]

Section 2.4 provides further details of New Zealand's domestic mitigation policies and measures.

New Zealand will continue to prioritise domestic action to achieve NDC1. However, the scale of emission reductions required to meet the target is greater than what can be achieved in an economically feasible way through domestic action alone.[125]

2.3.2.4 Progress toward international cooperation to support achieving NDC1

New Zealand is progressing actions to achieve its NDC1 target by exploring options for international cooperation under Article 6 of the Paris Agreement.[126] This includes exploring cooperation opportunities with partner governments, market intermediaries and entities that could enable New Zealand to undertake cooperative mitigation action in the future.

An example of such cooperation is New Zealand joining the Global Green Growth Institute's Carbon Transaction Facility by contributing climate finance to the Article 6 Readiness Facility. The Readiness Facility is a pillar of the Carbon Transaction Facility and aims to increase technical capacity and strengthen the institutions of developing member countries to participate in Article 6. A contribution is a prerequisite for participation in the Carbon Transaction Facility that operates a Carbon Trust Fund to facilitate the purchase of emissions reductions.

New Zealand's international engagement serves to:

- discover and deepen understanding of international cooperation options
- establish relationships with potential cooperation partners
- support development of partner countries' capability and capacity to participate in carbon markets
- influence practices and methodologies to satisfy the need for robust standards underpinning any use of international cooperation to help achieve NDC1.

Together with its partners, New Zealand is developing arrangements that establish frameworks for collaboration. Amongst other things, these seek to enable implementation of carbon market cooperation to contribute toward NDCs, promote economic and social benefits, and advance broader sustainable development goals. Examples include:

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124 If this central scenario is achieved, as projected, then New Zealand will meet the budget of 305 Mt CO_2e for emissions budget two. This modelling includes the impact of new second emissions reduction plan policies and updated New Zealand Emissions Trading Scheme unit and price control settings.

125 Climate Change Commission | He Pou a Rangi. 2021. *Ināia tonu nei: A low emissions future for Aotearoa*. Wellington: Climate Change Commission | He Pou a Rangi.

126 United Nations. 2015. The Paris Agreement. Article 6. Retrieved 14 November 2024.

- Enhancement of the Singapore–New Zealand Elevated Partnership under the Climate Change and Green Economy pillar. In April 2024, a Prime Ministerial Joint Statement agreed to explore how New Zealand and Singapore will cooperate to promote commercial partnerships in achievement of their respective climate change and economic transition goals.[127]
- Announcing an intention to work bilaterally with Thailand on combatting climate change and building a more sustainable future for all, in line with the goals of the Paris Agreement, as set out in a Joint Statement in early 2024.[128]
- A COP29 (29th Conference of the Parties) Joint Declaration signed with the Philippines agreeing to establish a framework to enhance partnership on climate change cooperation and sustainable development.[129]
- Agreement with Viet Nam to develop a climate change cooperation arrangement, to deepen engagement on this aspect of our growing relationship.

New Zealand also collaborates in plurilateral initiatives that offer opportunities to develop future carbon market cooperation. These include:

- The Indo-Pacific Economic Framework for Prosperity,[130] which is a cooperation framework among 14 Asia–Pacific countries that comprises four cooperation agreements, one of which is the Clean Economy Agreement. This is focused largely on clean economy technologies and includes a cooperative work programme specifically on carbon markets.
- New Zealand's investment through the Global Research Alliance on Agricultural Greenhouse Gases supports global research capability and capacity programmes. This includes New Zealand's Climate Smart Agriculture Initiative which supports countries throughout the Pacific, the Association of Southeast Asian Nations (ASEAN),[131] Africa, and Latin America and the Caribbean regions (see section 2.4.7.3) to improve their greenhouse gas inventories for agriculture, helping provide a foundation for carbon markets.
- New Zealand has joined the Asian Development Bank Climate Action Catalyst Fund as an observer to gain insights into the operational and transactional aspects of Article 6. In parallel, New Zealand is finalising a contribution to the Asian Development Bank's Article 6 Support Facility, to assist developing member countries to engage with international carbon markets through Article 6 readiness.

Furthermore, New Zealand is working closely with other countries that are actively engaging Article 6 as buyers, sharing experiences and monitoring developments in international carbon markets. Discussions are also ongoing with leading international carbon market intermediaries and project developers to determine how their services align with New Zealand's preferences and goals.

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127 Joint Statement by the Prime Ministers of Singapore and New Zealand. 15 April 2024. Retrieved 14 November 2024.

128 Joint Statement by the Prime Minister of the Kingdom of Thailand and the Prime Minister of New Zealand. 17 April 2024. Retrieved 14 November 2024.

129 Joint Statement by the Government of the Republic of the Philippines and the Government of New Zealand. 19 November 2024. Retrieved 28 November 2024.

130 New Zealand Ministry of Foreign Affairs and Trade. 2024. *IPEF overview*. Retrieved 14 November 2024.

131 Association of Southeast Asian Nations (ASEAN) countries include Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam.

New Zealand's participation in carbon market forums, such as the Carbon Markets Assembly and New Zealand-led Asia Pacific Carbon Market Roundtable, further supports engagement in Article 6 activities. These forums provide valuable platforms for knowledge exchange, helping New Zealand stay informed, learn best practices and share policy developments in global carbon markets. By engaging with a variety of stakeholders, New Zealand can explore new opportunities for cooperation, enhance technical capabilities and ensure its approach aligns with international standards.

2.3.2.5 Emissions data for NDC1

New Zealand's gross emissions in 2005, the base year for NDC1, were 86.6 Mt CO_2e.

In 2022, net target accounting emissions were 15.6 per cent below 2005 levels. New Zealand's net target accounting emissions in 2021 and 2022 were 75.7 Mt CO_2e and 73.1 Mt CO_2e respectively. When managed as a budget, this leaves an emissions budget of 430.1 Mt CO_2e for the remaining budget period until 2030 (see common tabular format (CTF) table 4).

CTF table 4: Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate (paras 67 and 77(a)(i) of the MPGs)	Implementation period of the NDC covering information for previous reporting years, as applicable, and the most recent year, including the end year or end of period (paras 68 and 77(a)(ii–iii) of the MPGs)		Target level	Target year or period	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras 69–70 of the MPGs)
		2005	2021	2022			
Indicator(s) selected to track progress of the NDC or portion of NDC under Article 4 of the Paris Agreement (paras 65 and 77(a) of the MPGs):							
Annual net target accounting emissions	kt CO_2 equivalent	86,615.38	75,741.67	73,115.79	43307.69	2030	In 2022, net target accounting emissions were 15.6 per cent below total gross emissions in the base year (2005). New Zealand's net target accounting emissions in 2021 and 2022 were 75,742 kt CO_2e and 73,116 kt CO_2e. This leaves an emissions budget of 430,143 kt CO_2e for the remaining budget period until 2030.
Where applicable, total GHG emissions and removals consistent with the coverage of the NDC (para 77(b) of the MPGs)	kt CO_2 equivalent		81,808.92	78,395.36			
Contribution from the LULUCF sector for each year of the target period or target year, if not included in the inventory time series of total net GHG emissions and removals, as applicable (para 77(c) of the MPGs)	kt CO_2 equivalent		–6,067.25	–5,279.57			

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate (paras 67 and 77(a)(i) of the MPGs)	Implementation period of the NDC covering information for previous reporting years, as applicable, and the most recent year, including the end year or end of period (paras 68 and 77(a)(ii–iii) of the MPGs)		Target level	Target year or period	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras 69–70 of the MPGs)
		2005	2021	2022			
Each Party that participates in cooperative approaches that involve the use of ITMOs towards an NDC under Article 4 of the Paris Agreement, or authorizes the use of mitigation outcomes for international mitigation purposes other than achievement of the NDC, shall provide (para. 77(d) of the MPGs):			Not applicable	Not applicable			

Note: GHG = greenhouse gas; LULUCF = Land Use, Land-Use Change and Forestry; MPGs = modalities, procedures and guidelines; NDC = Nationally Determined Contribution.

2.3.3 Indicators

New Zealand has an indicator of annual net target accounting emissions to monitor NDC1 progress. CTF table 1 provides further details on this indicator.

CTF table 1: Structured summary: Description of selected indicators

Indicator(s) selected to track progress	Description
Annual net target accounting emissions	Annual net target accounting emissions between 2021 and 2030 in kt CO_2e
Information for the reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate	Target reference year: 2005 LULUCF activity start year: 1990 Total emissions in base year (2005): provisional estimate 86.6 (Mt CO_2e) Base year emissions are as reported in the most recently published national greenhouse gas inventory report. Common metric: AR5 GWP100
Updates in accordance with any recalculation of the GHG inventory, as appropriate	Base year and indicator values are consistent with the most recently published national greenhouse gas inventory report and therefore include category-specific GHG inventory recalculations for all sectors.
Relation to NDC	This indicator allows us to quantitatively assess how New Zealand is tracking towards reducing net greenhouse gas emissions to 50 per cent below gross 2005 levels by 2030.

Note: AR5 GWP100 = the 100-year time horizon global warming potential values from the IPCC Fifth Assessment Report (IPCC, 2013[132]); GHG = greenhouse gas; LULUCF = Land Use, Land-Use Change and Forestry; NDC = Nationally Determined Contribution.

CTF table 2: Structured summary: Definitions needed to understand the Nationally Determined Contribution

	Definitions
Definition needed to understand each indicator:	
Annual net target accounting emissions in kt CO_2e	Annual net target accounting quantities comprise: • all gross emissions • emissions from the following LULUCF activities: *Afforestation and reforestation*, *Forest management* and *Deforestation*. A country-specific approach to account for emissions from *Afforestation and reforestation* is applied.
Any sector or category defined differently than in the national inventory report:	
Land Use, Land-Use Change and Forestry	New Zealand's accounting approach to the LULUCF sector is activity based and applies existing IPCC methodologies to distinguish areas subject to direct human-induced change that has occurred since 1990 from those under pre-existing management as at 1990, as follows.

[132] IPCC. 2013. Stocker TF, Qin D, Plattner G-K, Tignor M, Allen SK, Boschung J, Nauels A, Xia Y, Bex V, Midgley PM (eds). *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

Definitions	
	• Emissions and removals from *Afforestation and reforestation* activities are accounted for until the forests attain their long-term average carbon stock, taking into account all carbon pools. Thereafter, emissions and removals from these activities are tracked to ensure they are consistent with attaining the long-term average carbon stock over the long term under business-as-usual management. • Emissions and removals from *Deforestation* activities are fully accounted for. • Emissions and removals from *Forest management* activities are accounted for under a business-as-usual reference level, to address the dynamic effects of age structure resulting from activities and practices occurring before the start year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal, sustainable forest management in production forests. • Accounting provisions to address natural disturbances on managed lands, non-anthropogenic effects and additionality since the activity start year also apply, building on existing guidance. • Accounting for harvested wood products is based on the production approach.
Definition needed to understand mitigation co-benefits of adaptation actions and/or economic diversification plans:	
Adaptation actions	Not applicable.
Economic diversification plans	Not applicable.
Any other relevant definitions	

Note: IPCC = Intergovernmental Panel on Climate Change; LULUCF = Land Use, Land-Use Change and Forestry.

2.3.4 Methodologies and accounting approaches

2.3.4.1 Methodology for target and baselines

The NDC1 emissions budget sets the total amount of emissions able to be emitted over the period covered by NDC1. To calculate this budget, a trajectory is drawn between a start point and an end point. The starting point used is New Zealand's net target accounting emissions in 2020. The end point is the point year target of NDC1, which is for net emissions to be reduced to 50 per cent below 2005 gross emissions levels by 2030. The NDC1 emissions budget is equal to the amount of emissions occurring under the trajectory over the period of NDC1. The actual emissions pathway does not have to follow this exact trajectory, as long as New Zealand's total emissions over the period are less than the allowed level, that is, the NDC1 emissions budget.

2.3.4.2 Methodology for accounting approach

New Zealand uses a target accounting approach for NDC1. New Zealand accounts for all gross emissions as reported annually in New Zealand's Greenhouse Gas Inventory (the Inventory), but only a subset of emissions and removals from the LULUCF sector.

New Zealand's accounting approach for the LULUCF sector is based on the net emissions reported in the Inventory and applies elements of the 2013 Kyoto Protocol supplement,[133] and a country-specific approach to account for emissions from *Afforestation and reforestation* activities. New Zealand has elected to account for emissions from the following LULUCF activities: *Afforestation and reforestation*, *Forest management* and *Deforestation*.

Forests established from the activity start year (1990) are accounted for up until they attain their long-term average (LTA) carbon stock. This is to address the effects of age-class structure and to account only for the long-term additional carbon sequestered in these forests. Once these forests reach their LTA carbon stock, taking into account all carbon pools and activities, no further carbon gains or losses are accounted for. The net emissions from these forests above the LTA carbon stock are instead tracked separately to quantify deviations from an emissions pathway consistent with attaining the LTA carbon stock.

Forests established before the activity start (1990) year continue to be accounted for under a business-as-usual reference level, as they were under the Kyoto Protocol. This is to address the dynamic effects of age structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal, sustainable forest management in production forests.

New Zealand will continue to fully account for all deforestation emissions.

Accounting provisions to address natural disturbances on managed lands, non-anthropogenic effects and additionality since the activity start year will also continue to apply, building on existing guidance.

In the event of a significant non-anthropogenic event or circumstance, where the emissions from such an event exceed a predetermined threshold (ie, the background level), New Zealand retains the option to invoke the natural disturbance accounting provision. The following types of natural disturbances are captured by this provision:

- wildfires
- invertebrate and vertebrate pests and diseases
- extreme weather events
- geological disturbances.

Further detail on how the background level of these disturbances has been defined is provided in CTF table 3 and annex 2, section A2.3.7.

New Zealand accounts for the changes in the harvested wood products pool using the production approach. For *Afforestation and reforestation* and *Forest management* activities, estimates are derived from a modified Intergovernmental Panel on Climate Change (IPCC) reporting model. The emissions from harvested wood products originating from *Deforestation* activities are instantly oxidised, in line with the 2013 Kyoto Protocol supplement.[134] Annex 2,

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133 IPCC. 2014. Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Switzerland: IPCC.

134 IPCC. 2014. Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Switzerland: IPCC.

section A2.3.5 further describes the methods used for accounting for emissions and removals from harvested wood products.

New Zealand's approach builds on experience with accounting under the Kyoto Protocol to recognise and focus on additional action that will create incentives for the establishment of new forests, recognise permanent long-term enhancements of carbon sinks resulting from management, and take responsibility for deforestation, while accommodating the long-term cycles in net emissions and removals that arise from sustainable forest management of production forests.

2.3.4.3 Afforestation and reforestation

Forests established from the activity start year (1990) are accounted for as *Afforestation and reforestation* activities (as they would be under the Kyoto Protocol), but only up until they attain their LTA carbon stock. Once they reach their LTA carbon stock, taking into account all carbon pools and activities, no further carbon gains or losses are accounted for. At this point, these forests transfer from the *Below LTA* to the *Above LTA* subcategory, where their corresponding emissions and removals are tracked to ensure they balance out over the long term under business-as-usual management.

The LTA carbon stock is defined as the long-term average carbon stock per hectare that would be maintained (on average) across all biomass carbon pools under current management conditions. The 'LTA age' is the age at which this long-term average carbon stock is achieved, which is assumed to be an equilibrium point about which future losses and gains balance out to zero over subsequent harvest and replanting cycles, as long as current management continues to apply.

Afforestation and reforestation activities include emissions and removals from carbon losses and gains for all post-1989 forests including: post-1989 rotational planted forests, post-1989 permanent planted forests and post-1989 natural forests.

For planted forests that are managed under a clearfell rotation regime (post-1989 rotational planted forests), the LTA carbon stock refers to the carbon stocks of all carbon pools when averaged out over multiple rotations under current management. For these forests, the underlying principle of the long-term average is that, although the carbon stock of the forest and its associated products may fluctuate over time with harvesting and replanting, an LTA carbon stock can be calculated that represents a net change in stock compared with the pre-existing carbon levels before afforestation.[135]

For forests that do not undergo harvesting, such as post-1989 permanent planted forests and post-1989 natural forests, the LTA age is assumed to be over 40 years, therefore they will remain below the LTA carbon stock throughout NDC1.[136] By contrast, post-1989 rotational planted forests have a combined LTA age of 23 years and transition from the *Below LTA* subcategory to the *Above LTA* subcategory at the end of their 23rd year.

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135 Wakelin SJ, Manley BR, Dowling LJ. (Unpublished). *Options for calculating the long-term average carbon stock in post-1989 forests*. Contract report (Output 58646) prepared for the Ministry for Primary Industries (MPI) by New Zealand Forest Research Institute Ltd (trading as Scion) in 2017.

136 Wakelin SJ. Unpublished. *Post-1989 Forest Long-Term Average Carbon Stock and Reference Level.* Contract report prepared for the Ministry for the Environment by New Zealand Forest Research Institute Ltd (trading as Scion) in 2024.

The main drivers for the LTA carbon stock and corresponding age are:

- forest management and growth rates (represented by yield tables derived from the Land Use and Carbon Analysis System plot network)
- rotation age
- proportions of species contributing to the forest estate
- and lifespan of wood products.

More detail on the calculation of the LTA carbon stock and New Zealand's averaging approach to accounting for emissions from forests established from the activity start year (1990) can be found in annex 2, section A2.3.2. Annex 2, section A2.3.5 further describes the methods used for accounting for emissions and removals from harvested wood products.

2.3.4.4 Deforestation

New Zealand accounts for all emissions from deforestation activities. These emissions result from:

- the loss of carbon, which was stored in the biomass before deforestation, occurring in the year that deforestation occurs
- soil carbon stock changes including lagged emissions from previous deforestation events
- mineralisation of soil nitrogen associated with the land-use change
- emissions from burning biomass on deforested land
- removals from biomass growth in the new land use, which accumulates at the rates given in chapter 6 of the 2024 Inventory, under each land-use category.

2.3.4.5 Forest management

New Zealand reports emissions and removals from *Forest management* from 2021 onwards. New Zealand has applied the broad approach to interpreting the definition of forest management so that it includes the whole area classified as pre-1990 natural forest and pre-1990 planted forest. The area in this category excludes any area deforested since 1990, because this is reported under *Deforestation*, and includes areas to which the carbon equivalent forest provision is applied.

Emissions from *Forest management* are accounted for under a business-as-usual reference level, as per the Kyoto Protocol, to address the dynamic effects of age structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal, sustainable forest management in production forests.

The source of the activity data and emission factors applied to *Forest management* activities is described in more detail in the 2024 submission of the Inventory.[137] This is because New Zealand applies the same methods to estimating emissions from *Forest management* activities as those applied to the equivalent land-use category, *Forest land remaining forest land*, of the Inventory.

Further detail on New Zealand's accounting approach for LULUCF is provided in annex 2.

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137 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

2.3.4.6 Methodologies associated with any cooperative approaches

New Zealand does not currently have any cooperative approaches in place to use internationally transferred mitigation outcomes towards its NDC1.

2.3.4.7 Summary of methodologies and accounting approaches

CTF table 3 provides a summary of the methodologies and accounting approaches used for NDC1.

CTF table 3: Structured summary: Methodologies and accounting approaches – consistency with Article 4, paragraphs 13 and 14, of the Paris Agreement and with decision 4/CMA.1

Reporting requirement	Description or reference to the relevant section of the BTR
For the first NDC under Article 4:	
Accounting approach, including how it is consistent with Article 4, paras 13–14, of the Paris Agreement (para 71 of the MPGs)	New Zealand's accounting approach is described in section 2.3.4. New Zealand's accounting approach is a gross:net point-year target for 2030, managed as an emissions budget across the period from 2021 to 2030; economy-wide, all sectors, all gases; modified Kyoto Protocol accounting rules are applied to the LULUCF sector. Because the accounting approach is an absolute reduction in greenhouse gas emissions as reported annually in New Zealand's Greenhouse Gas Inventory, it is consistent with Article 4, paragraphs 13–14 of the Paris Agreement and paragraph 71 of the MPGs.
For the second and subsequent NDC under Article 4, and optionally for the first NDC under Article 4:	
Information on how the accounting approach used is consistent with paragraphs 13–17 and annex II of decision 4/CMA.1 (para. 72 of the MPGs)	Not applicable.
Explain how the accounting for anthropogenic emissions and removals is in accordance with methodologies and common metrics assessed by the IPCC and in accordance with decision 18/CMA.1 (para. 1(a) of annex II to decision 4/CMA.1)	Not applicable.
Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1)	Not applicable.
Explain how overestimation or underestimation has been avoided for any projected emissions and removals used for accounting (para. 2(c) of annex II to decision 4/CMA.1)	Not applicable.
For each NDC under Article 4:	
Accounting for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the IPCC and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (para. 12(a) of decision 4/CMA.1 and para 1 of its annex II):	

Reporting requirement	Description or reference to the relevant section of the BTR
Each methodology and/or accounting approach used to assess the implementation and achievement of the target(s) as applicable (para 74(a) of the MPGs)	Net target accounting quantities are used to assess the implementation, progress and achievement of the target for NDC1. See section 2.3.4 for details.
Methodology and/or accounting approach used for the construction of any baseline to the extent possible (para 74(b) of the MPGs)	Base year emissions are 2005 total (gross) emissions as reported in New Zealand's Greenhouse Gas Inventory. A forest reference level is used to account for Forest management activities. See annex 2, including section A.2.4.1 for details.
If the methodology or accounting approach used for the indicator(s) in table 1 differ from those used to assess the implementation and achievement of the target, describe each methodology or accounting approach used to generate the information generated for each indicator in table 4	Not applicable.
Assumptions relevant to the achievement of the NDC under Article 4, as applicable and available (para 75(i) of the MPGs) (para 74(c) of the MPGs)	Not applicable.
Key parameters, assumptions, definitions, data sources and models used, as applicable and available (para 75(a) of the MPGs)	Information on parameters, assumptions, data sources and models used to calculate New Zealand's target, forest reference level and indicator is provided in sections 2.3, 2.5, 2.6 and annex 2 of New Zealand's first Biennial Transparency Report.
IPCC Guidelines used, as applicable and available (para 75(b) of the MPGs)	2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines).[138] 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (2013 KP Supplement).[139]
Report the metrics used, as applicable and available (para 75(c) of the MPGs)	100-year time horizon global warming potential values used are those listed in table 8.A.1 of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,[140] excluding the value for fossil methane (AR5 GWP100).
For Parties whose NDC cannot be accounted for using methodologies covered by IPCC guidelines, provide information on their own methodology used, including for NDCs, pursuant to Article 4, paragraph 6, of the Paris Agreement, if applicable (para 1(b) of annex II to decision 4/CMA.1)	New Zealand is applying an activity-based accounting approach to the net emissions it accounts for from the LULUCF sector. The methods applied to estimate accounting quantities adhere to the 2006 IPCC Guidelines and the 2013 KP Supplement while taking a country-specific approach to account for emissions from Afforestation and reforestation activities. See annex 2, section A2.3.2 for a full description of the country-specific approach New Zealand applies to Afforestation and reforestation activities.

138 IPCC. 2006. Eggleston HS, Buendia L, Miwa K, Ngara T, Tanabe K (eds). *2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 1. General Guidance and Reporting.* IPCC National Greenhouse Gas Inventories Programme. Japan: Institute for Global Environmental Strategies for IPCC.

139 IPCC. 2014. Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Switzerland: IPCC.

140 IPCC. 2013. Stocker TF, Qin D, Plattner G-K, Tignor M, Allen SK, Boschung J, Nauels A, Xia Y, Bex V, Midgley PM (eds). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Reporting requirement	Description or reference to the relevant section of the BTR
Provide information on methodologies used to track progress arising from the implementation of policies and measures, as appropriate (para 1(d) of annex II to decision 4/CMA.1)	Not applicable.
Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance, taking into account any relevant decision under the Convention, as applicable (para 75(d) of the MPGs):	
For Parties that address emissions and subsequent removals from natural disturbances on managed lands, provide detailed information on the approach used and how it is consistent with relevant IPCC guidance, as appropriate, or indicate the relevant section of the national GHG inventory report containing that information (para 1(e) of annex II to decision 4/CMA.1, para 75(d)(i) of the MPGs)	In the event of a significant non-anthropogenic event or circumstance, New Zealand retains the option to invoke the natural disturbance accounting provision. The following types of natural disturbances are captured: wildfires; invertebrate and vertebrate pests and diseases; extreme weather events; geological disturbances. For planted forests, salvage logging is considered to take place in all disturbed forests. In the case of pre-1990 natural forests, the ground plot measurement programme captures emissions from natural disturbances implicitly, and the emissions from natural disturbance events, apart from wildfires, cannot be separated from other disturbance events. New Zealand assumes a zero baseline for all types of natural disturbance except wildfires. The background level has been defined for wildfire emissions using the default methodology described in section 2.3.9.6 of the 2013 KP Supplement. This is described in annex 2, section A2.3.7.
For Parties that account for emissions and removals from harvested wood products, provide detailed information on which IPCC approach has been used to estimate emissions and removals (para 1(f) of annex II to decision 4/CMA.1, para 75(d)(ii) of the MPGs)	New Zealand accounts for the changes in the harvested wood products pool by using the production approach. Annex 2, section A2.3.5 further describes the methods used for accounting for emissions and removals from harvested wood products.
For Parties that address the effects of age-class structure in forests, provide detailed information on the approach used and how this is consistent with relevant IPCC guidance, as appropriate (para 1(g) of annex II to decision 4/CMA.1, para 75(d)(iii) of the MPGs)	Forests established before the activity start year (1990) are accounted for under a business-as-usual reference level. For planted forests, the reference level addresses the dynamic effects of age-class structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal forest management in production forests. See annex 2, sections A2.1.1 and A2.3.4. Forests established after the activity start year (1990) are accounted for up until they attain their long-term average (LTA) carbon stock. Once they reach their LTA carbon stock, taking into account all carbon pools and activities, no further carbon gains or losses are accounted for. This is done to address the effects of age-class structure, and to only account for the long-term additional carbon sequestered in forests. This is further described in annex 2, sections A2.1.1 and A2.3.2.

Reporting requirement	Description or reference to the relevant section of the BTR
How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, as appropriate, if applicable (para 1(c) of annex II to decision 4/CMA.1)	New Zealand is applying an activity-based accounting approach to the net emissions it accounts for from the LULUCF sector. The methods applied to estimate accounting quantities adhere to the 2006 IPCC Guidelines[141] and the 2013 KP Supplement[142] while taking a country-specific approach to account for emissions from *Afforestation and reforestation* activities.
Any methodologies used to account for mitigation benefits of adaptation actions and/or economic diversification plans (para 75(e) of the MPGs)	Not applicable.
Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed related to Article 6 if relevant (para 76(d) of the MPGs)	New Zealand uses wall-to-wall land-use mapping, completed every five years; deforestation mapping completed every two years; and national statistics to estimate change areas in intervening years, to estimate afforested, reforested and deforested land areas. This spatially explicit approach ensures that no double counting of activity areas occurs.
Any other methodologies related to the NDC under Article 4 (para 75(h) of the MPGs)	Not applicable.
Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para 12(b) of the decision 4/CMA.1 and para 1 of its annex II)):	
Explain how consistency has been maintained in scope and coverage, definitions, data sources, metrics, assumptions and methodological approaches including on baselines, between the communication and implementation of NDCs (para 2(a) of annex II to decision 4/CMA.1)	New Zealand has implemented its NDC consistent with its NDC communication.
Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para 76(c) of the MPGs)	New Zealand has maintained consistency between its accounting quantities and the GHG data reported in its national GHG inventory by accounting for all gross emissions as reported in New Zealand's Greenhouse Gas Inventory 1990–2022 and, for LULUCF target accounting estimates, deriving the accounting quantities from the estimates reported in the latest GHG Inventory.[143]
For Parties that apply technical changes to update reference points, reference levels or projections, the changes should reflect either of the following (para 2(d) of annex II to decision 4/CMA.1):	
Technical changes related to improvements in accuracy that maintain methodological consistency (para 2(d)(ii) of annex II to decision 4/CMA.1)	Not applicable because this is New Zealand's first BTR.

141 IPCC. 2006. Eggleston HS, Buendia L, Miwa K, Ngara T, Tanabe K (eds). *2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 1. General Guidance and Reporting.* IPCC National Greenhouse Gas Inventories Programme. Japan: Institute for Global Environmental Strategies for IPCC.

142 IPCC. 2014. Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Switzerland: IPCC.

143 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

Reporting requirement	Description or reference to the relevant section of the BTR
Explain how any methodological changes and technical updates made during the implementation of their NDC were transparently reported (para 2(e) of annex II to decision 4/CMA.1)	Not applicable because this is New Zealand's first BTR.
Striving to include all categories of anthropogenic emissions or removals in the NDC and, once a source, sink or activity is included, continuing to include it (para 12 (c) of decision 4/CMA.1 and para 3 of annex II to decision 4/CMA.1):	
Explain how all categories of anthropogenic emissions and removals corresponding to their NDC were accounted for (para 3(a) of annex II to decision 4/CMA.1)	All categories of anthropogenic emissions and removals as communicated in New Zealand's NDC have been included in the accounting quantities reported for the 2021 and 2022 years.
Explain how Party is striving to include all categories of anthropogenic emissions and removals in its NDC, and, once a source, sink or activity is included, continue to include it (para 3(b) of annex II to decision 4/CMA.1)	New Zealand is not yet able to include sufficiently robust emission and removals estimates from non-forest activities when accounting for its NDC. Improvements are being undertaken to develop a better understanding of the carbon fluxes occurring from non-forest activities.
Provide an explanation of why any categories of anthropogenic emissions or removals are excluded (para 12 (c) of decision 4/CMA.1 and para 4 of annex II to decision 4/CMA.1)	New Zealand has focused resources on improving its understanding of forest carbon fluxes because these provide a larger contribution to the LULUCF sector.
Each Party that participates in cooperative approaches that involve the use of ITMOs towards an NDC under Article 4, or authorizes the use of mitigation outcomes for international mitigation purposes other than achievement of its NDC	
Provide information on any methodologies associated with any cooperative approaches that involve the use of ITMOs towards an NDC under Article 4 (para. 75(f) of the MPGs)	Not applicable.
Provide information on how each cooperative approach promotes sustainable development, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	Not applicable.
Provide information on how each cooperative approach ensures environmental integrity consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	Not applicable.
Provide information on how each cooperative approach ensures transparency, including in governance, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	Not applicable.
Any other information consistent with decisions adopted by the CMA on reporting under Article 6 (para. 77(d)(iii) of the MPGs)	Not applicable.

Note: BTR = Biennial Transparency Report; GHG = greenhouse gas; IPCC = Intergovernmental Panel on Climate Change; KP = Kyoto Protocol; LULUCF = Land Use, Land-Use Change and Forestry; MPGs = modalities, procedures and guidelines; NDC = Nationally Determined Contribution; NDC1 = first Nationally Determined Contribution.

2.4 Mitigation policies and measures, actions and plans

Key messages

New Zealand has a climate change strategy focused on five pillars aimed at ensuring New Zealand reaches its economic, social and environmental potential.

New Zealand's second emissions reduction plan was published at the end of 2024 and covers the years 2026 to 2030. It sets out actions and strategies to meet the second emissions budget. It also sets New Zealand up for longer-term climate action that will help achieve future emissions budgets and puts New Zealand on a sustainable path to net zero long-lived emissions by 2050. New Zealand is on track to meet the first two emissions budgets.

The second emissions reduction plan details eight key policies that will have the greatest potential emissions savings over the next five years.

- Enabling more renewable energy projects through Electrify NZ.
- Recognising carbon capture, utilisation and storage in the NZ ETS.
- Targeting a network of 10,000 EV charging points by 2030.
- Introducing agricultural emissions pricing by 2030 and incentivising the uptake of new technologies.
- Exploring private-sector partnerships to plant trees on Crown-owned land which has low conservation value and low farming value.
- Introducing a regulated product stewardship scheme for refrigerants from 2025.
- Leveraging the Waste Minimisation Fund to enable resource recovery systems and infrastructure to process organic waste.
- Improving organic waste management and landfill gas capture to increase landfill gas recovery rates.

The New Zealand Emissions Trading Scheme (NZ ETS) has been, and continues to be, New Zealand's key emissions pricing tool since its inception in 2008. Its legislated purposes include assisting New Zealand to meet the 2050 target, its international obligations, and domestic emissions budgets.

2.4.1 Introduction

This section outlines New Zealand's main policies and measures to reduce emissions and increase removals. It begins by setting out New Zealand's overarching approach through its climate change strategy (the Climate Strategy) and main policy tool, the New Zealand Emissions Trading Scheme (NZ ETS). It then covers New Zealand's policies and measures that are sector specific.

2.4.2 Overarching mitigation policies and plans

2.4.2.1 Climate Change Strategy

As part of its response to climate change, in July 2024, the Government developed and published its climate change strategy, which sets out its approach to how it will deliver on New Zealand's climate goals.[144]

The Climate Strategy focuses on five pillars to help the Government meet its targets to reduce emissions and manage the impacts of climate change:

1. infrastructure is resilient and communities are well prepared
2. credible markets support the climate transition
3. clean energy is abundant and affordable
4. world-leading climate innovation boosts the economy
5. nature-based solutions address climate change.

Figure 2.4.1: Five pillars of the Government's climate change strategy

Examples of the Government's plans under each pillar include:

- Pillar 1: Delivering a fair and enduring adaptation system that helps New Zealand be ready for climate change and provides clarity on costs
- Pillar 2: Pricing emissions fairly and effectively to incentivise emissions reductions

[144] Ministry for the Environment. 2024. *Responding to a changing climate: The Government's climate change strategy*. Retrieved 13 November 2024.

- Pillar 3: Doubling renewable energy by 2050 and installing 10,000 public charging points for electric vehicles
- Pillar 4: Providing tools and removing barriers to help businesses to innovate and prepare for the future
- Pillar 5: Restoring biodiversity, while investigating new ways of harnessing nature to remove emissions from the atmosphere.

The Climate Strategy reflects New Zealand's national context by using New Zealand's competitive and natural advantages. It ensures the right incentives are in place across the economy to reduce net emissions where it is most cost effective.

2.4.2.2 New Zealand Emissions Trading Scheme

The NZ ETS has been, and continues to be, New Zealand's main emissions pricing tool since its inception in 2008. Its legislated purposes include helping New Zealand to meet the 2050 target, its international obligations and domestic emissions budgets.

The NZ ETS is a cap-and-trade system that is based on government-issued New Zealand units (NZUs). Emitters with obligations under the NZ ETS must obtain and surrender NZUs to the Government at a rate of one NZU per tonne of carbon dioxide (CO_2) equivalent. There are penalties for non-compliance.

The NZ ETS creates a price signal by setting a 'cap', a limit on net emissions that NZ ETS covered sectors are allowed to produce. Over time, this cap will decrease in alignment with climate targets and emissions budgets. The reducing cap on net emissions and price signal encourages producers, consumers and investors to change their behaviour and investments and reduce net emissions; for example, by influencing technology choices towards low-emissions alternatives.

Participants in the NZ ETS include upstream entities, such as fuel suppliers and process emitters (who are required to surrender NZUs), and entities that remove CO_2 from the atmosphere by a recognised method (which for New Zealand is currently predominantly through forestry).

NZUs are provided to NZ ETS participants through three channels: government auctions, free allocation of NZUs to trade-exposed businesses (also known as industrial allocation), and for recognised removals activities, such as forestry. Once NZUs have been allocated, they can be traded on the secondary market with the price being set by supply and demand at a point in time.

The NZ ETS covers the stationary energy, liquid fossil fuel, industrial process, synthetic GHG, waste and forestry sectors.[145] Emissions from the Agriculture sector (around 50 per cent of New Zealand's emissions) are outside of the NZ ETS. Additionally, two-thirds of waste,[146]

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145 New Zealand Emissions Trading Scheme (NZ ETS) coverage is defined slightly differently from Intergovernmental Panel on Climate Change sectors.

146 Only waste emissions from managed landfills are within the NZ ETS. Emissions from unmanaged sites, or wastewater treatment plants, are not covered by the NZ ETS.

one-third of synthetic GHGs,[147] and other small sources of gross emissions are excluded from the NZ ETS to reduce administrative costs or to address measurement uncertainties.

NZ ETS settings for forestry have been designed to reflect how New Zealand accounts for forestry in the international target accounting rules. Emissions and removals depend on the forest type and if the forest existed before or after 1990. The NZ ETS includes two types of forest land.

- Land that was forest land on 31 December 1989 and predominantly exotic forest species on 31 December 2007[148] cannot earn NZUs from forest growth and is not required to surrender NZUs if harvested. However, if pre-1990 forest land is deforested, participation is mandatory.[149]
- Forest land, exotic or indigenous, established from 1 January 1990 (also known as post-1989 forest land) can be voluntarily entered into the NZ ETS. Once registered, the participant can earn NZUs for removals as the forest grows. NZUs are required to be surrendered if the land is deforested, and, depending on the accounting methodology used (see section 2.3), emissions units may need to be surrendered if the forest is harvested. Around 60 per cent of the post-1989 forest estate is in the NZ ETS.

The effectiveness of the NZ ETS depends on the credibility of its market. The Government supports this by providing regulatory predictability, sending clear signals on climate and NZ ETS policies, strengthening market governance and through its commitment to the emissions budgets and targets.

Annual decisions on the NZ ETS unit supply and price control settings are an important vehicle for the Government to manage potential risks and deliver emissions budgets and targets in a way that protects the credibility of the NZ ETS. New Zealand set the 2025 to 2029 limits and price control settings for unit volumes in August 2024. The unit limits reduced the number of units available by auction from 45 million to 21 million, with the aim of reducing the oversupply of units held by participants in the NZ ETS market and increasing the certainty of achieving New Zealand’s 2026 to 2030 domestic emissions budget.

2.4.2.3 Emissions reduction plans

New Zealand released its first emissions reduction plan (ERP1) in May 2022. This plan sets out the policies and strategies to meet the first emissions budget period from 2022 to 2025.

The Government actively manages delivery of this plan through regular progress reporting to ministers and the public. Of the 305 actions included in ERP1, more than half are either complete or actively being implemented, although a small number of actions have not yet started to be implemented. The Government has made several changes to the actions in ERP1 since it was published in 2022, including stopping actions that are no longer a priority or do not align with the new Government’s Climate Strategy. The central scenario modelling for

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147 Synthetic greenhouse gases are instead covered by a levy if they are contained in imported goods (eg, refrigeration and air-conditioning products).

148 Land that was forest land on 31 December 1989 and was *not* predominantly exotic on 31 December 2007 is not included in the NZ ETS. This land is predominantly indigenous forest land and its management is regulated under other environmental legislation.

149 Forest land is considered deforested when trees are not replanted or land is converted to another non-forest use.

the second emissions reduction plan (ERP2) shows that New Zealand is on track to achieve the first emissions budget.

New Zealand published ERP2 at the end of 2024. This plan sets out actions and strategies to meet the second emissions budget period, from 2026 to 2030. It also sets New Zealand up for longer-term action on climate that will help achieve future emissions budgets and puts New Zealand on a sustainable path to net zero long-lived emissions by 2050.

For ERP2, the Government is taking a net-based and cost-effective approach to reducing emissions and increasing carbon removals. The plan sets out policies across the five pillars of the Climate Strategy and focuses on the largest drivers of emissions in New Zealand: energy, transport, agriculture, forestry and wood processing, building and construction, non-forestry removals and waste sectors.

2.4.3 Funding and finance initiatives

The Government has a role in addressing barriers to climate investment. The public and private sectors need to work together to enable the investment that will be necessary to reduce New Zealand's emissions. This approach to funding and financing will complement other measures to drive emissions reductions, such as the NZ ETS and regulation.

2.4.3.1 New Zealand's Sovereign Green Bond Programme

New Zealand's Sovereign Green Bond Programme was launched in 2022. As of 30 June 2024, NZ$6.55 billion green bonds had been issued.

Unlike standard bonds, green bond proceeds can only be used to finance projects that meet strict environmental criteria. The criteria for the programme were developed to meet international investor requirements for green bonds and are published under the New Zealand Sovereign Green Bond Framework.

Money raised from the bonds will be used to support government-funded projects, such as in clean transport, which help New Zealand deliver its commitment to reduce net emissions by 50 per cent below 2005 levels by 2030 and reach its net zero carbon target by 2050. Other projects support New Zealand's adaptation to the impacts of climate change and protect New Zealand's biodiversity.

The New Zealand Treasury works with the government agencies in the programme to help ensure they deliver reporting that is in line with international best practice and that meets investor expectations. This increases agency capability in capturing and reporting performance metrics for 'green' spending.

2.4.3.2 New Zealand Green Investment Finance Ltd

New Zealand Green Investment Finance Limited (NZGIF) is a Crown-owned investment vehicle established in April 2019 that has been operational from September of that year. It was established with an initial investment capital of NZ$100 million from the Government. It was recapitalised to NZ$400 million in Budget 2021 and NZ$700 million in Budget 2023. NZGIF has a mandate to invest in commercial opportunities that accelerate the reduction in domestic greenhouse gas emissions and provide a commercial return on the investment. It seeks to crowd in private finance, target market failure and undertake market leadership and demonstration.

2.4.3.3 Climate-related disclosures

New Zealand became the first country in the world to require annual public disclosure of climate-related risks and opportunities across the financial system when it passed the Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act in 2021. This legislation, which applies to large publicly listed companies, insurers, banks, credit unions, building societies and investment scheme managers, ensures the effects of climate change are routinely considered in business, investment, lending and insurance decisions.

Climate reporting entities are required to publish climate statements in relation to financial years commencing on or after 1 January 2023, in accordance with climate standards published by the External Reporting Board. The first climate statements were published in early 2024.

New Zealand will continue to monitor the regime, learn lessons from reporting entities, and make changes, if necessary, as the regime matures. From 27 October 2024, climate reporting entities will also have to obtain independent assurance for sections of the disclosures that relate to the disclosure of GHG emissions.

2.4.4 Energy

2.4.4.1 Energy strategies

2.4.4.1.1 Electrify NZ

The Government has committed to doubling renewable energy by 2050. Electrify NZ is the Government's work programme to support private investment in electricity generation and networks that will enable New Zealand to achieve this goal.

Electrify NZ includes the following initiatives.

- Progressing the Fast-track Approvals Bill: this will create the one-stop-shop regime to provide a pathway for major renewable energy and transmission projects to be consented sooner and more efficiently.
- Amending the Resource Management Act 1991: to reduce consent and re-consenting processing time for most renewable energy consents to be within 1 year, as well as extending the default lapse periods for renewable energy, transmission and local electricity lines consents from 5 years to 10 years.[150] The Government will also increase the default consent duration to 35 years for most renewable energy consents.
- National direction for renewable energy and transmission: the Government will advance amendments to the National Policy Statements for Renewable Electricity Generation and Electricity Transmission so they are far more directive and enabling.[151]
- Offshore renewable energy: developing a regulatory regime for offshore renewable energy to be in place by mid-2025 to unleash investment in offshore renewable energy.

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150 A resource consent is an authorisation to undertake an activity or use a resource.

151 National direction provides national resource management policies and standards to support local government policy development and decision-making under the Resource Management Act 1991. It comprises national policy statements, national environmental standards, national planning standards and section 360 regulations.

- Further Resource Management Act 1991 national direction: to help enable a range of energy and infrastructure projects, including a new national policy statement for infrastructure and subsequent standards for different types of energy generation and infrastructure. A range of work is under way by the Commerce Commission and the Electricity Authority to update a variety of regulatory settings so New Zealand's system can cope with the economy-wide shift to electrification, including supporting the Government's goal to supercharge electric vehicle (EV) infrastructure.

2.4.4.1.2 Hydrogen Action Plan

Hydrogen is being trialled and demonstrated as a low-emissions alternative in heavy industry, heavy and specialty transport, production of green fuels and power generation.

The Government aims to support private investment in hydrogen. The Hydrogen Action Plan focuses on:

- creating an enabling regulatory environment
- reducing consenting barriers for hydrogen projects
- promoting a cost-effective and market-led transition to a low-emissions economy
- supporting access to international investment and markets.

2.4.4.1.3 Carbon capture, utilisation and storage

The Government has agreed to create an enabling regime for carbon capture, utilisation and storage (CCUS). This will allow New Zealand's industries to access CCUS technology on a level playing field with other emissions reduction and removal tools.

The regime will include a financial incentive for CCUS operators through the NZ ETS. It will draw on international examples, which typically include assessment and monitoring, and a clear liability framework. Through 2025, the Government will progress legislation to establish the CCUS regime.

2.4.4.2 Energy efficiency

2.4.4.2.1 Equipment Energy Efficiency programme

New Zealand and Australia's trans-Tasman Equipment Energy Efficiency (E3) Programme develops standards and measures for energy efficiency in both countries. The E3 Programme aims to increase the energy efficiency of new appliances and equipment sold in Australia and New Zealand, thereby reducing energy consumption and associated greenhouse gas emissions.

Inefficient appliances are kept out of the country through administering and developing Minimum Energy Performance Standards and Mandatory Energy Performance Labelling requirements. Under the Minimum Energy Performance Standards regulations, new products entering the market must meet or exceed minimum energy performance criteria before they can be sold in New Zealand. Mandatory Energy Performance Labelling regulations require an energy rating label to be displayed to consumers at the point of sale in retail outlets and also allow consumers to make more informed purchasing decisions.

2.4.4.2.2 Publicly Available Specifications

The Energy Efficiency and Conservation Authority (EECA) has worked with Standards New Zealand since 2020 to develop five Publicly Available Specifications. These are voluntary standards that provide best practice specifications on non-regulated products to support the shift towards low-carbon technologies. They cover residential and commercial EV chargers, high-temperature heat pumps, biomass boilers and fossil fuel boilers. Publicly Available Specifications for smart homes were published in September 2022, introducing the concept of residential demand response and demand flexibility systems to New Zealand households.

2.4.4.2.3 Gen Less

The Gen Less platform was launched in October 2019 to help educate people and businesses about their energy choices and support the Government's wider move towards a net zero carbon New Zealand by 2050. The Gen Less website, four social media channels and direct mailing lists provide information about how to reduce energy-related emissions at individual, household and business levels.

Activity is focused on encouraging New Zealanders to make conscious decisions about energy use, while guiding people to the website and other channels where they can get information relevant to their circumstances.

In the past five years, EECA has run campaigns under the Gen Less brand targeting emissions reduction in small- to medium-sized businesses, transport behaviours, increasing consideration of EVs and making energy-efficient household decisions.

2.4.4.2.4 Support for Energy Education in Communities Programme

The Support for Energy Education in Communities Programme[152] complements other initiatives across government, the community and private sector that focus on making homes warmer and more energy efficient.

The Support for Energy Education in Communities Programme funds New Zealand organisations to deliver personalised, specialist advice and education to households in their communities. Organisations can also supply low-cost, energy-saving items, such as LED light bulbs, low-flow showerheads, heaters and devices to monitor temperature and humidity. Funding is available to eligible community-level groups, organisations or businesses, and is mainly allocated through a regular open process. The first funding round opened in December 2020.

2.4.4.3 Business decarbonisation programmes

The Government's business decarbonisation programmes aim to help businesses meet emissions reduction targets, benefit from improved energy productivity and use low-emissions innovations and insights. Support is available for businesses to decarbonise process heat, including via energy audits and feasibility studies.

Energy audits find cost-effective opportunities for businesses to reduce energy costs and carbon emissions. Feasibility studies are co-funded up to 40 per cent to help build strong

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152 Ministry of Business, Innovation and Employment. *Support for Energy Education in Communities*. Retrieved 18 November 2024.

business cases for energy efficiency or renewable energy projects, giving confidence that the project will be a success.

2.4.4.3.1 Energy Transition Accelerator programme

The Energy Transition Accelerator programme offers up to 40 per cent co-funding, up to $35,000, to help large energy users onto a low-emissions pathway. Under this programme, EECA works with large businesses and public sector organisations to help them develop a tailored and practical long-term decarbonisation roadmap for transitioning. This shows large energy users what the technically and economically feasible opportunities are, including innovative technologies, energy efficiency initiatives and fuel switching opportunities.

2.4.4.3.2 Regional Energy Transition Accelerator programme

The Regional Energy Transition Accelerator programme aims to develop and share a well-informed and coordinated approach for regional decarbonisation.

The programme's focus is on understanding localised opportunities and barriers faced by medium and large energy users when seeking to reduce emissions from process heat. This currently makes up over a quarter of New Zealand's energy-related emissions.

2.4.4.3.3 Technology Demonstration Fund

The Technology Demonstration Fund offers up to 50 per cent co-funding to support energy and carbon savings through the early adoption of proven technology or an innovative process-improvement opportunity. The fund aims to accelerate market uptake of energy-efficient, low-carbon technologies. The project must improve energy efficiency and/or reduce carbon emissions. For example, high-temperature heat pump technologies supported by the fund were adopted to replace fossil fuels in the food processing sector and also as a heat source for large buildings. Recipients will share lessons learned with the business sector.

2.4.4.3.4 Sector Decarbonisation Programme

The Sector Decarbonisation Programme, administered by EECA, collaborates with sector associations and technical experts to connect New Zealand businesses with world-class innovation and best-practice guidance to decarbonise at a sector level. The programme also provides new businesses with best-practice knowledge when they enter the sector. Sector-wide decarbonisation pathways for businesses are provided for a range of sectors including commercial buildings, covered cropping, manufacturing, meat processing, on-farm dairy and plastics.

2.4.4.4 Other energy policies

2.4.4.4.1 Māori and Public Housing Renewable Energy Fund

The Māori and Public Housing Renewable Energy Fund was established in 2020 to trial small-scale renewable energy technologies in Māori (indigenous) and public housing. Renewable energy solutions can lead to improved health outcomes for people in public and Māori housing, lower their energy bills and encourage greater use of heating, leading to warmer and healthier homes. Additionally, the fund sought to trial new ways of generating energy and integrating it with existing electricity networks, while supporting New Zealand's commitment to renewable energy generation and its climate change goals.

2.4.4.4.2 Community Renewable Energy Fund

The Community Renewable Energy Fund was established in 2022 to build energy resilience in communities and trial innovative ways to store and distribute locally generated electricity. The fund supports renewable energy projects that help communities access secure, renewable and more affordable energy.

Funded projects are providing valuable insights into the operational, economic, environmental and wellbeing impacts of introducing renewable energy systems. This information will help inform future projects on a larger scale, as well as the overall future of the New Zealand energy system.

2.4.4.4.3 National Direction for Greenhouse Gas Emissions from Industrial Process Heat

The Resource Management (National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat) Regulations 2023 and National Policy Statement for Greenhouse Gas Emissions from Industrial Process Heat 2023 both came into force in July 2023.

The National Environmental Standards and National Policy Statement support an amendment made to the Resource Management Act 1991 at the end of 2022 to require regional councils to consider the effects of greenhouse gas emissions when assessing resource consent applications for discharges to air. Industries using process heat must now also consider the greenhouse gas emissions from their operations when applying for a discharge to air consent.

EECA has published guidance and information to help councils and industry with understanding the main requirements of the regulations, including how to prepare and assess emissions plans required as part of a discharge to air resource consent application.

2.4.4.5 Building and construction

2.4.4.5.1 Improving energy efficiency and reducing embodied carbon

New Zealand increased the minimum energy efficiency requirements for new buildings in 2023. The changes are expected to reduce the heating requirements in new homes by 40 per cent and reduce the energy needed to heat and cool larger commercial buildings by 23 per cent, on average.

The Ministry of Business, Innovation and Employment (MBIE) has supported the building and construction sector to reduce emissions from buildings by helping to improve data quality; providing tools, methods and guidance; and promoting low-emissions and climate resilient buildings. MBIE has developed two technical methodologies to enable the sector to measure embodied and operational carbon from new buildings in a consistent and credible way. MBIE has also partnered with the building and construction sector to establish a national embodied carbon data repository. This will provide an authoritative source of data that makes it easier for building practitioners and the public to make choices to reduce the embodied carbon of buildings.

MBIE is exploring further opportunities to support the sector to take voluntary action to reduce emissions. This includes opportunities to make it easier to retrofit buildings to improve their energy efficiency and provide information, data and tools to promote low-carbon buildings.

2.4.4.5.2 Energy performance ratings

New Zealand has several voluntary green building certification programmes. These include Homestar,[153] Green Star,[154] the National Australian Built Environment Rating System – New Zealand (NABERSNZ)[155] and Passive House.[156] For example, NABERSNZ is a voluntary building rating system for office buildings and public hospitals in New Zealand. It supports building owners to make informed decisions to improve the energy performance of their buildings and reduce emissions. These voluntary green building certification schemes have limited but increasing uptake across the sector. The Government is exploring opportunities to expand NABERSNZ to apply to more building typologies, such as shopping malls and hotels.

2.4.4.5.3 Insulation and heating grants: Warmer Kiwi Homes programme

The Warmer Kiwi Homes programme, administered by EECA, provides between 80 per cent and 90 per cent grant funding for ceiling and underfloor insulation and heating retrofits for low-income, homeowner-occupied households. The programme seeks to prevent unnecessary heat loss and increase the energy efficiency of homes while improving overall health and social outcomes for New Zealanders.

Since the programme began in 2018, over 150,000 insulation and heating retrofits have been completed. An independent evaluation of the programme showed it achieves a 16 per cent reduction in household electricity use over winter months and delivers a benefit cost ratio of 4:1. The programme is expected to deliver a further 26,000 insulation and heating retrofits a year over the next three years.

2.4.5 Transport

2.4.5.1 Electric vehicle charging infrastructure

The Government is taking steps to enable the delivery of a network of 10,000 public EV charging points by 2030. It will support the transition to and use of low-emissions transport by giving users the confidence that they can charge their vehicle on the public network when they need to. This includes funding to support the development of a network of EV charging outlets accessible by the public.

Main actions being taken include:

- developing a new model for government co-investment in charging infrastructure, including a cost–benefit framework to ensure maximum benefit from government investment
- reducing regulatory barriers, including making the installation of public EV chargers a permitted activity

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153 NZGBC. *Homestar*. Retrieved 18 November 2024.

154 NZGBC. *Introduction to Green Star*. Retrieved 18 November 2024.

155 NABERSNZ. *Welcome to NABERSNZ*. Retrieved 18 November 2024.

156 Passive House Institute New Zealand. *Te Tōpūtanga o te Whare Korou ki Aotearoa - Passive House Institute New Zealand*. Retrieved 18 November 2024.

- enabling standards to improve consumers' capability to shift home EV charging demand away from network 'peaks'
- working with the Electricity Authority on addressing barriers, such as connection costs, through the Electrify NZ work programme, and ensuring consistent approaches to EV charging connections across all 29 electricity distributors in New Zealand
- providing standardised guidance for in-home and commercial/industrial EV charging installation, and guidance on how to charge an EV safely and cost effectively at home
- developing an EV Smart Charger Approved List aimed at helping New Zealanders to identify, and purchase, smart and efficient EV chargers.

2.4.5.2 Clean Vehicle Standard

The Clean Vehicle Standard came into effect on 1 January 2023. The standard reduces CO_2 emissions through its annual CO_2 targets that progressively lower. Vehicle importers are required to meet the targets each year, on average, across the vehicles they import. Importers face charges calculated per vehicle and per gram of CO_2 where targets are not met. The CO_2 targets for 2025 to 2027 were reviewed and reset, and new targets have been set for 2028 to 2029.

2.4.5.3 Road User Charges exemptions

The removal of road user charges was introduced as an incentive to encourage electric vehicle uptake in both the light and heavy fleets.

A road user charges exemption on light electric vehicles began in 2009 and ran until 1 April 2024. A road user charges exemption for heavy electric vehicles was introduced in 2017 and is legislated to expire on 1 January 2026.[157]

2.4.5.4 Freight and Supply Chain Strategy

The Government released the Freight and Supply Chain Strategy in August 2023, informed by extensive stakeholder engagement.

Actions included under the road freight decarbonisation focus area of the strategy that have been completed or are being progressed are:

- the Ministry of Transport partnered with the Sustainable Business Council on a feasibility study into a market-led, low carbon freight mechanism, which was released in September 2023
- as part of Budget 2024 announcements, the Government confirmed a $30 million grant scheme for low-emissions, heavy vehicles would proceed
- officials and industry stakeholders are exploring regulatory barriers to the uptake of zero-emission heavy vehicles and how these could be addressed.

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[157] Anyone using New Zealand's roads contributes towards their upkeep. Most road users pay levies in the prices of their fuel. Others, such as drivers of light diesel vehicles and diesel-powered heavy vehicles like trucks, pay imposed fees known as road user charges.

2.4.5.5 Public transport bus decarbonisation

In 2020, the Government agreed to accelerate the decarbonisation of public transport bus fleets and later included this commitment as an action in ERP1. This commitment included:

- requiring that only zero-emission public transport buses be purchased by 2025 (the 2025 mandate)
- a target of decarbonising the public transport bus fleet by 2035 (the 2035 target)
- supporting regional councils to achieve these outcomes through additional funding.

In 2022, the New Zealand Transport Agency gave effect to the 2025 mandate by setting a condition in its Requirements for Urban Buses in New Zealand that Public Transport Authorities (PTAs) can only procure zero-emission public transport buses from 1 July 2025 onwards.

To support PTAs to achieve the 2025 mandate, the Government provides PTAs with co-funding to help meet the cost of replacing diesel buses with zero-emissions buses through the National Land Transport Fund. PTAs also can apply for Crown grant funding to help cover the cost of e-chargers and other enabling infrastructure through the Public Transport Bus Decarbonisation Contestable Fund.

Market conditions and incentives to transition to more operationally efficient zero emissions alternatives will change over time. As this happens Government will ensure its response remains relevant and effective.

2.4.5.6 Zero-emissions trucks and buses

Heavy vehicles (trucks and buses) contribute a quarter of New Zealand's carbon emissions related to road use. As part of Budget 2024 announcements, the Government confirmed a $30 million grant scheme for low-emissions heavy vehicles would proceed.

2.4.5.7 Low Emission Transport Fund

The Low Emission Vehicle Contestable Fund was launched in 2016 to support the uptake of low-emission vehicles. Projects funded included installing 832 public charging stations, supporting new low-emission vehicles, funding a fleet optimisation pilot project to reduce fleet sizes and help prepare for EVs, supporting the delivery of New Zealand's first hydrogen fuel cell bus, and supporting a 300-kilowatt hyper electric vehicle charger.

In 2021, the Low Emission Vehicle Contestable Fund was reconfigured into the Low Emission Transport Fund (LETF) to better reflect the expanded scope for projects. The LETF provides co-funding for the demonstration and adoption of low-emissions transport technology, innovation and infrastructure to accelerate the decarbonisation of New Zealand's transport sector. To date, 307 projects have been co-funded since 2016.

Transport projects co-funded under the LETF to accelerate the adoption of low-emission transport include New Zealand's first electric milk tanker, a wireless charging ground-pad solution for electric buses, a passenger bus with solar panels, and New Zealand's first electric tractor.

2.4.5.8 Vehicle Fuel Economy Labelling programme

The Vehicle Fuel Economy Labelling programme, which began in 2008, makes it compulsory for vehicle traders and online vendors to display information about the fuel economy of their vehicles. The programme aims to allow consumers to make a more informed choice when purchasing a vehicle and place an appropriate value on fuel economy.

In 2022, the label was updated to clearly display the CO_2 emissions of vehicles. Star ratings for carbon emissions were recalibrated to be much stricter and vehicles must now produce much lower emissions to receive a high star rating.

2.4.6 Industrial processes and product use

2.4.6.1 Emissions Trading Scheme

Emissions produced as a result of industrial processes and product use are captured by the NZ ETS. Activities include the production of iron and steel, aluminium,[158] clinker and burnt lime, and glass.

Importers of bulk hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) and users of sulphur hexafluoride above a threshold have obligations to surrender NZUs equivalent to the amount of HFCs and PFCs they import or the sulphur hexafluoride emitted through use. While currently no manufacture is undertaken of HFCs and PFCs in New Zealand, should this occur in the future, manufacturers of these gases would also have obligations under the NZ ETS.[159]

2.4.6.2 Synthetic greenhouse gas levy

A levy is applied to imported goods and motor vehicles containing synthetic greenhouse gas (HFCs and PFCs). The levy applies to goods such as fridges, freezers, heat pumps, air conditioners, refrigerated trailers and air-conditioning units contained in motor vehicles. The levy is linked to the price of carbon in the NZ ETS and varies between items to reflect the amount of gas, the specified gas and its global warming potential.

2.4.6.3 Permitting scheme for imports and exports of bulk HFCs

The Kigali Amendment to the Montreal Protocol is facilitating a worldwide phase-down of the use of HFCs by requiring parties to limit their consumption (defined as import and production minus export) of HFCs. In line with its ratification of the Kigali Amendment, New Zealand has implemented a permitting scheme for imports and exports of bulk HFCs. This requires importers and exporters of bulk HFCs to obtain a permit for the HFCs they want to transport. Import permits are issued in decreasing amounts each calendar year. By 2035, this limit will be 348,000 CO_2 equivalent tonnes, 26 per cent of the allowable import quantity in 2020. The scheme has been active since 1 January 2020.

158 The aluminium smelting definition in the NZ ETS includes PFC emissions inherent to its manufacturing process.

159 Exporters of HFCs and PFCs are eligible to receive NZUs, as long as they meet prescribed eligibility criteria.

2.4.6.4 Voluntary product stewardship scheme for refrigerants

The Trust for the Destruction of Synthetic Refrigerants (operating as Cool-Safe) operates a voluntary product stewardship scheme that facilitates the collection and export for destruction of synthetic refrigerants. The scheme is funded by NZUs obtained by exporting applicable gases. The Trust has operated since 1996, and the scheme has been accredited by the Government since 2010.

2.4.7 Agriculture

2.4.7.1 Implementing a fair and sustainable pricing system for on-farm agricultural emissions by 2030

The Government has committed to implementing a fair and sustainable pricing system for on-farm agricultural emissions by 2030 that reduces emissions without sending production overseas. This includes a commitment to support on-farm emissions measurement by 2025. As a part of the commitment to a fit-for-sector system, the Government amended the Climate Change Response Act 2002 to keep agriculture outside of the NZ ETS.

The scope and design of the pricing system are yet to be determined. Factors, such as the availability of mitigations and risks related to emissions leakage and other impacts, are expected to be important design and implementation considerations.

An important part of a reporting and pricing system will be having a standardised methodology for estimating emissions reductions at the farm level. Work is well under way. The first version of the standardised methodology (and the associated code) is likely to be published in 2024, and structures are being established to keep the method transparent, up to date and scientifically robust. Both the standardised methodology and the work on supporting uptake of the methodology into calculation tools are essential to supporting the Government's commitment to measurement by 2025.

The Government is also establishing a pastoral sector group, consisting of key pastoral sector stakeholders, to constructively tackle biogenic methane.

2.4.7.2 Centre for Climate Action on Agricultural Emissions

The Centre for Climate Action on Agricultural Emissions (the Centre) is a significant increase in public and private investment to get emissions reduction solutions to farmers faster, to meet New Zealand's agricultural greenhouse gas (GHG) targets and remain internationally competitive.[160]

The Government has committed to investing over $419 million over the next four years and $105 million per year from 2027/28 to accelerate the development of adoptable GHG mitigations. This work includes the Centre to drive New Zealand's efforts.

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[160] Ministry for Primary Industries. *Centre for Climate Action on Agricultural Emissions*. Retrieved 18 November 2024.

The Centre aligns two organisations: the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) and the Crown–Industry joint venture known as AgriZero^{NZ}.

- The NZAGRC focuses on fundamental early research and the farm systems aspect of the research investment portfolio, including Māori-led innovation. An additional $50.5 million has been invested in NZAGRC over the next five years. Work to be supported through this scaled-up funding includes accelerating progress on breeding low-emissions cattle; developing faster and cheaper ways of identifying low-emissions animals; and accelerating work on methane and nitrous oxide inhibitors with a view to transitioning to commercial partners in the next four years.
- AgriZero^{NZ} is a long-term partnership (at least 10 years) with industry funding matched 1:1 by the Government ($191 million was committed by the Crown and industry over the first four years from 2022/23). AgriZero^{NZ} drives product development and commercialisation of emissions reduction solutions. Significant investments by AgriZero^{NZ} to date include in vaccine technology, low-emissions ryegrass and a slow release methane-inhibiting bolus.

The Centre is supported by the Ministry for Primary Industries, which oversees Crown investment in the Centre and leads a broader programme of work to ensure effective and efficient domestic and international policy and regulation.

2.4.7.3 Global Research Alliance on Agricultural Greenhouse Gases

The Global Research Alliance on Agricultural Greenhouse Gases (GRA), initiated by New Zealand in late 2009, seeks to increase cooperation and investment to reduce the emissions intensity of agricultural production systems globally.[161]

New Zealand support of the GRA covers three categories:

1. Capability building: building capability in developing countries to reduce agricultural emissions and establish reporting systems to enable them to access wider climate finance. Between 2020 and 2023, more than 400 individuals have benefited from the GRA capability-building activities.
2. Research: facilitating global research programmes to mitigate agricultural greenhouse gases, to accelerate the development of global solutions, and access large international funding mechanisms with their associated large data sets.
3. Leadership: New Zealand's leadership in establishing and hosting the GRA Secretariat and New Zealand's activities in support of the GRA aim to foster collaborative international research projects, global datasets, and standard measurement and mitigation techniques and protocols between countries.

New Zealand's activities have established global networks of scientists, creating capability development and training opportunities (particularly for scientists from developing countries) and identifying good-practice mitigation options for different production systems and climates.

Through the GRA, New Zealand and Samoa established the Indigenous Research Network. The network provides the opportunity for indigenous people in GRA member countries to be able to connect and share their traditional knowledge in both 'adaptation and mitigation' to address

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161 *Global Research Alliance on Agricultural Greenhouse Gases*. Retrieved 18 November 2024.

greenhouse gas emissions reductions. The Tāngata Whenua Alliance provides a New Zealand platform for iwi Māori to work with indigenous peoples in their GRA work programmes.

To further its engagement in supporting global collaboration in reducing greenhouse gases from food systems, New Zealand is planning to invest NZ$103 million to support GRA's activities until 2028.

2.4.7.4 Sustainable Food and Fibre Futures

The Government established the Sustainable Food and Fibre Futures (SFF Futures) fund in 2018.[162] SFF Futures supports problem-solving and innovation in New Zealand's food and fibre sector by co-investing in initiatives that make a positive and lasting difference.

About NZ$60 million of funding is available each year through SFF Futures. Projects undertaken require joint investment between the Government and private partner(s). Many projects provide sustainability and climate change benefits (of either reducing absolute emissions from the primary sector or reducing emissions per unit of product).

Example projects include: prototyping a spatial integrated farm plan for greenhouse gas reduction; the preliminary evaluation of potential feed-based commercial solutions to ruminant methane emissions; 'N-Vision', a programme to enable smarter nitrogen management; and 'Future Ready Farms', a project trialling and developing 12 farm nutrient technologies that will help reduce the food and fibre sector's environmental footprint.

2.4.7.5 Sustainable Land Management and Climate Change Research Programme

In 2007, the Government set up the Sustainable Land Management and Climate Change research programme as part of a wider plan of action to support the generation of new climate change knowledge across the agriculture and forestry sectors.

The research programme has covered all aspects of climate change in the land-based sectors, including impacts and adaptation, reducing greenhouse gas and nutrient emissions, and increasing forest carbon sinks. Since 2007, 193 projects have been commissioned, creating high-quality research, engaging stakeholders and end users, and growing climate change science capability in New Zealand.

In 2020, the Sustainable Land Management and Climate Change research programme was changed to limit its focus to climate change adaptation (including in the forestry sector). The programme supports projects providing an evidence base for policy and on-farm decision-making and identifying the social impacts of climate change. Projects also focus on the development and uptake of available technology to improve and adapt farming practices in response to the changing climate.

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162 Ministry for Primary Industries. *Sustainable Food and Fibre Futures*. Retrieved 13 November 2022.

2.4.7.6 Regulations to manage freshwater introduced under the Essential Freshwater package

The National Policy Statement for Freshwater Management provides national policy direction to regional councils on freshwater management. These measures can affect emissions through their influence on land use and management practices.

Freshwater management in New Zealand is largely devolved to local authorities under the Resource Management Act 1991. Regional councils are responsible for managing water bodies in their region, including the flows and levels in any water body; control of the taking, use or damming, and diversion of water; the allocation of water; and the control of discharges.

New Zealand's freshwater regulations are currently under review. In December 2023, the Government announced work to review and replace the National Policy Statement for Freshwater Management and this work is underway.

2.4.8 Land Use, Land-Use Change and Forestry

2.4.8.1 Role of forests in emissions reduction

Forests can act as significant carbon sinks, by absorbing CO_2, as well as helping to achieve other positive environmental outcomes (such as reducing erosion). In 2022, the Land Use, Land-Use Change and Forestry (LULUCF) sector offset 25 per cent of New Zealand's gross emissions. Both the natural forests and the plantation estate of New Zealand are significant carbon stores. In 2022, New Zealand's forests were estimated to hold about 2 billion tonnes of carbon in their biomass.[163]

2.4.8.2 Promoting afforestation and carbon sequestration

Afforestation has been used as a tool to mitigate soil erosion and sedimentation for over 80 years in New Zealand. In the early 1990s, the Government introduced the East Coast Forestry Project (more recently renamed the Erosion Control Funding Programme) to support land owners to treat vulnerable land in the East Coast region of the North Island. Afforestation initiatives increased from the late 2000s, and their scope broadened to address wider environmental issues and promote carbon sequestration. Six principal measures to promote afforestation have been in place for part, or all, of the past 15 years. These initiatives are listed below and described in more detail later in this section:

- NZ ETS
- One Billion Trees Fund[164]
- Sustainable Land Management Hill Country Erosion Programme
- Erosion Control Funding Programme (formerly the East Coast Forestry Project)

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163 Estimated from the data generated for *New Zealand's Greenhouse Gas Inventory 1990–2022*. Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

164 Closed to new applications. The One Billion Trees Fund covered direct grants, joint venture and partnership projects.

- Permanent Forest Sink Initiative (PFSI)[165]
- Afforestation Grant Scheme.[166]

Between 2008 and 2022, the majority of total afforestation in New Zealand can be attributed to the Government initiatives listed above. This figure includes afforestation resulting from the initiatives listed above, as well as the estimated effect the NZ ETS has had on reducing pre-1990 planted forest deforestation since 2008.

2.4.8.3 Principal measures

2.4.8.3.1 New Zealand Emissions Trading Scheme

The NZ ETS is the main policy instrument to encourage afforestation and reduce deforestation for climate change purposes.[167]

The forestry sector entered the NZ ETS in 2008, and, as at 31 December 2022, around 77 per cent of post-1989 forests had been voluntarily registered in the NZ ETS.[168]

Forests established since 1 January 1990 and entered into the NZ ETS are eligible to earn emissions units that represent the carbon sequestered by the forest since the start of the mandatory emissions return period in which they were registered.[169] These forests can also be liable to surrender units if there is a reduction in carbon stock (depending on the accounting methodology used).[170] Most land owners with exotic forests planted before 1990 face deforestation liabilities[171] under the NZ ETS, if they deforest.

Amendments to the NZ ETS were enacted in 2020, to improve its overall operation and effectiveness and ensure its settings are able to support New Zealand to meet its future emissions reduction targets. For forestry, these improvements include the following.

- Introducing mandatory averaging accounting for 'standard forestry'[172] for those registered from 1 January 2023. Under averaging accounting, first-rotation forests earn units up to the long-term average carbon stock of the forest based on multiple rotations, without having to surrender units at harvest. By recognising the long-term average carbon stock, averaging accounting enables more NZUs to be sold at low risk, offering higher returns

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165 No longer in place, see section 2.4.12.

166 No longer in place, see section 2.4.12.

167 Ministry for Primary Industries. *How forest land is defined in the ETS*. Retrieved 9 July 2024.

168 New Zealand Forest Service. 2024. *Emissions Trading Scheme for forestry as at 31 December 2022*. Retrieved 3 July 2024.

169 The mandatory emissions return periods have been 2008–12, 2013–17 and 2018–22. The current period is 2023–25, then every five-year period after that (eg, 2026–30).

170 Forests registered under stock change accounting are required to surrender units back from any loss in forest carbon over the reporting period, whereas those registered under averaging accounting are not required to surrender units back, so long as they are replanted.

171 Up to 2 hectares of pre-1990 forest per mandatory emissions return period can be deforested without liability; land owners can avoid pre-1990 deforestation liabilities by establishing an equivalent forest (an offset forest) elsewhere; some land owners can apply for exemptions from deforestation liabilities; and small areas of pre-1990 forest can be cleared without liabilities for the purpose of maintaining best-practice forest management.

172 Forests registered before 1 January 2023 remain using the stock change accounting method.

and incentivising afforestation. As with all post-1989 forests in the NZ ETS, if the land is deforested or deregistered, units need to be surrendered.

- A new permanent post-1989 forest category was introduced from 1 January 2023. Forest land registered as permanent must remain in the NZ ETS for at least 50 years and cannot be clear-felled during that time. If the land is clear-felled, there are substantial penalties. Permanent forests will use the stock change accounting approach. Registered forest owners will earn NZUs as long as the forest carbon stock is increasing. The permanent post-1989 forest category replaced the PFSI, which closed on 31 December 2023.
- Several operational and process changes were made to improve the NZ ETS for forestry and make it easier and more flexible for participants.

2.4.8.3.2 One Billion Trees Fund

The One Billion Trees Fund was designed to increase tree planting across New Zealand and help reach the Government's goal to plant one billion trees by 2028. The $176.8 million fund supports two types of projects: Direct Landowner Grants for planting projects and Partnership Grants for broader initiatives that enable planting to occur. In addition, the fund's Matariki Tu Rākau programme supports commemorative community tree-planting projects.

The fund was open for applications from August 2018 until 30 June 2021, however, planting projects are still being established and will continue to be monitored and paid for several years.

As at March 2024, the fund has supported the establishment of over 41 million trees. Projects range in size from small commemorative planting sites through to large areas of new afforestation. Trees planted include native and exotic species.

2.4.8.3.3 Sustainable Land Management Hill Country Erosion Programme

The Sustainable Land Management Hill Country Erosion Programme helps protect New Zealand's estimated 1.4 million hectares of pastoral hill country that are classified as erosion prone. The programme was initiated in 2007 in response to significant storm events as a partnership between the Ministry for Primary Industries, land owners, and regional and unitary councils.

It currently provides up to NZ$6.3 million of targeted funding support annually, across four-year programmes led by regional and unitary councils. Programmes deliver sustainable land management treatments including wide-spaced poplar and willow planting, small-scale afforestation, reversion to indigenous forest and retirement of land. The fund also supports catchment facilitation work and capability-building initiatives.

In 2023, over $25 million of funding was allocated to 14 regional and unitary councils to continue the momentum towards soil conservation and revegetation work under regional programmes. The current four-year projects target over 22,000 hectares of land management treatments. Funding support started in July 2023 and will end in June 2027.

Although its main purpose is to reduce erosion, the programme also contributes to the sequestration of carbon in small-scale forests, reverting land to native vegetation and through planting of poplars and willows, often within grazed pastures.

2.4.8.3.4 Erosion Control Funding Programme

The Erosion Control Funding Programme (formerly the East Coast Forestry Project) was implemented in 1992 to address soil erosion in the Gisborne district. The programme aims to encourage tree planting on severely eroding or erodible land. Government grants help to fund the cost of establishing and managing treatments on this land, including indigenous or exotic afforestation, reversion to indigenous forest, and wide-spaced poplar and willow planting. Nearly 46,000 hectares have been treated through the programme to date.

Although its main purpose is to reduce erosion, the programme also contributes to the sequestration of carbon in forests as a co-benefit of some treatments.

The final funding round for programme land treatments was held in 2018 but land treatment under those grants is still underway.

2.4.8.4 Other measures

2.4.8.4.1 Afforestation on Crown-owned land

The Government is exploring opportunities to partner with the private sector to plant trees on Crown-owned land (excluding national parks) that is of low conservation value and low farming value.

The Government will test domestic and international partner interest in forming public/private partnerships to plant trees on Crown-owned land, and the conditions they might require to partner with the Crown.

2.4.8.4.2 Woody biomass for bioenergy

Woody biomass offers an alternative to coal and other carbon-intensive fuels and materials. New Zealand has a growing solid heat energy sector (based on renewable wood pellets, hog fuel and chips for boilers) and investigations and research have been done into the development of a liquid biofuels sector, which is building sector and investment interest. To offset and replace carbon emissions from fossil fuels, this initiative will:

- enable Crown Forestry to invest in commercial planting to increase supply of biomass for energy and other products in targeted areas where increased supply is required
- support research into the costs and benefits of alternative biomass crops and regimes
- commission research to examine ways to support effective slash (forest waste) recovery to use biomass left in forests after harvest.

2.4.8.4.3 Maximising Forest Carbon Programme

The Maximising Forest Carbon Programme is a research and policy initiative aiming to improve how forest carbon is measured, recognised and rewarded. The programme aims to help reduce emissions by around 9.3 million tonnes over 2022 to 2035 through three main deliverables:

1. expanding the NZ ETS carbon look-up tables to more accurately reflect carbon stock changes
2. exploring the feasibility of moving to a more efficient carbon measurement method, for example by using remote-sensing tools such as light detection and ranging (LiDAR)

3. exploring whether a measurable link exists between forest management actions (eg, pest control) and increased carbon storage in pre-1990 forests.

2.4.8.4.4 National Environmental Standards for Commercial Forestry

The National Environmental Standards for Commercial Forestry are regulations under the Resource Management Act 1991 and are the main forestry management rules for commercial forestry activities in New Zealand, including afforestation, harvesting and replanting. In 2023, the Government made amendments to ensure non-indigenous forests planted for carbon sequestration could be managed in the same way as plantation forests.

The Government is reviewing the current regulatory settings to provide clearer forestry regulations that can support the forestry sector and ensure regulations strike the right balance between managing environmental impacts and restoring certainty and confidence in the forestry and wood processing sector.

2.4.9 Waste

2.4.9.1 Reducing emissions from waste

The Government has a range of policies and strategies aimed at reducing greenhouse gases from waste generation, treatment and disposal. These include:

- measures to reduce emissions from landfills (eg, improved landfill gas capture systems)
- implementation of organic waste reduction behaviour-change programmes
- investing in organic waste processing and resource recovery infrastructure to support an increase in food, garden, paper, cardboard and wood waste diversion from landfill.

These measures aim to reduce biogenic methane emissions, which constitute most waste sector emissions, primarily from the decomposition of organic waste in landfills.

2.4.9.2 Waste disposal levy

The waste disposal levy [173] was introduced under the Waste Minimisation Act 2008. The levy encourages organisations and individuals to take responsibility for their waste generation and to find more effective ways to reduce, reuse, recycle or reprocess waste.

From 1 July 2021, the Government has progressively increased and expanded the levy. This expansion involves:

- progressively increasing the levy rate for landfills that take household waste between 2021 and 2024
- expanding the levy to cover additional landfill types, including construction and demolition fills. Previously, the levy only applied to municipal landfills that take household waste
- collecting better data on waste generation, disposal and management

173 Ministry for the Environment. *Waste disposal levy*. Retrieved 19 November 2024.

- investing the additional waste revenue from the levy into initiatives that support waste reduction.

Half of the levy money goes to city and district councils to spend on promoting or achieving the waste minimisation activities set out in their waste management and minimisation plans. The remaining levy money (minus administration costs) goes to central government for investment in waste minimisation activities via the Waste Minimisation Fund.

Changes made to the Waste Minimisation Act 2008 in July 2024 will increase levy rates between 2025 and 2027. These changes also broadened the range of environmental and waste priorities on which the central government portion of the levy can be spent.

2.4.9.3 Waste Minimisation Fund

The Waste Minimisation Fund was established under the Waste Minimisation Act 2008, to support projects that increase the reuse, recovery and recycling of materials. Through this fund, a portion of the total levy on waste disposed to landfills is allocated towards investments in a range of project types from infrastructure investments to behaviour change and community-centred projects. These projects are targeting construction and demolition waste materials, organic waste, plastics and kerbside recyclables. Many of these projects and activities have co-benefits for emissions reductions.

Over the past few years, the size of the fund has increased from $10 million to $12 million annually in 2020 to $86 million in 2023/24. Since October 2022, the fund has supported 27 city and local council projects to evaluate and implement kerbside collections of residential organic waste thus diverting the waste from landfill. By partnering with private and public entities, the fund has also contributed to the establishment of additional organic waste processing capacity across the country.

2.4.9.4 Product stewardship

In July 2020, the New Zealand Government announced six products to be declared 'priority products' for the establishment of product stewardship schemes under the Waste Minimisation Act 2008. The products are:

- plastic packaging
- tyres
- electrical and electronic products (e-waste including large batteries)
- agrichemicals and their containers
- refrigerants and other synthetic greenhouse gases
- farm plastics.

Industry-led working groups have been designing product stewardship schemes for each priority product group. The first product stewardship regulatory framework to be implemented under the Waste Minimisation Act 2008 for the six priority products is for end-of-life tyres.

The Waste Minimisation (Tyres) Regulations 2023 will support full implementation of the minister-accredited Tyrewise scheme from September 2024. The other priority product stewardship schemes and proposed regulations are in various stages of development. Of particular interest from an emissions perspective is product stewardship for refrigerants (found in heating and cooling devices). Public consultation on proposed regulations has been completed and, subject to Cabinet approval, it is anticipated regulations will be in place in 2024/25.

2.4.9.5 National Environmental Standard for Air Quality

The Ministry for the Environment administers a National Environmental Standard for Air Quality (including control of greenhouse gas emissions at landfills), which is implemented by local and regional councils. The standard includes specific regulations for the control of landfill methane, which requires landfill sites with a lifetime design capacity of greater than 1 million tonnes of refuse to collect and destroy methane emissions.

2.4.9.6 New Zealand Emissions Trading Scheme

Since 2012, landfill operators have had an obligation to report their emissions and surrender NZUs under the NZ ETS.

For the purposes of the NZ ETS, a disposal facility is any facility including a landfill that operates (at least in part) as a business to dispose of waste, at which:

- waste is disposed
- the waste disposed includes waste from a household that is not entirely from construction, renovation or demolition of a house.

Operators of other types of waste-related facilities, such as clean fills or sewage treatment facilities, are not currently NZ ETS participants. A facility (or any part of a facility) at which waste is combusted to generate electricity or industrial heat is not considered a disposal facility.

Disposal facility operators are responsible only for methane emitted through the biodegradation of organic waste in their facilities.

2.4.9.7 Ongoing strategic changes to support emissions reductions from waste

Work is under way to review the Waste Minimisation Act 2008 and Litter Act 1979 to ensure a fit-for-purpose, modern waste regulatory system that provides more options and flexibility to reduce and manage waste effectively and efficiently.

2.4.10 Public sector policies

2.4.10.1 Carbon Neutral Government Programme

The Carbon Neutral Government Programme (CNGP) has been set up to understand and accelerate the reduction of emissions within the public sector. It was launched in December 2020 and is a cross-government programme led by the Ministry for the Environment in partnership with EECA and MBIE.

December 2023 was the first full year of reporting, with 84 CNGP participants reporting on their emissions, reduction targets, plans to achieve them and progress on these plans.

As of December 2023, an overall emissions reduction of 14 per cent (238,019 tonnes CO_2 equivalent) compared with the base year has been achieved. Most participants are on track to achieve the programme reduction goal of 20 per cent by 2025.

The CNGP emissions reduction targets will be reviewed in 2025, 2028 and 2030 to ensure they are ambitious and practicable. Guidance, tools, training and support are provided to CNGP organisations.

2.4.10.2 Sustainable government procurement

The Procurement System Lead is responsible for leading and coordinating best-practice procurement across government. New Zealand Government Procurement, a branch within MBIE, supports the Procurement System Lead to undertake this role. Government spends around NZ$51.5 billion through procurement each year, providing an opportunity to achieve positive social, economic, cultural and environmental outcomes through its procurement activities.

The Government is committed to designing waste out of the system. Rule 20 of the Government Procurement Rules sets an expectation that agencies:

- procure low-emissions and low-waste goods, services and works
- encourage innovation to significantly reduce emissions and waste impacts from goods and services.

The Procurement System Lead has published a procurement guide to reducing carbon emissions in building and construction, which:

- provides practical guidance to support government agencies to lead the way in reducing carbon emissions generated by the construction of new government buildings
- sets an expectation that agencies should choose the lowest carbon option that meets the project requirements.

2.4.10.3 Climate implications of policy assessment

Central government agencies have been required since November 2019 to complete a GHG emissions analysis on eligible policy proposals that go to Cabinet via a Climate Implications of Policy Assessment. The requirement enables New Zealand to measure, monitor and report on Cabinet decisions that will affect New Zealand's greenhouse gas emissions and meet the criteria.

A Climate Implications of Policy Assessment requirement will apply if the policy proposal's objective is to reduce emissions or if the direct impact on greenhouse gas emissions is likely to be 0.5 Mt carbon dioxide equivalent (CO_2e) or more in the first 10 years. For forestry-related proposals, it applies if the impact on greenhouse gas emissions is likely to be 3 Mt CO_2e or above within the first 30 years.

If an agency's policy proposal meets the requirement threshold, they must provide the Ministry for the Environment with their emissions impact analysis, where feasible. The Ministry will peer review and a summary of the impact of the proposal is included in the Cabinet paper, to be taken into consideration as part of the Government's decision-making.

2.4.11 International aviation and shipping

In 2016, New Zealand agreed to the International Civil Aviation Organization's (ICAO's) long-term aspirational goal of net zero aviation emissions by 2050 and, more recently, the ICAO Global Framework for Sustainable Aviation Fuels, Lower Carbon Aviation Fuels and other Aviation Cleaner Energies.

Since 2016, New Zealand has been voluntarily participating in the ICAO's Carbon Offsetting and Reduction Scheme for International Aviation, through a Memorandum of Understanding between the Ministry of Transport and Air New Zealand. Participation in the Carbon Offsetting and Reduction Scheme will become mandatory starting from 2027 under international law and will become domestically regulated through the Civil Aviation Act 2023.

Sustainable Aviation Aotearoa was established as a result of ERP1 in 2022. Sustainable Aviation Aotearoa is a collaboration between the Government and industry working to support the sector to accelerate the decarbonisation of aviation.

New Zealand works with the International Maritime Organization (IMO) to reduce its emissions from international shipping and has agreed to meet the targets from the 2023 revised IMO GHG reduction strategy. New Zealand adopted the short-term measures in 2023 to give effect to these strategies and continues to participate in the negotiations at the IMO to develop measures that will further aid the sector in reducing its emissions to reach net zero maritime emissions by, or around, 2050.

At the 2021 United Nations Climate Change Conference, New Zealand agreed to support the Clydebank Declaration on Green Shipping Corridors. The Ministry of Transport is conducting research on regulatory barriers that could act as a brake on the operation of vessels running alternative fuels to New Zealand or other low carbon marine technologies.

2.4.12 Policies no longer in place

This section details policies that are no longer in place but continue to have mitigation effects beyond the policy implementation period. The mitigation effects of these policies are included in the With Existing Measures projections scenario (see section 2.5).

2.4.12.1 Government Investment in Decarbonising Industry Fund

In 2020, the Government launched the Government Investment in Decarbonising Industry (GIDI) Fund, administered by EECA, to accelerate the decarbonisation of industrial process heat. The fund helped businesses with the upfront capital costs of energy efficiency initiatives as well as switching from fossil fuels to renewables to accelerate their decarbonisation goals.

The first iteration of the GIDI Fund was an NZ$69 million fund, which supported 53 projects. In 2022, the Government expanded the GIDI Fund to further support businesses with decarbonisation and invest in necessary renewable fuel supply infrastructure to enable decarbonisation projects. GIDI Fund applications closed at the end of 2023.

Overall, co-funding was provided for 83 projects with $119.3 million in co-funding provided by the Government and $220.5 million in private funding. This is expected to provide an estimated annual CO_2 abatement of 463,900 tonnes.

Partnership projects were approved with two of New Zealand's largest industrial emitters, taking a more bespoke approach to reducing their reliance on fossil fuels. These two partnerships were with New Zealand Steel (steel manufacturer) and Fonterra (dairy co-operative). The Government committed $230 million in co-investment with private funding of $860 million across the two partnerships. This is expected to provide an estimated lifetime abatement of 9.3 Mt CO_2. The New Zealand Steel partnership is expected to provide an estimated annual CO_2 abatement of 800,000 tonnes per year. The Fonterra partnership is expected to bring about annual carbon abatement of up to 330,000 tonnes per year by 2030.

2.4.12.2 State Sector Decarbonisation Fund

In December 2019, the Government launched the State Sector Decarbonisation Fund (SSDF). The SSDF supports the CNGP and aims to help numerous organisations within the public sector to be carbon neutral from 2025. The NZ$219.5 million fund is administered by EECA. EECA works with the state sector to provide expert advice and technical support, and to facilitate low-emissions energy investments.

As of June 2023, all SSDF funds have been committed. The SSDF funds 126 individual projects, across 57 agencies. Collectively, these projects are estimated to represent total abatement of 961,482 tonnes CO_2e over 10 years.

2.4.12.3 Clean Vehicle Discount Scheme

The Clean Vehicle Discount encouraged buyer demand for low-emission vehicles by providing rebates for zero- and low-emission light vehicles, and requiring a fee be paid for high-emission vehicles, registered in New Zealand for the first time.[174]

The Clean Vehicle Discount was based on vehicle CO_2 emissions. The rebate part of this policy for those buying zero- and low-emission vehicles was introduced in July 2021. The second part, comprising fees for those purchasing higher-emitting vehicles, was introduced on 1 April 2022.

The Clean Vehicle Discount Scheme ended on 31 December 2023.

2.4.12.4 Permanent Forest Sink Initiative

The PFSI pre-dates the NZ ETS and promoted the establishment of permanent forests on land that was unforested before 1 January 1990. It offered land owners with land registered in the PFSI the opportunity to earn emissions units for the carbon sequestered by their forests.

In return, participants had a legal covenant registered against their land title in perpetuity to ensure the carbon removals remain 'permanent'. The covenant was in perpetuity, even if the land was sold, although there was an ability to terminate after 50 years. Land owners were responsible for establishing and maintaining the forest. Limited harvesting was allowed on a continuous forestry cover basis.

The PFSI was reviewed between 2015 and 2018. These reviews concluded that the PFSI was costly and complex to administer and had underperformed compared with the NZ ETS. Following these reviews, the Government announced it would discontinue the PFSI and introduce a new permanent forest category for post-1989 forest land into the NZ ETS to replace it (available from 1 January 2023). The PFSI closed on 1 January 2024, following the

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174 New Zealand Transport Agency. *Clean Car Standard overview*. Retrieved 19 November 2024.

land subject to the covenants being moved into the NZ ETS, with most of the land moving into the permanent forestry category.

2.4.12.5 Afforestation Grants Scheme

The Afforestation Grant Scheme was a funding programme designed to help establish new small- to medium-sized forests (5 hectares to 300 hectares) across New Zealand. It aimed to sequester carbon, improve water quality, reduce soil erosion, improve land-use productivity and boost regional economic development. The Ministry for Primary Industries provided grants to land owners to plant native or exotic forests. The scheme ran in two parts, with the first establishing 12,000 hectares of forest between 2008 and 2013. The second initially aimed to establish 15,000 hectares between 2015 and 2020 and this was partially achieved before the One Billion Trees Fund was established. This saw some applicants transition to support under the One Billion Trees Fund or the NZ ETS.

2.4.13 Assessment of economic and social impacts of response measures

Meeting New Zealand's emissions reduction targets will involve businesses, communities and households making different choices about how they trade, work and live. These choices bring benefits and opportunities for New Zealanders, including new, low-emissions jobs and business opportunities, but also challenges and disruption for some.

Analysis of the expected distributional impacts of ERP2 policies found that mitigation efforts will not add significant costs to households. We expect the effects to be similar to what is projected without ERP2 policies. The modelling suggests that, overall, the economy will grow between now and 2050. Table 2.4.1 gives a high-level summary of the main impacts that emerged from the analysis.

Table 2.4.1: Summary of impacts from analysis of expected distributional impacts of second emissions reduction plan policies

Group affected	Impact
Households	• New Zealand households are, on average, expected to have only marginally lower consumption in 2050 than they would have without efforts to reduce emissions. • The second emissions reduction plan will have a limited effect on overall inflation or the cost of living for New Zealanders. The effects mainly come from emissions pricing, which in 2030 is estimated to cost the average household $705, or 0.7 per cent, of annual household income. • Lower income households are expected to be the most affected by higher household and transition costs. This includes a disproportionate number of disabled people and people from Māori and Pasifika communities.
Industries and workers	• Agriculture is expected to be the most affected sector. Agricultural output (in gross domestic product terms) is expected to be higher in 2050 than today, but lower than it would have been without any mitigation actions, mainly because of land-use changes to forestry. Agricultural manufacturing is similarly affected. • Farm owners may benefit from changes in land use to forestry. However, workers on farms and in agricultural manufacturing may face disruption, reduced opportunities, and the need to reskill and change careers. • Other sectors are less affected.

Group affected	Impact
Regions	• Regional impacts are mainly driven by the mix of industry in each region and how they are affected by the changes in land use. The impact on specific areas varies significantly, depending on forest and farm type, and regional circumstances. • More affected areas, such as Southland and the West Coast, have a risk of disruption through lower local employment, the need to retrain local workers, reduced population for small communities and greater exposure to climate risks.
Iwi and Māori	• Modelling found that Māori households are expected to be marginally more affected than non-Māori households. Māori are more likely to be affected by economic transitions, as they start from a position of greater socio-economic disadvantage. Māori are disproportionately affected by expected land-use changes from agriculture to forestry, because of high involvement in agriculture and forestry, and disproportionate ownership of lower quality land.
Youth	• A strong focus on forestry to meet emissions budgets and targets leaves future generations with high levels of gross emissions that must be either reduced or offset through further removals. Both come with costs and economic trade-offs, but these may be reduced somewhat by future technological developments. • Large areas of forestry must be maintained to prevent the release of stored carbon. They also limit future flexibility of land use and increase adaptation risks.

2.4.13.1 Strategy to mitigate impacts

The Government is approaching climate change in a way that will meet New Zealand's climate targets while minimising the costs to New Zealanders. It is also committed to strengthening the economy, to put New Zealanders in a much better position to adapt to a lower emissions way of life and to manage any costs and challenges this shift brings.

Some of the largest distributional effects stem from impacts on the agriculture sector and conversions from farmland to forestry. These will be most felt by regional communities, Māori and agricultural manufacturing. The Government's plan helps reduce these impacts by:

- committing to limit on-farm conversions registering in the NZ ETS to restrict shifts from agriculture to forestry
- delaying the pricing of agricultural emissions
- providing substantial support for research and development of mitigation tools and technologies for agriculture, to offer alternatives to land-use change.

These impacts will be reduced further through the Government's strategy to mitigate impacts on affected groups. Under the strategy, the Government has a range of supports available, as follows:

- financial support, including returning NZ ETS revenue to New Zealanders through tax relief to help meet rising costs, including those related to climate change mitigation
- retraining support
- information provision
- targeted support for Māori.

2.4.14 Information about how actions, policies and measures are modifying longer-term trends in GHG emissions and removals

The Climate Change Response Act 2002 is New Zealand's primary climate change legislation. The 2019 amendments to the Act set new domestic emissions reduction targets for 2050; established a system of emissions budgets to step New Zealand towards these targets; and required the development of an emissions reduction plan for each budget period that sets out the policies and strategies for achieving the emissions budget.

This system of domestic targets, emissions budgets and emissions reduction plans is known as the Zero Carbon Framework. The system steps New Zealand towards the goals of net zero of all GHG emissions, other than biogenic methane, by 2050, and a 24 per cent to 47 per cent reduction of biogenic methane by 2050, compared with 2017 levels. The framework shows how New Zealand is modifying longer-term trends in GHG emissions and removals through actions, policies and measures.

Further details can be found in section 2.1.8 and section 2.4.2.

2.4.15 CTF table 5. Policy status and impacts

CTF table 5: Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement

Note: CCRA = Climate Change Response Act 2002; CH_4 = methane; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHGs = greenhouse gases; HFCs = hydrofluorocarbons; IPPU = Industrial Processes and Product Use; kt = kilotonnes; LULUCF = Land Use, Land-Use Change and Forestry; N_2O = nitrous oxide; NE = not estimated; IE = included elsewhere; NZU = New Zealand Unit; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

Estimates are produced using sector-based emissions projections models. Methodologies used are described in Annex 3. A negative estimate of mitigation impact indicates additional GHG emissions resulting from this policy or measure for this particular year. Under LULUCF, only forests established as a direct result of the initiative are included. A negative value is reported in 2022. This is due to vegetation clearance and soil carbon emissions upon conversion to a forest exceeding removals in that year. The impact the NZ ETS has in reducing (avoided) deforestation is excluded from CTF table 5. LULUCF removal estimates are based on New Zealand's first Nationally Determined Contribution accounting methodology, rather than the full LULUCF sector as reported in New Zealand's Greenhouse Gas Inventory.

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Overarching policies											
Climate Strategy	The Climate Strategy sets out five pillars that guide New Zealand's approach for reducing emissions and managing the impacts of climate change.	Sets out the approach to how the Government will deliver on New Zealand's climate goals	Other	Implemented	Energy, Transport, IPPU, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2024	Ministry for the Environment	NE	NE	NE
New Zealand Emissions Trading Scheme (NZ ETS)	The NZ ETS requires upstream entities, such as fuel suppliers and large emitters, to surrender emissions units (NZUs) to the Government for their activities that result in	Reduce emissions by creating a market through which emitters pay for emissions covered by the scheme.	Regulatory, economic instrument	Implemented	Energy, Transport, IPPU, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment,	IE	IE	IE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	emissions. It also rewards entities that remove carbon dioxide from the atmosphere, which for New Zealand is predominantly through forestry sequestration. Estimate of GHG emissions reductions by sector are detailed in individual rows, below.							Ministry for Primary Industries			
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on Energy sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	NE	NE	519
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on Transport sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	119	169	194
New Zealand Emissions Trading Scheme	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF,	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the	304	485	1,125

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
(NZ ETS) - Impact on Agriculture sector emissions		the objectives of this policy.			Waste management			Environment, Ministry for Primary Industries			
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on IPPU sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	163	215	358
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on Waste sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy. The estimates of GHG emissions reductions for this policy also include those from the National Environmental Standard for Air Quality.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	669	629	706
New Zealand Emissions Trading Scheme (NZ ETS) - LULUCF	The NZ ETS is an important tool for meeting domestic and international climate change targets. Owners of post-1989 eligible forest can earn NZUs for carbon sequestered. There are also liabilities for forest carbon	Promote afforestation and disincentivise planted forest deforestation.	Economic instrument	Implemented	LULUCF	CO_2	2008	Ministry for Primary Industries	299	–104	10,440

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	loss, via harvesting or deforestation.										
First emissions reduction plan	The policies and strategies in the first emissions reduction plan form a package with an aim to reduce emissions in key sectors of the economy, including sector-specific policies.	Sets out over 300 actions, policies and strategies for meeting New Zealand's first emissions budget.	Regulatory, economic instrument, other	Implemented	Energy, Transport, Agriculture, Waste management, IPPU, LULUCF	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2022	Ministry for the Environment, Ministry for Primary Industries, Ministry of Transport, Ministry of Business, Innovation and Employment, The New Zealand Treasury, Ministry of Foreign Affairs and Trade, Ministry of Social Development, Ministry of Housing and Urban Development, Department of Conservation, Energy Efficiency and Conversation Authority, NZ Transport Agency, Kāinga Ora, Te Arawhiti, Te Puni Kōkiri, the New Zealand Infrastructure Commission, Department of Internal Affairs	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Funding and finance initiatives											
New Zealand's Sovereign Green Bond Programme	Green Bonds provide financing for government expenditure with positive climate and environmental outcomes. Design of the Green Bond Programme has been informed by international best practice and incorporates New Zealand-specific elements.	Finance or refinance specific government projects with positive climate and environmental government impacts.	Economic instrument	Implemented	Energy, Transport, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2022	The New Zealand Treasury	NE	NE	NE
New Zealand Green Investment Finance Limited	This government-owned entity has the objective of accelerating emissions reduction in New Zealand by investing in climate-mitigating technologies.	Invest in climate-mitigating technologies.	Economic instrument	Implemented	Energy, Transport, IPPU, Agriculture, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2019	New Zealand Green Investment Finance Limited	NE	NE	NE
Climate-related disclosures	Climate reporting entities are required to publish disclosures from financial years starting on or after 1 January 2023, in accordance with climate standards published by the External Reporting Board.	Ensure that the effects of climate change are routinely considered in business, investment, lending and insurance decisions.	Regulatory	Implemented	Energy, Transport, IPPU, Agriculture, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2023	Ministry for the Environment, Ministry of Business, Innovation and Employment	NE	NE	NE
State Sector Decarbonisation Fund	The NZ$219.437 million State Sector Decarbonisation Fund provides co-funding to state sector agencies to replace coal boilers with low-emissions alternatives and	Government agencies demonstrate the action required to decarbonise.	Economic instrument	Implemented	Energy, Transport	CO_2	2020	Energy Efficiency and Conservation Authority, Ministry of Business, Innovation and Employment, The	NE	NE	96

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	for other energy efficiency or renewable energy projects, including efficient lighting and electric vehicles. Three-quarters of the funding is targeted for hospitals, schools and universities, which are the biggest emitters.							New Zealand Treasury			
Energy: Strategies											
Electrify NZ	The Government is committed to doubling renewable energy by 2050. Electrify NZ includes a range of initiatives designed to support achievement of this goal.	Enable investment by removing barriers and resolving market failures that prevent or slow investment in infrastructure for electrification.	Regulatory	Adopted	Energy	CO_2	2025	Ministry of Business, Innovation and Employment	0	0	42
Hydrogen Action Plan	Development of a Hydrogen Action Plan	Support private investment in hydrogen.	Regulatory, other	Planned	Energy, Transport, IPPU	CO_2	2024	Ministry of Business, Innovation and Employment	NE	NE	NE
Carbon capture, utilisation and storage	The Government has agreed to create an enabling regime for carbon capture, utilisation and storage.	Allow New Zealand's industries to access carbon capture, utilisation and storage technology on a level playing field with other emissions reduction and removal tools.	Regulatory	Adopted	Energy	CO_2	2025	Ministry of Business, Innovation and Employment	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Energy: energy efficiency											
Equipment Energy Efficiency programme	The joint Equipment Energy Efficiency Programme has been developed with Australia. Energy efficiency measures, including energy rating labelling for a range of residential, commercial and industrial products, along with mandatory performance standards, allow both countries to set consistent standards and measures for energy efficiency.	Help households and businesses to purchase and use products that use less energy and save money.	Regulatory, other	Implemented	Energy	CO_2	2002	Energy Efficiency and Conservation Authority	NE	NE	NE
Publicly Available Specifications	The Energy Efficiency and Conservation Authority has worked with Standards New Zealand since 2020 to develop five Publicly Available Specifications. This includes guidance for biomass boilers, high-temperature heat pumps, and residential and commercial electric vehicle chargers.	Provide best-practice specifications for non-regulated products.	Other	Implemented	Energy	CO_2	2020	Energy Efficiency and Conservation Authority	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Gen Less	The Gen Less website, social media channels and direct mailing lists provide information about climate change and how to reduce energy-related emissions at household, business and national levels.	Educate people and businesses about their energy choices.	Other	Implemented	Energy	CO_2	2019	Energy Efficiency and Conservation Authority	NE	NE	NE
Support for Energy Education in Communities Programme	The Support for Energy Education in Communities Programme funds New Zealand organisations to deliver personalised, specialist advice and education to struggling households in their communities. Organisations can also supply low-cost, energy-saving items, such as LED light bulbs, low-flow showerheads, heaters and devices to monitor temperature and humidity.	Lift people out of energy hardship.	Economic instrument	Implemented	Energy	CO_2	2020	Ministry of Business, Innovation and Employment	NE	NE	NE
Energy: Business decarbonisation											
Business decarbonisation programmes	The Government's business decarbonisation programmes help businesses reduce emissions and improve energy productivity. Support is provided through the programmes included below, as well as via energy	Support businesses to decarbonise process heat.	Other	Implemented	Energy	CO_2	2013	Energy Efficiency and Conservation Authority	277	332	646

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	audits and feasibility studies. It includes the Energy Transition Accelerator programme, Regional Energy Transition Accelerator programme, Technology Demonstration programme and the Sector Decarbonisation Programme.										
Energy Transition Accelerator Programme	The Energy Efficiency and Conservation Authority works with large energy users to help them develop tailored and practical low-carbon transition pathways. The goal is to facilitate long-term thinking by drafting a practical map for transition, showing what the technically and economically feasible opportunities are, including innovative technologies, energy efficiency and fuel switching. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.	Develop long-term plans for businesses to transition to lowering emissions as much as possible.	Economic instrument, other	Implemented	Energy	CO_2	2019	Energy Efficiency and Conservation Authority	IE	IE	IE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Regional Energy Transition Accelerator programme	The Regional Energy Transition Accelerator programme's focus is on understanding localised opportunities and barriers faced by medium and large energy users when seeking to reduce emissions from process heat. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.	Develop and share a well-informed and coordinated approach for regional decarbonisation	Other	Implemented	Energy	CO_2	2022	Energy Efficiency and Conservation Authority	IE	IE	IE
Technology Demonstration Fund	The Technology Demonstration Fund co-funds and reduces risks for underused energy-saving technology for wider market deployment. Since 2018/19, the programme has included a specific investment focus to demonstrate innovative electric heat pump technologies. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.	Promote technology that is commercially proven but underused in New Zealand.	Other	Implemented	Energy	CO_2	2013	Energy Efficiency and Conservation Authority	IE	IE	IE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Sector Decarbonisation Programme	The Sector Decarbonisation Programme provides easy-to-follow pathways for businesses across a range of sectors to understand how to use existing equipment and processes as efficiently as possible. It provides businesses with resources and tools to reduce reliance on fossil fuels. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.	Energy efficiency pathways for businesses.	Other	Implemented	Energy	CO_2	2019	Energy Efficiency and Conservation Authority	IE	IE	IE
Government Investment in Decarbonising Industry Fund	The Government Investment in Decarbonising Industry Fund provided co-funding for private sector businesses to help with energy efficiency initiatives and the decarbonisation of process heat. The original fund was expanded in 2022 with a significant increase in funding. This included funding to help large energy users with decarbonising, to provide energy-efficient equipment subsidies and	Decarbonise businesses through several workstreams, including industrial process heat, commercial space and water heating, and efficient industrial equipment replacements.	Economic instrument	Implemented	Energy	CO_2	2020	Energy Efficiency and Conservation Authority	NE	NE	1,549

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	develop enabling infrastructure.										
Energy: Other energy policies											
Māori and Public Housing Renewable Energy Fund	This fund trials community-scale renewable technologies for Māori and public housing. These include technologies such as modern geothermal, solar panels and batteries. The final round made funding available for larger, more complex, renewable energy projects, such as small-scale hydro and solar photovoltaic projects integrating remote distribution and retail solutions. The $28 million Community Renewable Energy Fund builds on and expands this.	Support renewable and affordable energy in communities.	Economic instrument	Implemented	Energy	CO_2	2020	Ministry of Business, Innovation and Employment	NE	NE	NE
Community Renewable Energy Fund	The fund supports renewable energy projects that help communities access secure, renewable and more affordable energy. Funded projects are providing valuable insight into the operational, economic, environmental and wellbeing effects of introducing renewable	Support renewable and affordable energy in communities.	Economic instrument	Implemented	Energy	CO_2	2022	Ministry of Business, Innovation and Employment	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	energy systems. This information will help inform future projects on a larger scale, as well as the overall future of the New Zealand energy system.										
National Direction for Greenhouse Gas Emissions from Industrial Process Heat	Industries using process heat are required to consider greenhouse gas emissions for their operations when applying to local councils for a discharge to air consent. Guidance has been published to help local councils and industry understand the requirements.	Requires local councils to consider greenhouse gas emissions for resource consent applications.	Regulation, other	Implemented	Energy	CO_2	2023	Ministry for the Environment, Ministry of Business, Innovation and Employment, Energy Efficiency and Conservation Authority	0	0	579
Energy: Building and construction											
Improvements to the energy efficiency requirements in the New Zealand Building Code	The Ministry of Business, Innovation and Employment increased the minimum energy efficiency standards for new buildings through changes to the compliance requirements in Clause H1 of the New Zealand Building Code.	Improve the energy efficiency of new buildings.	Regulatory	Implemented	Energy	CO_2	2023	Ministry of Business, Innovation and Employment	0	0	154
Technical methodologies to measure embodied carbon and	The Ministry of Business, Innovation and Employment has developed two technical methodologies to enable the building and	Reduce embodied and operational emissions from new buildings.	Other	Implemented	Energy	CO_2	2022	Ministry of Business, Innovation and Employment	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
operational carbon	construction sector to measure embodied and operational carbon from new buildings in a consistent and credible way.										
Energy performance ratings: National Australian Built Environment Rating System – New Zealand (NABERSNZ™)	NABERSNZ™ is a system for rating the energy efficiency of existing office buildings and identifies opportunities for implementing building energy performance improvements. Other work includes financial grants and loans for energy audits; energy plans; monitoring and verification systems; systems optimisation; and new and emerging technologies.	Improve the energy performance of new and existing commercial buildings.	Other	Implemented	Energy	CO_2	2013	Energy Efficiency and Conservation Authority	NE	NE	NE
Insulation and heating grants: Warmer Kiwi Homes Programme	Warmer Kiwi Homes offers insulation and heating grants to low-income households to make their homes warmer, drier and more energy efficient.	Provide warmer, drier homes through improved thermal performance.	Economic instrument	Implemented	Energy	CO_2	2018	Energy Efficiency and Conservation Authority	0	1	4
Transport											
Electric vehicle charging infrastructure	The Government is taking steps to enable the delivery of a network of 10,000 public electric vehicle charging points by 2030. It will support the transition to	Provide a long-term strategic direction as New Zealand's electric vehicle infrastructure expands.	Other	Planned	Transport	CO_2	2024	Ministry of Transport, Ministry of Business, Innovation and Employment, Energy Efficiency	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	and use of low-emissions transport by giving users the confidence that they can charge their vehicle on the public network when and where they need to.							and Conservation Authority			
Clean Vehicle Standard and Clean Vehicle Discount Scheme	The Clean Vehicle Standard requires vehicle importers to achieve annually stricter carbon dioxide targets from 2023 or otherwise face financial charges. The Clean Vehicle Discount encouraged buyer demand for low-emission vehicles by providing rebates for zero- and low-emission light vehicles, and requiring a fee be paid for high-emission vehicles registered in New Zealand for the first time.	Address both the supply of and the demand for low-emissions vehicles in New Zealand.	Regulatory, economic instrument	Implemented	Transport	CO_2	2021	Ministry of Transport, NZ Transport Agency	6	30	364
Road user charges exemptions for electric vehicles	A road user charges exemption on light electric vehicles started in 2009 and ran until 1 April 2024. A road user charges exemption for heavy electric vehicles was introduced in 2017 and will run until 1 January 2026.	Encourage electric vehicle uptake in both the light and heavy fleets.	Economic instrument	Implemented	Transport	CO_2	2009	Ministry of Transport, NZ Transport Agency	2	5	6
Freight and Supply Chain Strategy	The Government released the Freight and Supply Chain Strategy in August 2023,	Reduce emissions from heavy road freight.	Other	Implemented	Transport	CO_2	2023	Ministry of Transport	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	informed by extensive stakeholder engagement.										
Public transport bus decarbonisation	The Government will require only zero-emission public transport buses to be purchased by 1 July 2025 and is targeting full decarbonisation of the bus fleet by 2035. The Government is providing $44.7 million over four years to support bus decarbonisation initiatives.	Accelerate decarbonisation of the public transport bus fleet.	Regulatory, economic instrument	Implemented	Transport	CO_2	2023	Ministry of Transport, NZ Transport Agency, Energy Efficiency and Conservation Authority	1	3	37
Zero-emissions trucks and buses	The Government has committed $30 million for a grant scheme to reduce the upfront capital cost of low-emissions heavy vehicles.	Reduce emissions from heavy vehicles.	Economic instrument	Planned	Transport	CO_2	2024	Energy Efficiency and Conservation Authority	NE	NE	NE
Low Emissions Transport Fund	The Government increased the funding contribution from $6 million–$7 million per year to $25 million per year by 2023/24.	Support the demonstration and adoption of low-emissions transport technology, innovation and infrastructure to accelerate the decarbonisation of New Zealand's transport sector.	Economic instrument	Implemented	Transport	CO_2	2021	Energy Efficiency and Conservation Authority	NE	NE	NE
Vehicle Fuel Economy Labelling	This compulsory programme requires vehicle traders and online vendors to display	Allow consumers to make more informed vehicle purchase choices, and to place an	Regulatory, other	Implemented	Transport	CO_2	2008	Energy Efficiency and Conservation Authority	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	information relating to fuel economy.	appropriate value on fuel economy.									
Industrial Processes and Product Use											
Synthetic greenhouse gas levy	A levy is applied to imported goods containing certain HFCs and PFCs, based on the global warming potential and quantity of HFCs or PFCs they contain.	Encourage the use of lower global warming potential gases.	Regulatory	Implemented	IPPU	HFCs, PFCs	2013	Environmental Protection Authority	NE	NE	NE
Permitting scheme for imports and exports of bulk HFCs	Staged phase-down on consumption (production, importation and exportation) of bulk HFCs.	Phase-down of consumption of HFC gases.	Regulatory	Implemented	IPPU	HFCs	2020	Ministry for the Environment	0	0	102
Voluntary product stewardship scheme for refrigerants	A government-accredited organisation facilitates the collection and export of refrigerant gases for destruction overseas.	Export for destruction of refrigerant gases.	Other	Implemented	IPPU	HFCs, PFCs, SF6	2010	Ministry for the Environment	0	0	51
Agriculture											
A fair and sustainable pricing system for on-farm agricultural emissions	The Government has committed to a fair and sustainable pricing system for agricultural emissions no later than 2030, with on-farm emissions measurement by 2025.	Encourage reduction in agricultural emissions.	Regulatory, economic instrument	Planned	Agriculture	CH_4, N_2O, CO_2	2030	Ministry for Primary Industries	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Centre for Climate Action on Agricultural Emissions	The Centre for Climate Action on Agricultural Emissions accelerates the commercialisation of new mitigation technologies. The Centre has two components: AgriZero[NZ], a catalyst and investment industry–Crown joint venture company, and the New Zealand Agricultural Greenhouse Gas Research Centre.	Accelerate the development of greenhouse gas mitigations.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2022	Ministry for Primary Industries	NE	NE	NE
New Zealand Agricultural Greenhouse Gas Research Centre	Brings together nine primary sector research organisations.	Focus on ways to reduce on-farm CH_4 and N_2O emissions and enhance soil carbon.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2009	Ministry for Primary Industries	NE	NE	NE
Global Research Alliance on Agricultural Greenhouse Gases (GRA)	New Zealand plays an active role in supporting the GRA through funding and delivery of education, training and public awareness, funding of mitigation research projects and funding of regional and international collaboration in addition to co-chairing the GRA's Livestock Research Group and hosting the GRA Secretariat and Special Representative.	Increase international collaboration on and investment in research on increasing agricultural and food production, without increasing greenhouse gas emissions.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2009	Secretariat support and co-Chair of the Livestock Research Group provided by New Zealand Ministry for Primary Industries	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Sustainable Food and Fibre Futures	Provides co-funding for programmes driving sustainable impact for the food and fibre sectors.	Co-invest in innovative projects to grow New Zealand's food and fibre industries sustainably.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2018	Ministry for Primary Industries	NE	NE	NE
Sustainable Land Management and Climate Change Research Programme	Initiatives and programmes in the agriculture and forestry sectors that focus on adaptation to climate change.	Research programmes in agriculture and forestry sectors.	Other	Implemented	Agriculture, LULUCF	CH_4, N_2O, CO_2	2007	Ministry for Primary Industries	NE	NE	NE
Synthetic nitrogen fertiliser cap	From 1 July 2021, a cap on the use of synthetic nitrogen fertiliser applies on any contiguous parcel of pastoral land. The cap has been set at 190 kilograms per hectare per year.	Limit the impacts of synthetic nitrogen fertiliser on freshwater ecosystems following application to land. Has a co-benefit of reducing synthetic nitrogen fertiliser applied to land.	Regulatory	Implemented	Agriculture	N_2O	2021	Ministry for the Environment, regional and local councils	0	0	50
Regulations to manage freshwater introduced under the Essential Freshwater package	The National Policy Statement for Freshwater Management provides national policy direction to regional councils on freshwater management (This excludes the impact of the nitrogen fertiliser cap). These measures will impact emissions from agriculture through their influence on animal numbers.	Improve the quality of freshwater in New Zealand. Has co-benefits of more streamside planting (to reduce rural runoff), retention of more natural wetlands, and potentially less intensive stocking.	Regulatory	Implemented	Agriculture	CH_4, N_2O	2020	Regional and local councils	0	0	200

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Land Use, Land-Use Change and Forestry											
Afforestation Grant Scheme	Under the Afforestation Grant Scheme, land owners who have received a grant have ongoing obligations to maintain their grant forests for a minimum 10-year period.	Promote the establishment of production and permanent forests on previously unforested land. Reduce erosion by encouraging tree planting on erosion-prone land. Enhance the sequestration of carbon in forest sinks. Increase the area of new forests that meet the afforestation and reforestation definition under the Kyoto Protocol in New Zealand.	Economic instrument	Implemented	LULUCF	CO_2	2008	Ministry for Primary Industries	447	502	698
One Billion Trees	This $176.8 million fund ran for three years from August 2018 until its closure on 30 June 2021. Existing funding agreements extend into the future and will receive continued support and relationship management as these projects progress to completion.	Increase tree planting across New Zealand to contribute to the wider programme's goal of reaching 1 billion trees planted by 2028.	Economic instrument	Implemented	LULUCF	CO_2	2018	Ministry for Primary Industries	NE	NE	NE
Sustainable Land Management Hill Country	The programme currently provides up to NZ$6.3 million of targeted funding support annually to	Protect New Zealand's estimated 1.4 million hectares of pastoral hill	Economic instrument	Implemented	LULUCF	CO_2	2007	Ministry for Primary Industries	180	211	871

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Erosion Programme	regional and unitary councils. The purpose of the programme is to speed up the rate of treatment of erosion-prone land.	country that is classified as erosion prone.									
Erosion Control Funding Programme	Land owner grants can be used to control erosion on erosion-prone land in the Tairāwhiti district, by providing effective tree cover through planting or encouraging natural reversion to native bush.	Provide funding to land owners to prevent and control erosion.	Economic instrument	Implemented	LULUCF	CO_2	1993	Ministry for Primary Industries	1,200	1,152	1,065
Permanent Forest Sink Initiative	Enable land owners to receive New Zealand Units for permanent forest sinks. It closed in 2023 and was replaced by ‘permanent forestry’ in the ETS.	Incentivise land owners for the creation of permanent forests.	Economic instrument	Implemented	LULUCF	CO_2	2008	Ministry for Primary Industries	229	223	156
Afforestation on Crown-owned land	The Government is exploring opportunities to partner with the private sector to plant trees on Crown-owned land (excluding national parks) that is of low conservation value and low farming value.	Secure additional net emissions reductions that contribute towards our climate change targets, boost forestry and wood processing, and provide other environmental benefits.	Economic instrument	Planned	LULUCF	CO_2	2025	Ministry for Primary Industries	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Woody biomass for bioenergy	Investment in commercial planting to increase the supply of biomass, research into alternative biomass crops and effective forest waste recovery for biomass.	Directly increase biomass supply and stimulate private sector investment to create further supply.	Economic instrument	Implemented	LULUCF	CO_2	2023	Ministry for Primary Industries	NE	NE	NE
Maximising forest carbon programme	Maximise carbon stored in new and existing forests. Expand NZ ETS look-up tables to more accurately reflect carbon stock changes and explore the feasibility of measuring carbon with remote-sensing tools.	Support the increased sequestration of forest carbon.	Economic instrument	Planned	LULUCF	CO_2	2022	Ministry for Primary Industries	NE	NE	NE
National Environmental Standards for Commercial Forestry	These regulations under the Resource Management Act 1991 are the main forestry management rules for commercial forestry activities in New Zealand, including afforestation and harvesting. Changes to the National Environmental Standards for Commercial Forestry were completed in November 2023.	Ensure the environmental effects of commercial forestry are managed.	Regulatory	Implemented	LULUCF	CO_2	2023	Ministry for the Environment, Ministry for Primary Industries	NE	NE	NE
Waste											
Food waste reduction (behaviour change)	Encourage behaviour to prevent waste at home.	Enable households and businesses to reduce organic waste.	Regulatory, economic instrument	Implemented	Waste management	CH_4	2023	Ministry for the Environment, regional and local councils	0	0	8

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Limits on organic waste disposal	Banning organic materials from a range of landfill types to incentivise businesses and households to look for ways to reduce, recycle or compost their organic waste.	Explore bans or limits to divert more organic waste from landfill.	Regulatory, economic instrument	Planned	Waste management	CH_4	2030	Ministry for the Environment, regional and local councils	NE	NE	NE
Kerbside expansion	Provide services and infrastructure for kerbside organic collections to make it easier for households and businesses to manage their organic waste.	Enable households and businesses to reduce food and garden waste.	Regulatory, economic instrument	Planned	Waste management	CH_4	2030	Ministry for the Environment, regional and local councils	NE	NE	NE
Paper waste diversion (business)	Investigate whether to require paper and cardboard to be collected separately from other recyclables.	Require the separation of paper and cardboard.	Regulatory, economic instrument	Planned	Waste management	CH_4	2026	Ministry for the Environment, regional and local councils	NE	NE	NE
Wood waste reduction and diversion	Invest in organic waste processing and resource recovery infrastructure and support the building and construction sector to minimise waste through research and improved capability.	Increase the amount of organic waste diverted from landfill.	Regulatory, economic instrument	Implemented	Waste management	CH_4	2023	Ministry for the Environment, regional and local councils	0	0	1
Landfill gas capture expansion	Regulations will require landfill gas capture at municipal landfills. Feasibility studies will determine the need for additional landfill gas	Increase the capture of gas from landfills.	Regulatory, economic instrument	Planned	Waste management	CH_4	2026	Ministry for the Environment, regional and local councils	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	capture requirements. This could include expanding landfill gas capture systems to smaller class 1 (municipal waste) facilities, for example, facilities that receive over 10,000 Tonnes of waste per year.										
Waste disposal levy under the Waste Minimisation Act 2008	The waste disposal levy rate for landfills has progressively increased and expanded. From $10 per tonne for landfills that receive household waste, set in 2009, to $60 per tonne as of July 2024, further increasing to $75 in 2027 as a result of additional changes to the Waste Minimisation Act 2008 in July 2024. The levy was also expanded from July 2021 to cover additional landfill types.	Achieve a range of waste and environmental objectives, including encouraging waste minimisation and decreasing waste disposal to protect the environment from harm and provide environmental, social, economic and cultural benefits.	Regulatory	Implemented	Waste management	CO_2, CH_4, N_2O	2010	Ministry for the Environment	13	15	97
Waste Minimisation Fund	A levy is imposed on waste disposed to landfill and generates funds for waste minimisation activities. These funds are distributed to territorial authorities and waste minimisation projects (via the Waste Minimisation Fund). Additional funding	Increase resource efficiency, increase reuse, recovery and recycling, and decrease waste to landfill.	Economic instrument	Adopted	Waste management	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	2010	Ministry for the Environment	NE	NE	NE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	from the Climate Emergency Response Fund is available for infrastructure projects to reduce emissions from waste over 2022 to 2024.										
Product stewardship	Co-designing product stewardship for six priority products. The first regulatory framework to be implemented addresses end-of-life tyres and has been designed by industry-led working groups. The other priority product schemes and proposed regulations are in various stages of development.	Implement regulations to increase circular economy and place responsibilities for managing end-of-life products on producers, importers and retailers rather than on communities, councils, neighbours and nature.	Regulatory	Adopted	IPPU, Waste management	CO_2, CH_4, HFCs, SF_6	2020	Ministry for the Environment	NE	NE	NE
National Environmental Standard for Air Quality	Amendments proposed under the first emissions reduction plan will require all municipal landfills to capture gas, including sites with less than 1 million tonnes capacity. The estimates of GHG emissions reductions from this policy are included within NZ ETS – Impact on Waste sector emissions.	Effectively manage discharges to air of greenhouse gases (mainly CH_4) generated from large landfills.	Regulatory	Implemented	Waste management	CH_4	2004	Ministry for the Environment, regional and local councils	IE	IE	IE

Name	Description	Objectives	Type of instrument	Status	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Public sector policies											
Carbon Neutral Government Programme	Support public sector organisations to measure, report and reduce their emissions to achieve a 20% reduction by 2025 and 42% by 2030. Agencies should offset remaining emissions to achieve a future neutrality date.	Understand and accelerate the reduction of emissions within the public sector.	Other	Implemented	Energy, Transport, IPPU, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	2022	Ministry for the Environment, Ministry of Business, Innovation and Employment, Energy Efficiency and Conservation Authority	NE	NE	NE
Sustainable Government Procurement	The Government Procurement Rules were updated in 2019 to include a focus on the achievement of wider social, economic, cultural and environmental outcomes that go beyond the immediate purchase of goods and services. A new Government Procurement Rule was introduced. Rule 20: Transitioning to a net zero emissions economy and designing waste out of the system.	Make sustainable procurement part of government procurement practice.	Other	Implemented	Energy	CO_2	2019	Ministry of Business, Innovation and Employment	NE	NE	NE
Climate implications of policy assessment	Government agencies must do a greenhouse gas emissions analysis on certain policy proposals that go to Cabinet, so that Cabinet can make decisions informed of the impact on greenhouse gas emissions.	Measure, monitor and report on policy decisions that will impact New Zealand's greenhouse gas emissions.	Regulatory	Implemented	Energy, Transport, IPPU, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2019	Ministry for the Environment	NE	NE	NE

2.5 Projections of greenhouse gas emissions and removals

Key messages

The effects of New Zealand's main quantifiable policies and measures on its greenhouse gas emissions and removals are projected out to 2050.

New Zealand's gross emissions (excluding emissions and removals from the Land Use, Land-Use Change and Forestry (LULUCF) sector) reported in *New Zealand's Greenhouse Gas Inventory 1990–2022* (Inventory 2024) were 78.4 million tonnes of carbon dioxide equivalent (Mt CO_2e) in 2022.

New Zealand's gross emissions (excluding emissions and removals from the LULUCF sector) are projected to be 71.7 Mt CO_2e in 2030 and 62.9 Mt CO_2e in 2050.

New Zealand's net emissions (including emissions and removals from the LULUCF sector) reported in Inventory 2024 were 59.2 Mt CO_2e in 2022.

New Zealand's net emissions (including emissions and removals from the LULUCF sector) are projected to be 54.7 Mt CO_2e in 2030 and 34.0 Mt CO_2e in 2050.

Over the period to 2050, the largest projected decreases are expected from the Energy, Transport, and Industrial Processes and Product Use sectors. Agriculture emissions are projected to gradually decrease to 2035 and remain relatively stable out to 2050. Emissions from the Waste sector, having already decreased 20 per cent since 1990, are projected to gradually decline out to 2050.

The net emissions reported in section 2.5 are based on the full Land Use, Land-Use Change and Forestry sector. They are not used to account towards New Zealand's emissions reduction targets. See instead section 2.6 for projections that monitor progress towards New Zealand's first Nationally Determined Contribution.

2.5.1 Introduction

This section presents New Zealand's projected greenhouse gas (GHG) emissions and removals under two scenarios:

- 'with existing measures' (WEM) – currently implemented and adopted policies and measures
- 'without measures' (WOM) – excludes implemented, adopted and planned policies and measures.

A 'with additional measures' scenario is not included at this time. This was due to the timing of the second emissions reduction plan, which was published in December 2024.

The projections in this section do not measure progress towards New Zealand's first Nationally Determined Contribution (NDC1) under the Paris Agreement or New Zealand's domestic emissions targets and budgets.[175] This information is provided in section 2.6.

[175] New Zealand's domestic emissions targets and budgets do not include Tokelau's emissions.

The net emissions reported in section 2.5 are based on the full Land Use, Land-Use Change and Forestry (LULUCF) sector, known as LULUCF reporting. It includes carbon stock changes across all land uses as reported in New Zealand's Greenhouse Gas Inventory (the Inventory).

New Zealand's NDC1 applies accounting rules to the LULUCF sector (to derive LULUCF target accounting quantities). The accounting rules for the LULUCF sector quantify the emissions and removals that arise from the additional action that has occurred since 1990. LULUCF target accounting quantities are derived from forestry activities. Further information on New Zealand's LULUCF target accounting approach can be found in section 2.3 and annex 2. Projections of LULUCF target accounting quantities and net target accounting emissions are detailed in section 2.6.

Section 2.5.2 provides a summary of projections for total gross and net emissions under the WEM scenario from 1990 to 2050.

Section 2.5.3 provides details on the key assumptions, variables, policies and measures under the WEM scenario, and section 2.5.4 provides New Zealand's gross and net greenhouse emissions under the WEM scenario from 1990 to 2050 disaggregated by sector and gas type.

Section 2.5.5 provides details on the methodologies under the WEM scenario, including key cross-sectoral assumptions and variables, and the 'sector-based' and 'whole-of-economy' modelling approach used to develop the projections. Section 2.5.6 provides details of the sensitivity analyses performed under the WEM scenario.

Section 2.5.7 provides a summary of the WOM scenario, including gross and net emissions from 1990 to 2050 disaggregated by gas and sector. It includes details on the methodologies used for the WOM scenario.

The projections are calibrated against estimates reported in *New Zealand's Greenhouse Gas Inventory 1990–2022* (Inventory 2024),[176] alongside the historical and projected key assumptions driving the emissions scenarios. Projections of emissions and removals are produced on a sector-by-sector and whole-of-economy basis, by gas, and compiled by the Ministry for the Environment.

2.5.2 Summary of projections

2.5.2.1 Projected gross and net greenhouse gas emissions and removals, under the 'with existing measures' scenario

New Zealand's reported (historical) and projected gross and net GHG emissions are shown in figure 2.5.1.[177] The estimates for 1990 to 2022 are consistent with data reported in Inventory 2024. The estimates for 2023 to 2050 are projections, using the WEM scenario.

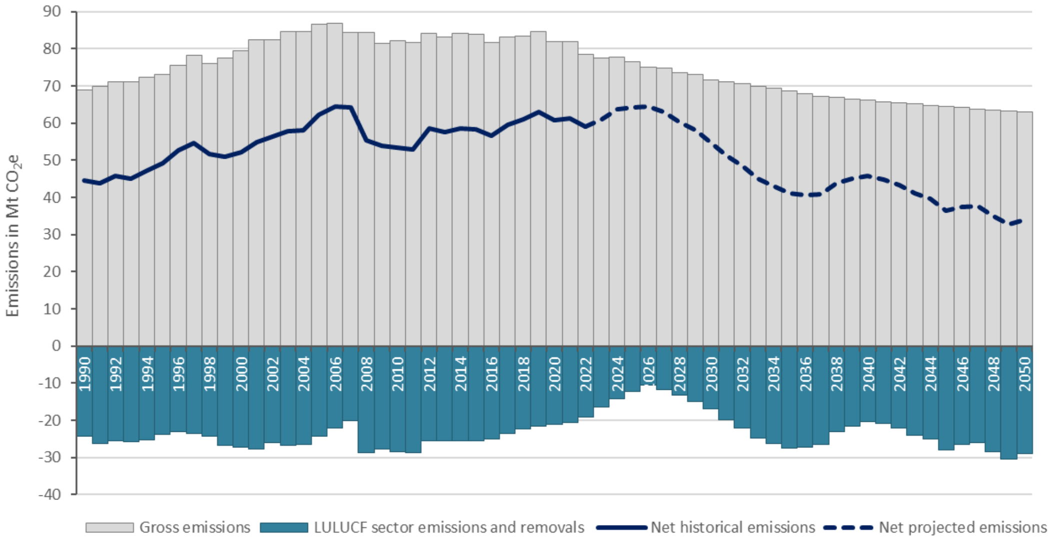
The WEM scenario quantifies the impacts of policies implemented and adopted by the Government at the time when modelling was undertaken. This includes the impacts of current

176 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

177 Gross emissions are New Zealand's total emissions from the Energy, Transport, Industrial Processes and Product Use, Agriculture, and Waste sectors as well as gross emissions from Tokelau. Net emissions are New Zealand's gross emissions plus net emissions from the Land Use, Land-Use Change and Forestry (LULUCF) sector.

legislation and any anticipated changes, while also taking account of the signalled strengthening of existing policies and measures (ie, any strengthening foreseen under current legislation).

Figure 2.5.1: New Zealand greenhouse gas emissions and removals under the 'with existing measures' scenario, 1990–2050



Note: LULUCF = Land Use, Land-Use Change and Forestry; Mt CO_2e = million tonnes of carbon dioxide equivalent.

2.5.2.1.1 Changes in gross emissions

New Zealand's gross emissions (excluding emissions and removals from the LULUCF sector) were reported as 69.0 million tonnes of carbon dioxide equivalent (Mt CO_2e) in 1990 and 78.4 Mt CO_2e in 2022 (13.7 per cent above 1990 levels).

New Zealand's gross emissions first exceeded 80.0 Mt CO_2e per year in 2001 and peaked in 2006 at 86.7 Mt CO_2e. Gross emissions declined moderately thereafter but remained above 80.0 Mt CO_2e per year until 2021. Gross emissions declined to below 80.0 Mt CO_2e in 2022 and were reported as 78.4 Mt CO_2e in that year.

Under the WEM scenario, gross emissions are projected to be 71.7 Mt CO_2e (3.9 per cent above 1990 levels) in 2030 and 62.9 Mt CO_2e (8.8 per cent below 1990 levels) in 2050. From 2035, gross emissions are projected to remain below 1990 levels.

Over the projected period to 2050, the largest decreases will likely occur in the Energy, Transport, and Industrial Processes and Product Use (IPPU) sectors. Agriculture emissions are projected to gradually decrease to 2035 and remain relatively stable out to 2050. Emissions from the Waste sector, having already decreased 20 per cent since 1990, are projected to gradually decline out to 2050.

These projections do not include the impact of new policies as part of the Government's ERP2. ERP2 projections, which include ERP2 policies and updated data, are projected to further reduce emissions by 5.2 Mt CO_2e over the 2021 to 2030 period compared with the WEM scenario.[178] Because this report and the ERP2 have been prepared in parallel, the impact of the ERP2 on emissions has not been included in this report. These will be fully reported in New Zealand's next Biennial Transparency Report.

[178] Note ERP2 projections for the LULUCF sector apply the same target accounting methodologies as NDC1.

The projections of gross emissions and net emissions (including emissions and removals from the LULUCF sector) are summarised by sector and gas in table 2.5.1 under the WEM scenario.

Table 2.5.1: New Zealand greenhouse gas emissions and removals under the 'with existing measures' scenario, 1990–2050 (Mt CO_2e)

	Historical							Projected					
	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Sector													
Energy	15.9	15.7	18.3	21.6	18.9	18.5	17.7	14.9	12.4	11.0	10.5	10.7	10.7
Transport	8.1	10.2	11.6	13.0	13.3	13.8	13.2	14.3	13.7	12.6	10.8	8.9	7.4
IPPU	3.48	3.17	3.47	4.01	4.50	4.94	4.48	4.23	3.11	3.03	2.91	2.92	2.83
Agriculture	37.1	39.2	41.2	43.1	41.0	42.8	42.9	39.6	39.1	38.8	38.7	38.8	38.8
LULUCF	–24.3	–23.7	–27.4	–24.3	–28.6	–25.6	–21.1	–12.2	–17.0	–27.4	–20.4	–27.9	–28.9
Waste	4.36	4.69	4.90	4.85	4.28	3.86	3.60	3.40	3.27	3.21	3.16	3.14	3.12
Tokelau	0.003	0.003	0.004	0.005	0.005	0.004	0.004	0.005	0.005	0.004	0.004	0.004	0.004
Gas, excluding net emissions from LULUCF sector													
CO_2	25.5	28.0	32.2	37.4	34.8	35.8	34.0	31.9	28.1	25.6	23.2	21.5	20.1
CH_4	37.5	39.0	40.8	41.5	39.5	39.7	39.0	36.3	35.4	35.1	35.1	35.1	35.1
N_2O	5.1	5.8	6.2	6.9	6.7	7.1	7.4	7.1	7.0	6.9	6.9	6.9	6.9
HFCs	0.00	0.03	0.23	0.65	1.01	1.20	1.34	1.13	1.04	0.96	0.83	0.84	0.75
PFCs	0.82	0.14	0.08	0.06	0.04	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05
SF_6	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Gas, including net emissions from LULUCF sector													
CO_2	0.8	3.8	4.4	12.7	5.8	9.9	12.6	19.4	10.8	-2.2	2.5	-6.7	-9.1
CH_4	37.6	39.1	40.9	41.6	39.6	39.8	39.1	36.3	35.5	35.2	35.2	35.2	35.1
N_2O	5.4	6.2	6.5	7.3	7.0	7.4	7.6	7.4	7.3	7.2	7.2	7.2	7.1
HFCs	0.00	0.03	0.23	0.65	1.01	1.20	1.34	1.13	1.04	0.96	0.83	0.84	0.75
PFCs	0.82	0.14	0.08	0.06	0.04	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05
SF_6	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Total excl LULUCF	**69.0**	**73.0**	**79.5**	**86.6**	**82.1**	**83.9**	**81.9**	**76.5**	**71.7**	**68.6**	**66.1**	**64.4**	**62.9**
Total incl LULUCF	**44.6**	**49.3**	**52.2**	**62.4**	**53.5**	**58.3**	**60.8**	**64.3**	**54.7**	**41.2**	**45.7**	**36.5**	**34.0**

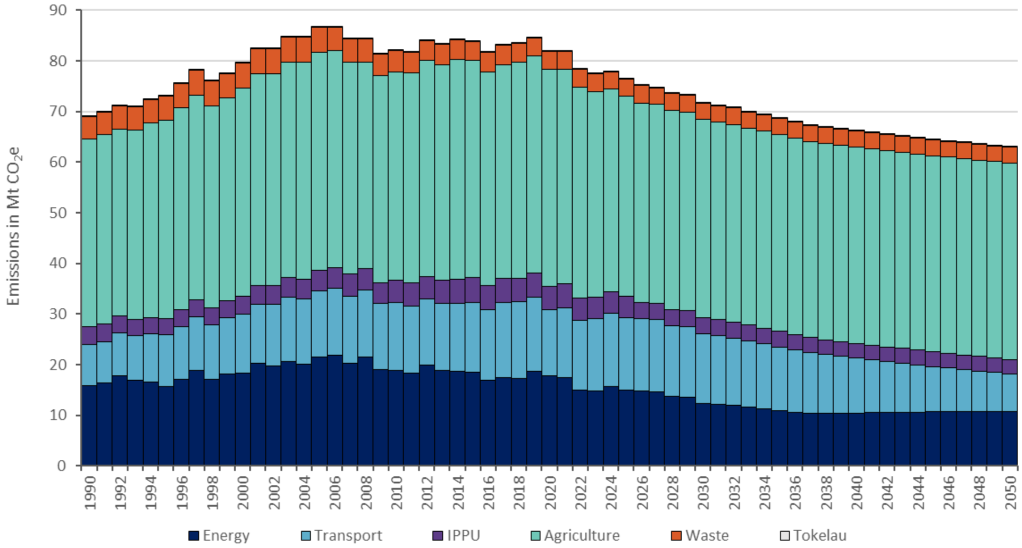
Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; IPPU = Industrial Processes and Product Use; LULUCF = Land Use, Land-Use Change and Forestry; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

Figure 2.5.2 shows New Zealand's gross GHG emissions by sector, using the WEM scenario. Figure 2.5.3 shows the same information in percentage terms.

New Zealand's gross emissions profile by sector is dominated by emissions from the Agriculture sector. Agriculture accounted for 54 per cent of gross emissions in 1990 and 53 per cent of gross emissions in 2022. Between 1990 and 2022, the proportion of emissions from the Energy sector declined, while those from the Transport sector increased. Details of trends for each sector are provided in section 2.5.4 and details of emissions projections sensitivities for each sector are provided in section 2.5.6.

Over the projected period to 2050, the proportions of gross emissions from the Energy and Transport sectors are expected to decline, which results in the Agriculture sector growing to 62 per cent of gross emissions by 2050 despite its absolute emissions decreasing.

Figure 2.5.2: Greenhouse gas emissions by sector under the 'with existing measures' scenario for gross emissions (total without LULUCF), 1990–2050



Note: IPPU = Industrial Processes and Product Use; Mt CO_2e = million tonnes of carbon dioxide equivalent.

Figure 2.5.3: Proportion of greenhouse gas emissions by sector under the 'with existing measures' scenario for gross emissions (total without LULUCF), 1990–2050

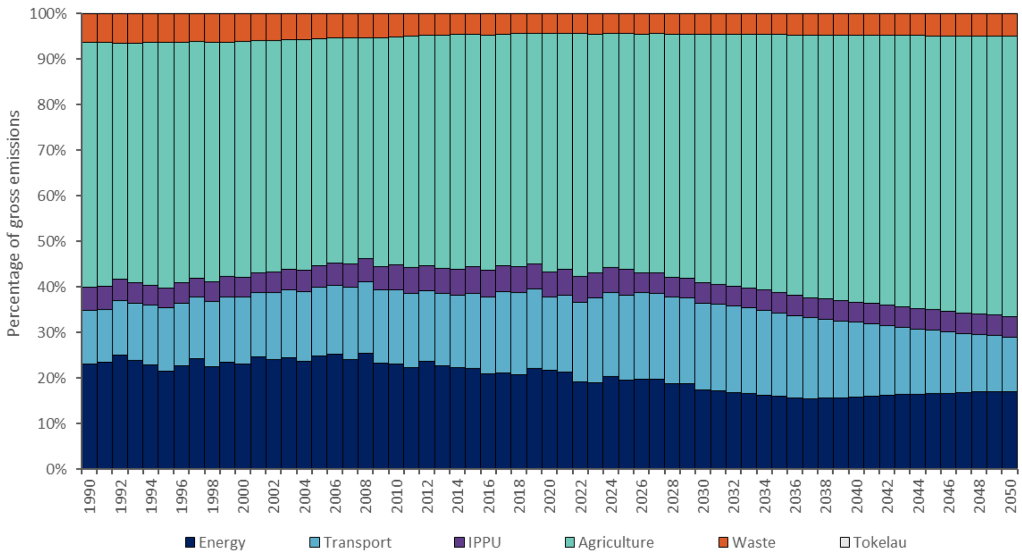
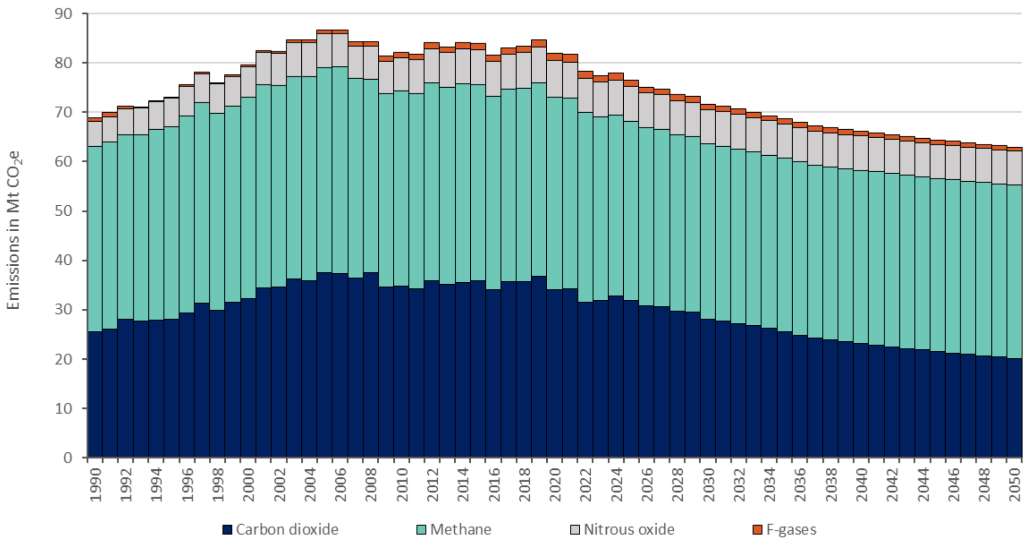


Figure 2.5.4 shows New Zealand's gross GHG emissions by gas under the WEM scenario. Figure 2.5.5 shows the same information in percentage terms. With the dominance of emissions from the Agriculture sector, methane (CH_4) makes up the largest proportion of gas emissions.

In 1990, carbon dioxide (CO_2) emissions were 25.5 Mt CO_2e (37.0 per cent of gross emissions) and CH_4 emissions were 37.5 Mt CO_2e (54.4 per cent of gross emissions). By 2022, CO_2 emissions were 31.6 Mt (40.3 per cent of gross emissions) and CH_4 emissions were 38.3 Mt CO_2e (48.9 per cent of gross emissions).

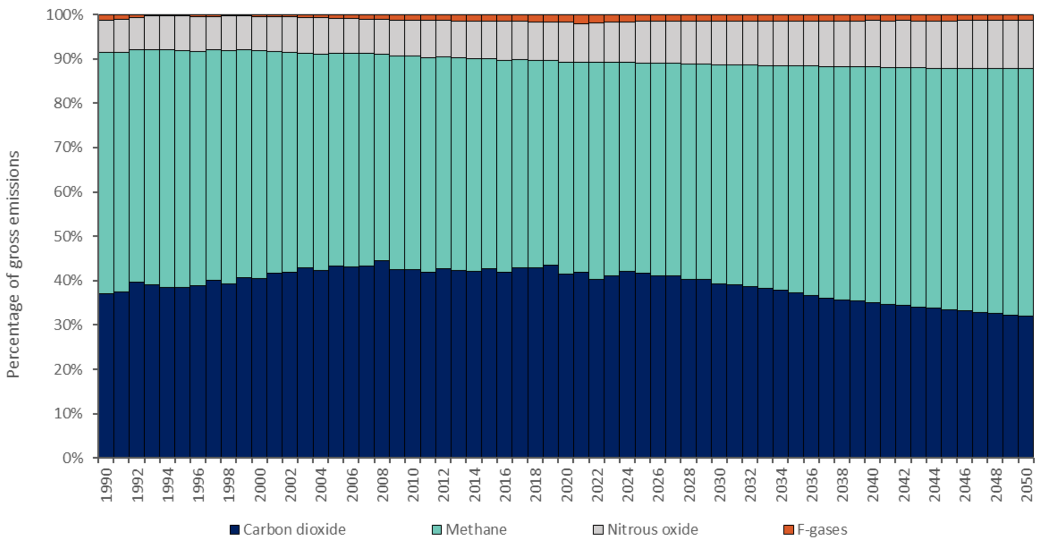
Over the projected period to 2050, CH_4 becomes more dominant in the gas profile. Carbon dioxide is expected to reduce by 11.5 Mt CO_2e to 20.1 Mt CO_2e in 2050 (32.0 per cent of gross emissions) while CH_4 reduces by 3.3 Mt CO_2e to 35.1 Mt CO_2e in 2050 (55.8 per cent of gross emissions).

Figure 2.5.4: Greenhouse gas emissions by gas under the 'with existing measures' scenario for gross emissions (total without LULUCF), 1990–2050



Note: F-gases = fluorinated gases; Mt CO_2e = million tonnes of carbon dioxide equivalent.

Figure 2.5.5: Proportion of greenhouse gas emissions by gas under the 'with existing measures' scenario for gross emissions (total without LULUCF), 1990–2050



Note: F-gases = fluorinated gases.

2.5.2.1.2 Changes in net emissions

In this section, net emissions are calculated and presented as gross emissions plus net emissions from the LULUCF sector. Net emissions from the LULUCF sector include the emissions and removals occurring in all land-use types.

Accounting rules are applied to the LULUCF sector for tracking and meeting emissions reduction targets. Section 2.6 provides the LULUCF target accounting quantities that are derived by applying accounting rules to the LULUCF sector and used for tracking progress against New Zealand's emission reduction target for NDC1.

New Zealand's net emissions (including emissions and removals from the LULUCF sector) were reported as 44.6 Mt CO_2e in 1990 and 59.2 Mt CO_2e in 2022 (32.5 per cent above 1990 levels).

Under the WEM scenario, New Zealand's net emissions (including emissions and removals from the LULUCF sector) are projected to be 54.7 Mt CO_2e (22.5 per cent above 1990 levels) in 2030 and 34.0 Mt CO_2e (23.7 per cent below 1990 levels) in 2050 (table 2.5.1). Trends in net emissions are strongly influenced by the harvest and growth cycles of New Zealand's exotic production forests.

2.5.3 Key assumptions and variables

2.5.3.1 Policies and measures considered under the 'with existing measures' scenario

Table 2.5.2 shows the policies and measures included in the WEM scenario and table 2.5.3 shows key cross-sector assumptions.

Table 2.5.2: Policies and measures included in the 'with existing measures' scenario

Policy or measure	Timeframe modelled	Sector	Notes on 'sector-based' emissions modelling
New Zealand Emissions Trading Scheme (NZ ETS)	2010–50	Energy	NZ ETS price added to fuel costs for demand and generation modelling.
Electrify NZ	2025–50	Energy	Electrify NZ contains initiatives to support doubling renewable energy by 2050. We currently model reduction in consenting costs for plants not yet consented.
Government Investment in Decarbonising Industry	2020–50	Energy	This fund helped businesses with the upfront capital costs of energy efficiency initiatives as well as switching from fossil fuels to renewables to accelerate their decarbonisation goals. The fund is now closed but impacts remain.
National Direction on Greenhouse Gases – Industrial process heat	2023–50	Energy	Policy direction to phase out coal use for low- to medium-temperature process heat by 2037.
Clean Car Discount Scheme	2021–23	Transport	This policy is no longer in place.
Clean Car Standard	2023–40	Transport	The standard was reviewed in 2024 and the revised settings will be applied from 2025.
Road user charges exemptions for electric vehicles	2021–24 for light electric vehicles (EVs) 2021–25 for heavy EVs	Transport	The road user charges exemption on light EVs ceased from 31 March 2024.
Public transport bus decarbonisation	2021–35	Transport	–

Policy or measure	Timeframe modelled	Sector	Notes on 'sector-based' emissions modelling
NZ ETS	2021–50	Transport	The NZ ETS is incorporated into transport fuel costs. Its impact on gross transport emissions is estimated through its effects on EV uptake and travel demand.
NZ ETS	2023–50	Agriculture	The impact of the NZ ETS price is entirely based on the impact of the NZ ETS on forestry (ie, the incentive to afforest under the NZ ETS), and the resulting land-use change from agriculture to forestry land use.
Other forestry programmes	1990–2027	Agriculture	Includes: direct grants and partnerships (eg, One Billion Trees Programme[179]), joint ventures, Afforestation Grant Scheme, Hill Country Erosion Programme, Permanent Forest Sink Initiative and the Erosion Control Funding Programme.
Regulations to manage freshwater introduced under the Essential Freshwater package	2028–38	Agriculture	The impacts on agricultural emissions resulting from this package include: reductions in dairy area to reduce nitrogen pollution; reductions in the use of nitrogen fertiliser; and setback requirements to exclude stock from rivers.
Cap on synthetic nitrogen fertilisers	2028–38	Agriculture	A cap on the use of synthetic nitrogen fertiliser applied on any contiguous parcel of pastoral land, of 190 kilogram per hectare per year. The modelling accounts for overlap between the Essential Freshwater package and the cap on synthetic nitrogen fertiliser.
National Environmental Standard for Air Quality (landfill methane)	2004–50	Waste	–
Waste disposal levy	2004–50	Waste	The waste disposal levy rate for landfills has progressively increased and expanded and is reflected in the modelling. This is modelled as $10 per tonne for landfills that receive household waste, set in 2009, to $60 per tonne as of July 2024 further increasing to $75 in 2027.
Food waste reduction (behaviour change)	2023–26	Waste	–
Wood waste reduction and diversion	2004–50	Waste	–
Permitting scheme for imports and exports of bulk hydrofluorocarbons	2020–50	Industrial Processes and Product Use (IPPU)	The relative effect of the three key synthetic greenhouse gas policies is modelled based on a wide range of stakeholder opinions on their relative contributions to historical and future abatement. The implementation of the Kigali Amendment to the Montreal Protocol will increase in importance from 2030 to 2033 then become the dominant factor (as NZ ETS prices decrease in importance) from 2034 to 2040.

179 Ministry for Primary Industries. *One Billion Trees Programme*. Retrieved 28 November 2024.

Policy or measure	Timeframe modelled	Sector	Notes on 'sector-based' emissions modelling
Voluntary product stewardship scheme for refrigerants	2010–50	IPPU	The relative effect of the three key synthetic greenhouse gas policies is modelled based on a wide range of stakeholder opinions on their relative contributions to historical and future abatement. It is assumed that once industry standard practices are well established, the scheme will become the dominant policy contribution from 2041 to 2050.
NZ ETS	2008–50	IPPU	The relative effect of the three key synthetic greenhouse gas policies is modelled based on a wide range of stakeholder opinions on their relative contributions to historical and future abatement. The NZ ETS price is likely to continue to be the dominant policy until 2030. The threat of high NZ ETS prices is one of the major factors driving current conversions to low global warming potential technologies.

2.5.3.2 Key cross-sector assumptions

Table 2.5.3: Summary of key cross-sector assumptions for modelling New Zealand's greenhouse gas emissions projections, 1990–2050

Key assumptions and scenarios		Historical							Projections					
		1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Population million people	WEM	3.5	3.7	3.9	4.1	4.3	4.6	5.1	5.2	5.4	5.6	5.8	6.0	6.1
	Low	3.5	3.7	3.9	4.1	4.3	4.6	5.1	5.1	5.2	5.3	5.4	5.5	5.5
	High	3.5	3.7	3.9	4.1	4.3	4.6	5.1	5.3	5.6	5.9	6.2	6.5	6.7
GDP billion real 2009/ 10 $NZ	WEM	113	130	152	184	197	226	255	293	325	342	355	364	371
	Low	113	130	152	184	197	226	255	293	332	360	385	409	431
	High	113	130	152	184	197	226	255	293	339	381	420	459	498
Effective carbon price[180] $NZ tonne CO_2e	WEM					19.12	6.72	30.58	67.80	67.86	50.00	50.00	50.00	50.00
	Low					19.12	6.72	30.58	58.33	46.67	35.00	35.00	35.00	35.00
	High					19.12	6.72	30.58	65.80	70.00	70.00	70.00	70.00	70.00

Note: CO_2e = carbon dioxide equivalent; GDP = gross domestic product; WEM = with existing measures.

180 The New Zealand Emissions Trading Scheme was established in 2008.

2.5.4 Emissions projections by sector, under the 'with existing measures' scenario

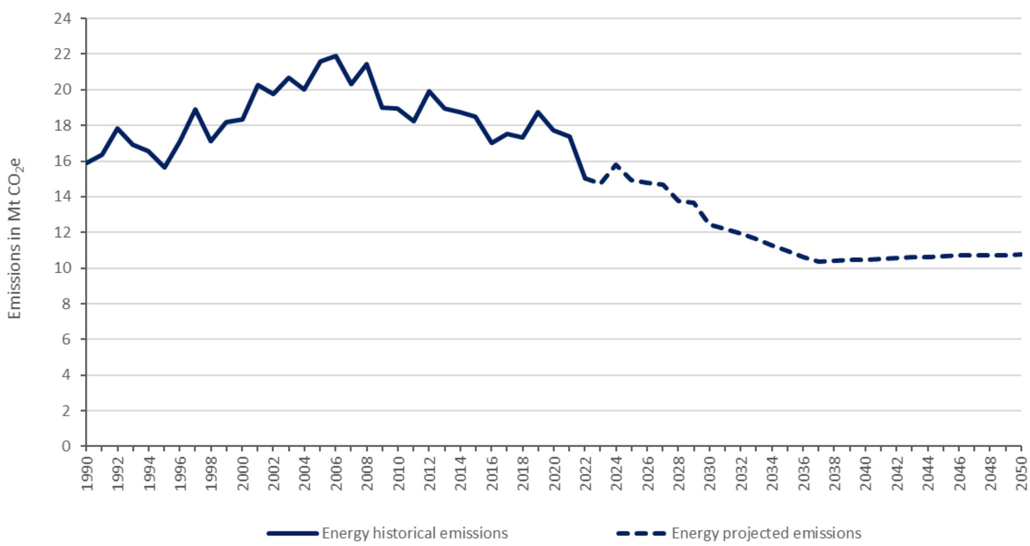
2.5.4.1 Energy (excluding transport)[181]

New Zealand's non-transport energy emissions were mostly from industrial activities (40.7 per cent) and electricity generation (27.3 per cent) in 2022. Most of New Zealand's electricity is generated from renewable sources, mainly hydro generation. However, this means gas and coal generation are often required to provide backup when rainfall levels are low, which can lead to high variance in results if dry or wet years occur.

Energy emissions are expected to fall over time (see figure 2.5.6). Compared with 2005, energy emissions are expected to be 42.5 per cent lower in 2030. This is driven by an assumption of electrification of some existing fossil fuel processes and the retirement of some important thermal plants and large industrial users. Domestic natural gas supply is also falling, and so current gas demand levels are not sustainable, which will lead to further falls in emissions. However, an expectation of reduced rainfall means emissions may rise above recent historic levels in the short term, due to an increase in coal use for electricity generation.

New generation build is mostly onshore wind and solar farms. These will partially meet growing electricity demand but also displace some thermal baseload generation. For example, the Taranaki Combined Cycle Power Station is anticipated to close at the end of 2024. However, gas and coal generation will still be required for electricity grid stability, particularly in dry years, for the foreseeable future.

Figure 2.5.6: Greenhouse gas emissions under the 'with existing measures' scenario in the Energy (excluding Transport) sector, 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

181 Emissions projections for the Energy sector only include non-transport energy. Transport energy emissions are accounted for in the Transport sector. This is due to the roles and responsibilities different government agencies have in developing emissions projections.

New Zealand's historical and projected non-transport Energy sector emissions (excluding transport) by gas are given in table 2.5.4.

Table 2.5.4: Historical and projected non-transport Energy sector emissions by gas under the 'with existing measures' scenario, 1990–2050 (Mt CO_2e)

	Historical							Projected					
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
CO_2	14.6	14.4	17.0	20.2	17.3	17.5	17.0	14.2	11.9	10.4	10.0	10.2	10.2
CH_4	1.2	1.1	1.3	1.2	1.5	0.9	0.6	0.6	0.5	0.5	0.4	0.4	0.4
N_2O	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	**15.9**	**15.7**	**18.3**	**21.6**	**18.9**	**18.5**	**17.7**	**14.9**	**12.4**	**11.0**	**10.5**	**10.7**	**10.7**

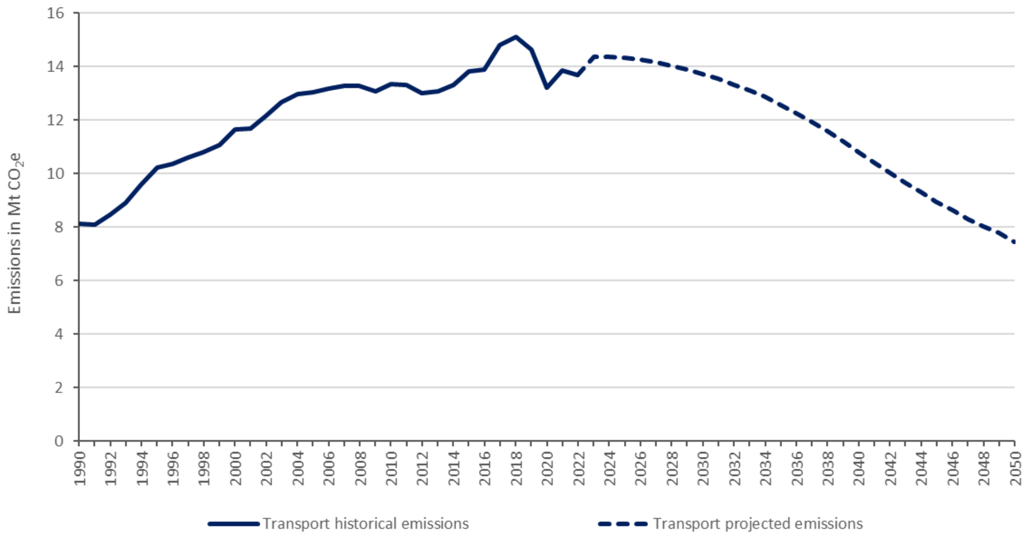
Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.4.2 Transport

In New Zealand, GHG emissions from domestic transport are dominated by road transport (91 per cent in 2022), followed by domestic aviation (7.5 per cent in 2022), with emissions from rail, domestic navigation (coastal shipping) and other transport modes representing less than 2 per cent in the same year.

In the WEM scenario, domestic transport emissions are projected to peak around 2024 and then decline over time (see figure 2.5.7). Compared with 2005, transport emissions are expected to be around 5 per cent higher in 2030. The main drivers for the emissions decrease include the increasing uptake of zero- or low-emissions vehicles and continuous improvements in the fuel efficiency of internal combustion engine vehicles.

Figure 2.5.7: Greenhouse gas emissions under the 'with existing measures' scenario in the Transport sector, 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

New Zealand's historical and projected Transport sector emissions by gas are given in table 2.5.5.

Table 2.5.5: Historical and projected Transport sector emissions by gas under the 'with existing measures' scenario, 1990–2050 (Mt CO_2e)

	Historical							Projected					
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	7.9	10.0	11.4	12.8	13.1	13.6	13.1	14.2	13.6	12.5	10.7	8.9	7.4
CH_4	0.09	0.08	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01
N_2O	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	**8.1**	**10.2**	**11.6**	**13.0**	**13.3**	**13.8**	**13.2**	**14.3**	**13.7**	**12.6**	**10.8**	**8.9**	**7.4**

Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.4.3 Industrial Processes and Product Use

In New Zealand, CO_2 emissions from IPPU result mainly from the manufacture of iron, steel, aluminium, urea, cement, lime and hydrogen, as well as from the production of methanol. Large-scale manufacturing in New Zealand is dominated by a small number of firms. As a result, projections from these sources are subject to an unusually high degree of variability because small changes in one firm (or a closure) will significantly affect total IPPU emissions. Many of these industries are assumed to be at or near production capacity, so their emissions are projected to remain constant unless a closure date for a particular site is assumed.

Based on the WEM scenario, emissions from the IPPU sector are projected to generally steadily decrease from 4,316 kilotonnes (kt) CO_2e in 2024 to 2,829 kt CO_2e in 2050 (see figure 2.5.8). Compared with 2005, IPPU emissions are expected to be 22.3 per cent lower in 2030. A steep decrease in emissions is evident from the end of 2025 due to the projected installation of an electric arc furnace at the Glenbrook steel smelter. The only aluminium smelter in New Zealand is assumed to operate through to 2050.

The emissions from methanol production are expected to step down to zero between 2028 and 2030 because all methanol production facilities are anticipated to be closed by 2029. The emissions from sulphur hexafluoride and nitrous oxide are expected to remain steady at low levels out to 2050.

Hydrofluorocarbon (HFC) emissions are expected to have reached a peak level at around 1,585 kt CO_2 in 2021. Starting in 2025, HFC emissions are expected to steadily decline, reaching 1,038 kt CO_2e in 2030 and 754 kt CO_2e in 2050. The use of HFCs has grown rapidly since the early 1990s when they replaced chlorofluorocarbons, which are being phased out under the Montreal Protocol. The phase-down of HFC consumption in New Zealand is expected to reduce HFC emissions, in line with the Kigali Amendment to the Montreal Protocol (Kigali Amendment).[182] The HFC phase-down, likely along with an NZ ETS price increase, has already started to affect HFC consumption. Note that New Zealand's ratification of the Kigali Amendment does not extend to Tokelau.[183]

Emissions of nitrogen trifluoride do not occur in New Zealand, because the industries that could be potential sources of the gas do not exist in the country and no nitrogen trifluoride is imported.

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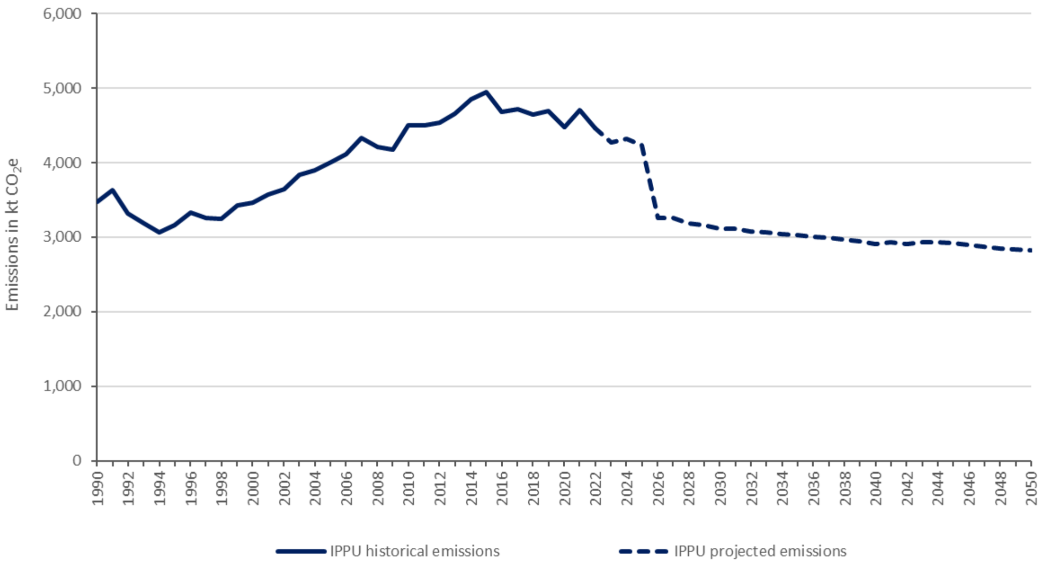
182 Ministry for the Environment. nd. *Kigali Amendment to the Montreal Protocol*. Retrieved 22 November 2022.

183 United Nations. 3 October 2019. *Amendment to the Montreal Protocol on substances that deplete the ozone layer, New Zealand: Territorial exclusion in respect of Tokelau*. Retrieved 5 November 2019.

Figure 2.5.8: Greenhouse gas emissions under the 'with existing measures' scenario in the IPPU sector, 1990–2050



Note: IPPU = Industrial Processes and Product Use; kt CO_2e = kilotonnes of carbon dioxide equivalent.

New Zealand's historical and projected IPPU sector emissions by gas are presented in table 2.5.6.

Table 2.5.6: Historical and projected IPPU emissions by gas under the 'with existing measures' scenario, 1990–2050 (kt CO_2e)

	Historical						
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
CO_2	2,520	2,814	2,922	3,209	3,319	3,503	2,868
CH_4	31	89	155	22	53	120	108
N_2O	89	70	55	40	48	53	66
HFCs	0	29	231	649	1,010	1,198	1,343
PFCs	818	139	85	62	43	53	79
SF_6	21	25	20	26	24	17	17
NF_3	NA	NA	NA	NA	NA	NA	NA
Total	**3,478**	**3,166**	**3,468**	**4,008**	**4,497**	**4,943**	**4,480**

	Projections					
Gas	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	2,834	1,895	1,895	1,895	1,895	1,895
CH_4	100	0	0	0	0	0
N_2O	98	109	109	109	109	109
HFCs	1,129	1,038	958	834	843	754
PFCs	47	47	47	47	47	47
SF_6	20	22	22	22	22	22
NF_3	NA	NA	NA	NA	NA	NA
Total	**4,230**	**3,113**	**3,032**	**2,908**	**2,917**	**2,829**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs hydrofluorocarbons; NA = not applicable; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

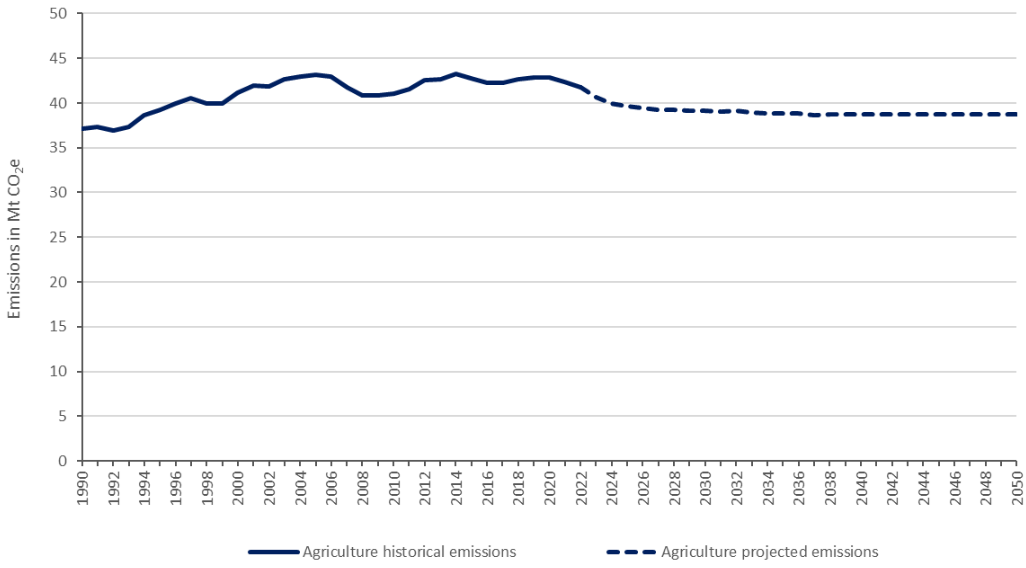
2.5.4.4 Agriculture

Enteric fermentation is the main source of emissions from the Agriculture sector, contributing 78.2 per cent of the sector's emissions in 2022. Agricultural soils (15.2 per cent in 2022) are the second-largest source followed by manure management (4.6 per cent in 2022). Urea application and liming contributed 1.0 per cent and 1.1 per cent in 2022 respectively.

Under the WEM scenario, total agricultural emissions are expected to reduce in the near term (from 2022), with emissions stabilising after 2030. Total agriculture emissions are projected to decrease from the 2022 value by 6.1 per cent by 2030 and 7.1 per cent by 2050. Compared with 2005, agricultural emissions are expected to fall 9.2 per cent by 2030, and reach a maximum reduction of 10 per cent in 2037, then remain relatively stable until 2050 (see figure 2.5.9).

The decline in agricultural emissions out to 2030 is largely associated with a decline in animal numbers due to land-use change, mainly to forestry. This predominantly affects sheep, beef cattle, and deer populations. From 2030 onwards, the uptake of on-farm mitigation technologies starts to have a measurable (but relatively small) effect because various technologies are assumed to become available near 2030. In the long term, the effect of land-use change and mitigation technologies is largely offset by the projected continuation of improving meat and dairy productivity per animal, which results in more emissions per animal.

Figure 2.5.9: Greenhouse gas emissions under the 'with existing measures' scenario in the Agriculture sector, 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

New Zealand's historical and projected Agriculture sector emissions by gas are presented in table 2.5.7.

Table 2.5.7: Historical and projected Agriculture sector emissions by gas under the 'with existing measures' scenario, 1990–2050 (Mt CO_2e)

	Historical							Projected					
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	0.3	0.6	0.8	1.1	1.0	1.1	1.0	0.6	0.7	0.7	0.5	0.5	0.5
CH_4	32.1	33.2	34.7	35.6	33.8	35.1	35.0	32.3	31.9	31.7	31.7	31.7	31.8
N_2O	4.7	5.4	5.7	6.5	6.3	6.7	7.0	6.7	6.6	6.5	6.5	6.5	6.5
Total	**37.1**	**39.2**	**41.2**	**43.1**	**41.0**	**42.8**	**42.9**	**39.6**	**39.1**	**38.8**	**38.7**	**38.8**	**38.8**

Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.4.5 Waste

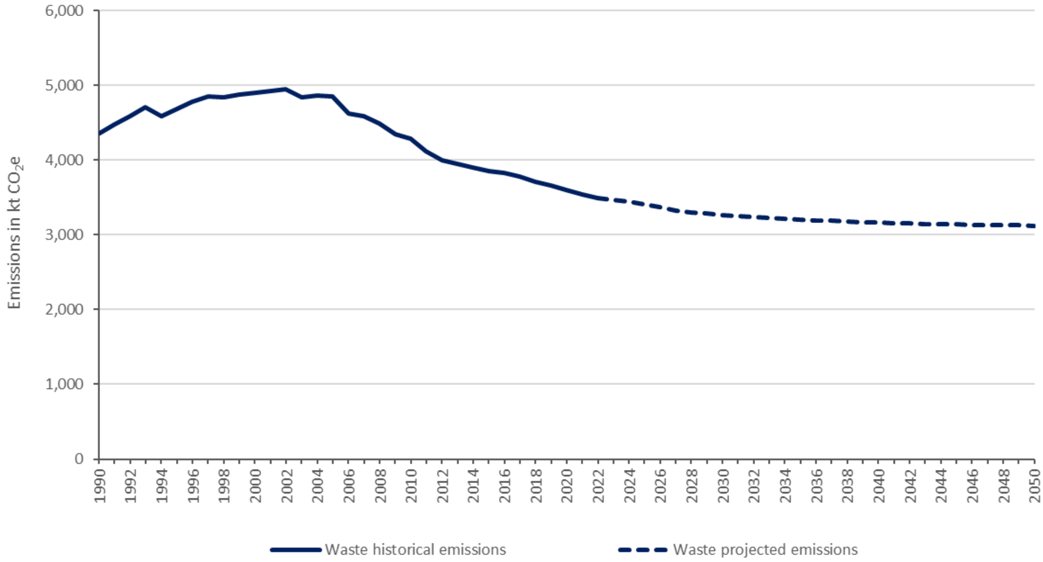
Emissions from the Waste sector are projected to decrease to 3,266 kt CO_2e by 2030 (32.6 per cent below 2005 levels) and to 3,124 kt CO_2e by 2050 (10.6 per cent below 2022 levels) (see figure 2.5.10). Figure 2.5.10 presents historical GHG emissions from 1990 to 2022 and projected GHG emissions from 2023 to 2050 for the Waste sector.

Most waste emissions are CH_4 emissions resulting from the disposal of solid waste to landfill, averaging 81.9 per cent across the 1990 to 2050 time series. Due to the increasing use of landfill gas capture, particularly since this became mandatory for certain landfills under the National Environmental Standard for Air Quality,[184] net emissions from landfills and the Waste sector peaked around 2002. The changing composition of waste, notably a reduction in the proportion of food and paper waste to landfill, offsets projected increases in waste volumes, resulting in a slightly decreasing trend to 2035.

The remaining 18.1 per cent of emissions in the Waste sector consist of CO_2 and N_2O, originating from the following sources in decreasing order of contribution: domestic wastewater, open burning, industrial wastewater, composting, incineration and anaerobic digestion. Carbon dioxide emissions, primarily from open burning, are projected to show a slight and gradual decrease from 2022 to 2050. Methane emissions are expected to steadily decline between 2022 and 2050. Nitrous oxide emissions are anticipated to increase over the same period, mainly due to rising wastewater emissions from a growing population, with additional contributions from increased composting activities.

184 Parliamentary Council Office. 2004. Resource Management (National Environmental Standards for Air Quality) Regulations 2004. Retrieved 29 November 2024.

Figure 2.5.10: Greenhouse gas emissions under the 'with existing measures' scenario in the Waste sector, 1990–2050



Note: kt CO_2e = kilotonnes of carbon dioxide equivalent.

New Zealand's historical and projected Waste sector emissions by gas are given in table 2.5.8.

Table 2.5.8: Historical and projected emissions from waste by gas, under a 'with existing measures' scenario, 1990–2050 (kt CO_2e)

	Historical							Projected					
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
CO_2	154	132	145	116	105	97	87	82	80	79	78	76	76
CH_4	4,103	4,449	4,645	4,620	4,061	3,627	3,368	3,167	3,024	2,961	2,917	2,889	2,873
N_2O	100	104	114	112	116	131	149	154	162	165	169	172	176
Total	**4,357**	**4,685**	**4,905**	**4,848**	**4,282**	**3,855**	**3,603**	**3,403**	**3,266**	**3,205**	**3,163**	**3,137**	**3,124**

Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.4.6 Tokelau

On 13 November 2017, New Zealand extended its ratification of the United Nations Framework Convention on Climate Change and the Paris Agreement to include Tokelau. Emissions estimates for Tokelau have been included in the Inventory since 2019.

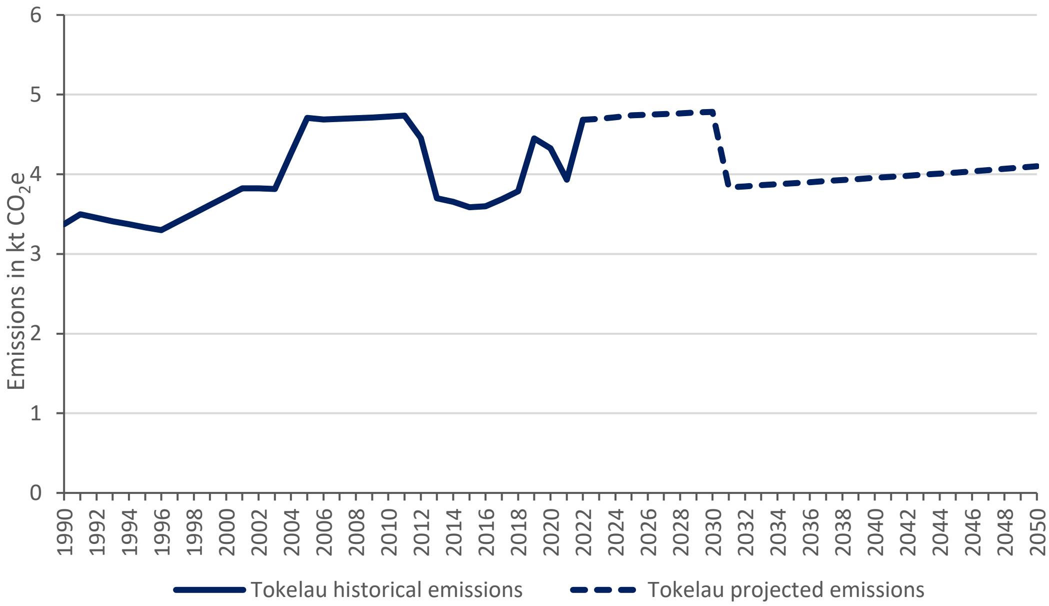
Including and refining Tokelau's emissions projections has been carried out in an iterative manner through a continuous improvement process. As with inventory reporting, this requires building expert capacity in the various small government departments and organisations in Tokelau that participate in decision-making, data collection and processing.

Tokelau's historical and projected gross GHG emissions are shown in figure 2.5.11.

Between 1990 and 2022, Tokelau's total emissions increased by 38.9 per cent, from 3.37 kt CO_2e to 4.69 kt CO_2e. The main contributors to this increase were domestic navigation and electricity generation. The changes in domestic navigation are a result of Tokelau gaining ownership and use of the ferry *Mataliki* in 2016, cargo vessel *Kalopaga* in 2018 and *Fetu o te Moana* in 2019, leading to an increasing number of sea voyages between the atolls, which increased transport emissions.

Tokelau's transport emissions reduced in 2020 but are expected to increase at a similar rate as that seen before 2018. It is assumed that solar power will be again fully operational by 2030, which explains the drop in emissions. Figure 2.5.11 presents historical and projected GHG emissions for Tokelau.

Figure 2.5.11: Greenhouse gas emissions under the 'with existing measures' scenario in Tokelau, 1990–2050



Note: Kt CO_2e = kilotonnes of carbon dioxide equivalent.

In 2030, total emissions from Tokelau are projected to be 4.78 kt CO_2e (1.4 per cent higher than in 2005) and 4.10 kt CO_2e in 2050 (13 per cent lower than 2005).

Tokelau's historical and projected gross GHG emissions by gas are presented in table 2.5.9.

Emissions of perfluorocarbons (PFCs), sulphur hexafluoride and nitrogen trifluoride are not occurring in Tokelau.

Table 2.5.9: Tokelau's gross greenhouse gas emissions by gas, 1990–2050 (kt CO_2e)

	Historical							Projected					
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
CO_2	1.30	1.38	1.45	2.45	2.52	1.63	2.42	2.85	2.93	2.07	2.18	2.28	2.38
CH_4	2.00	1.89	2.19	2.16	2.03	1.72	1.65	1.66	1.66	1.65	1.66	1.66	1.66
N_2O	0.08	0.06	0.05	0.03	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04
HFCs	0.00	0.01	0.03	0.07	0.14	0.20	0.21	0.19	0.15	0.12	0.08	0.05	0.02
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total	**3.37**	**3.33**	**3.72**	**4.71**	**4.72**	**3.58**	**4.33**	**4.74**	**4.78**	**3.88**	**3.96**	**4.03**	**4.10**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs hydrofluorocarbons; NO = not occurring; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

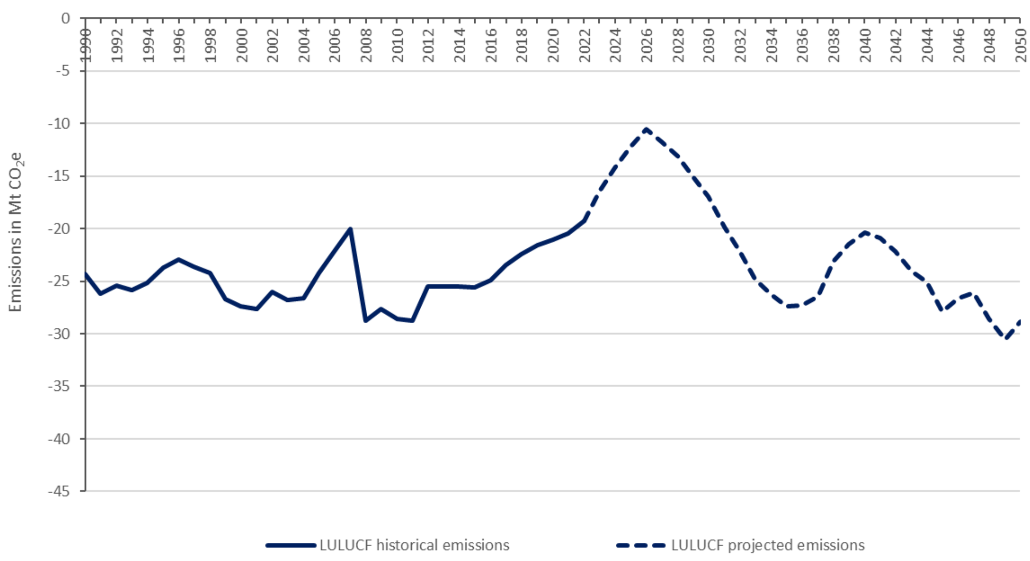
2.5.4.7 Land Use, Land-Use Change and Forestry

The net emissions reported under New Zealand's LULUCF sector are significantly influenced by New Zealand's planted forest age-class profile and harvesting rates (see figure 2.5.12). New Zealand has undergone three periods of significant afforestation and reforestation, most of which have been for the production of timber. The subsequent growth, harvest and replanting cycles of these production forests have affected the net emissions profile and will continue to do so into the future.

New Zealand's LULUCF sector is currently a net sink of GHG emissions. In 2005, the LULUCF sector contributed –24.3 Mt CO_2e of net emissions, compared with –17 Mt CO_2e projected in 2030 (table 2.5.10). The main reason for the increase in emissions from 2010 is an increase in forest harvesting of New Zealand's sustainable production forests. See Inventory 2024 for a more detailed explanation of the change.[185]

Net emissions in New Zealand's LULUCF sector are projected to continue to increase until the mid-2020s as plantation forests established in the late 1980s and early 1990s continue to be harvested for timber. However, the LULUCF sector is expected to see that trend reverse in the late 2020s as the growth from the replanted forests following harvest accelerates, harvest rates decline and the additional sequestration from recent and projected afforestation activities increases.

Figure 2.5.12: Greenhouse gas emissions under the 'with existing measures' scenario in the LULUCF sector, 1990–2050



Note: LULUCF = Land Use, Land-Use Change and Forestry; Mt CO_2e = million tonnes of carbon dioxide equivalent.

185 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment, section 6.1. Retrieved 23 August 2024.

Table 2.5.10: Historical and projected LULUCF sector emissions and removals by gas under the 'with existing measures' scenario, 1990–2050 (Mt CO_2e)

	Historical							Projected					
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	–24.7	–24.2	–27.8	–24.7	–29.0	–25.9	–21.4	–12.5	–17.3	–27.7	–20.7	–28.2	–29.2
CH_4	0.08	0.09	0.08	0.12	0.10	0.09	0.10	0.07	0.07	0.07	0.07	0.07	0.07
N_2O	0.29	0.34	0.36	0.35	0.31	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	**–24.3**	**–23.7**	**–27.4**	**–24.3**	**–28.6**	**–25.6**	**–21.1**	**–12.2**	**–17.0**	**–27.4**	**–20.4**	**–27.9**	**–28.9**

Note: Net emissions expressed as negatives (–) represent the amount of carbon dioxide equivalent that is removed from the atmosphere, while emissions expressed as positives represent emissions to the atmosphere. CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide. Totals may not add up due to rounding.

2.5.5 Methodologies for the 'with existing measures' scenario

2.5.5.1 Overview of 'with existing measures' modelling approach

New Zealand uses two types of models to project GHG emissions:

- 'sector-based' emissions models, which, for some sectors, are extensions of models used for the Inventory
- the 'Emissions in New Zealand' (ENZ) model, which is a bottom-up 'whole-of-economy' model that includes data to represent individual industries and technologies.

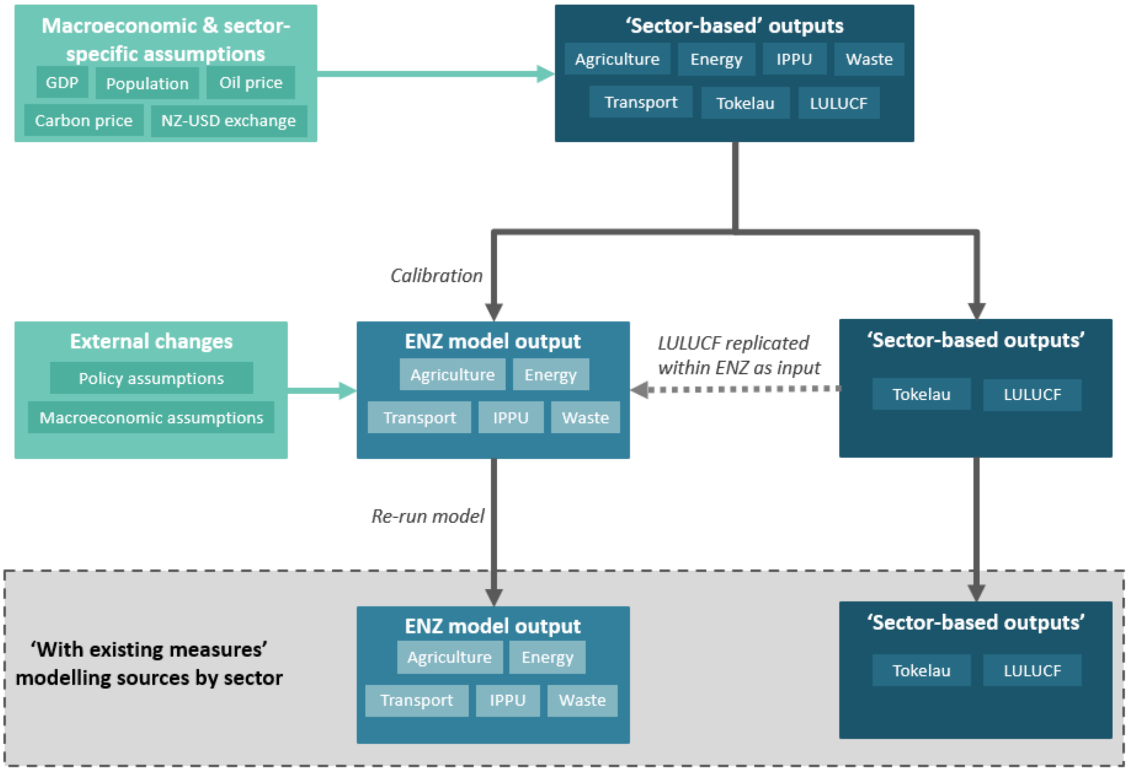
Sector-based emissions models are comprehensive and incorporate macroeconomic and sector-specific assumptions. The ENZ model incorporates these assumptions but can also model how emissions outcomes may vary given changes in future 'state-of-the-world' drivers (eg, technology or commodity prices) or policy settings (eg, NZ ETS pricing) in an endogenous or exogenous manner.

The combined use of sector-based and ENZ models enables the development of economy-wide GHG emissions projections data when macroeconomic assumptions, technology or policy settings change, and supports ongoing policy development and target tracking. Sector-based models are developed and run by different New Zealand government agencies, are granular in nature and based on a range of detailed inputs. This means several months are required to compile sector-based projections. The ENZ model is flexible by nature and, while it retains a degree of granularity observed in sector-based models, it can respond to changing macroeconomic assumptions, technology or policy settings in a more timely manner. An important advantage of applying ENZ is that it also models interactions between and among sectors (such as the effect of carbon prices) to provide more realistic projections.

For this report, WEM model projections using macroeconomic and sector-specific assumptions have been compiled by applying sector-based models. Sector-based model outputs are then used to calibrate the ENZ model. This calibration ensures the ENZ model uses the latest sector-specific information from sector-based models and external changes, including the same input data, the latest Inventory, and different policy assumptions or macroeconomic assumptions. Following this calibration, ENZ is used to produce WEM GHG emissions projections time series data for all sectors except LULUCF reporting and Tokelau. ENZ does not produce LULUCF reporting and Tokelau emissions projections, and sector-based projections data are provided for LULUCF reporting and Tokelau for the WEM scenario.

The WEM GHG emissions projections data presented in this section are derived from the combined ENZ and sector-specific modelling approach described above and shown in figure 2.5.13.

Figure 2.5.13: Overview of 'with existing measures' modelling approach



Note: ENZ = Emissions in New Zealand; GDP = gross domestic product; IPPU = Industrial Processes and Product Use; NZ-USD = New Zealand-United States dollars; LULUCF = Land Use, Land-Use Change and Forestry.

2.5.5.2 Overview of sector-based methods

Table 2.5.11: Overview of sector-based models and approaches used to project New Zealand's greenhouse gas emissions

Sector(s)	Gases	Type and characteristics of approach or model	Original purpose of approach or model	Strengths and weaknesses	Accounting of overlaps and synergies
Energy (excluding transport)	CO_2, CH_4, N_2O	Non-transport energy (demand): Partial equilibrium model of the Energy sector Non-transport energy (generation): Least-cost optimisation	Ministry of Business, Innovation and Employment's Energy Outlook Electricity Authority's grid expansion modelling	Based on official energy data used for GHG Inventory Full plant-level cost optimisation expansion modelling Modular and flexible demand modelling Some assumptions required on future fuel switching rates and behaviour, not	Policies and measures must be considered additional to the NZ ETS to be included directly in WEM modelling Some policies are modelled separately, but these are excluded from final results to avoid double-counting or

Sector(s)	Gases	Type and characteristics of approach or model	Original purpose of approach or model	Strengths and weaknesses	Accounting of overlaps and synergies
		model for new build		captured by existing price relationships Not all second-order interactions captured	assumption misalignment
Transport	CO_2, CH_4, N_2O	The Vehicle Fleet Model takes a bottom-up approach, based on detailed transport activity and fuel economy data	Annual projections of vehicle fleet composition, travel, fuel use and GHG emissions	The Vehicle Fleet Model works at a detailed level of vehicle categories, using New Zealand-specific data. The new aviation model represents a significant improvement over the previous approach However, significant uncertainty is associated with the long-term projections	Policies and measures included in the modelling are assumed to have different impacts on the gross transport GHG emissions
Industrial processes and product use	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	For F-gases and N_2O: Simplified bottom-up equipment model developed from UNFCCC Common Reporting tables For other gases: Activity forecasts built as sub-module of non-transport energy's activity modelling	Annual F-gas and N_2O GHG Inventory calculations	Detailed F-gas sectoral breakdown allows assessment of low uncertainties to those sectors with consistent, precise statistics on stocks and emissions	Policies and measures are assumed to target distinct sources of greenhouse gases
Agriculture	CO_2, CH_4, N_2O	Bottom-up estimates using AIM to produce the agriculture estimates for Inventory 2024	Annual GHG Inventory	Uses same detailed calculations as AIM	
Land Use, Land-Use Change and Forestry (LULUCF reporting)	CO_2, CH_4, N_2O	Bottom-up projections LULUCF model. Based on 2006 IPCC Guidelines	International projections reporting based on the latest LULUCF GHG inventory approach, method and assumptions	Engagement with sector helps to calibrate projections, and the additional impact of policies and measures is assessed independently	Additional impact of policy and measures is estimated individually and incorporated into projections

Sector(s)	Gases	Type and characteristics of approach or model	Original purpose of approach or model	Strengths and weaknesses	Accounting of overlaps and synergies
Waste	CO_2, CH_4, N_2O	Bottom-up estimates using GHG Inventory waste models, in line with 2006 IPCC Guidelines, and a bottom-up policy impacts model	Annual GHG Inventory and policy impacts calculations for the Emissions Reduction Plan	Calculations are consistent with the GHG Inventory at the category level, requiring a full set of projections of activity data and emission factors	Policies and measures are assumed to target distinct sources of greenhouse gases
Tokelau	CO_2, CH_4, N_2O, HFCs	A hybrid top-down, bottom-up approach, based on historical emissions	Projection of Tokelau's emissions	Based on historical trends and prepared at the level of single gases	Policies and measures adopted by New Zealand (including the NZ ETS) do not extend to Tokelau
International Transport	New Zealand has developed emissions projections for international air transport, but not for international shipping				

Note: AIM = Agriculture Inventory Model; CH_4 = methane; CO_2 = carbon dioxide; F-gas = fluorinated gas; GHG = greenhouse gas; HFCs hydrofluorocarbon; N_2O = nitrous oxide; NZ ETS New Zealand Emissions Trading Scheme; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride; UNFCCC = United Nations Framework Convention on Climate Change; WEM = with existing measures. Inventory 2024 = *New Zealand's Greenhouse Gas Inventory 1990–2022*. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, prepared by the National Greenhouse Gas Inventories Programme, edited by HS Eggleston, L Buendia, K Miwa, T Ngara and K Tanabe.

2.5.5.3 Sector-based emissions projections methodologies

2.5.5.3.1 Energy

Methodology

The Energy sector modelling system comprises two main models: the Supply and Demand Energy Model (SADEM) and the Generation Expansion Model (GEM). SADEM performs three main functions. First, it projects energy demand for all sectors of the economy based on exogenous projections of population and economic growth and incorporates econometric relationships based on historical relationships and observed trends of energy efficiency growth. Second, it provides a central hub to incorporate electricity supply information from GEM. Finally, it calculates projections of Energy sector GHG emissions by applying emission factors. SADEM also produces activity forecasts for users relevant to IPPU emissions, such as methanol or steel production.

GEM is a long-term planning model used to study capacity expansion specifically in the New Zealand electricity sector. Selecting from a large list of potential new generation facilities, the model determines which plant to construct and in which year each new plant is to be commissioned, while taking account of several technical, physical and economic constraints. While it is most often used to conduct research on generation capacity expansion given a fixed transmission network, GEM can also be configured to simultaneously optimise generation and transmission capacity investment decisions. However, GEM only considers large-scale generation that is connected to the grid. GEM requires fuel prices and electricity demand projections from SADEM as inputs.

Strengths and weaknesses of models or approach

The GEM is technically a comprehensive model of the New Zealand electricity system. However, the model does not account for departures from assumptions underlying a perfect competition framework. GEM is formulated as a mixed integer programming problem with a cost-minimisation objective function. Each potential new plant is characterised by parameters describing attributes such as location, technology, fuel type, capacity, capital cost and operating costs. The model is typically run for a series of scenarios describing possible future outcomes for factors such as demand for electricity (energy and peak), hydro and thermal fuel availability, fuel prices, plant costs, and policies such as carbon pricing, renewables targets or transmission pricing. Under each scenario, a build plan and a supporting set of prices are generated. The time horizon over which the model is operated is typically 20 to 40 years.

Grid-scale batteries are currently modelled as supporting peak demand, meaning the model requires fewer thermal peakers if more grid-scale batteries provide firming. However, GEM is not yet equipped to model the likely timing of charging, discharging and losses for grid-scale batteries, and how these might provide market arbitrage opportunities as the generation mix becomes more intermittent. This is also relevant to expectations of time-weighted pricing for different generation types, and how these might change if solar or wind generators increase market penetration over time.

SADEM projects energy demand for all sectors in the economy. However, the modelling is of the Energy sector only and not the entire economy. SADEM also has limited representation of potential mitigation technologies and their uptake in response to a carbon price. The main drivers in this modelling are exogenous (eg, gross domestic product (GDP) and carbon prices), meaning that secondary effects are not modelled (eg, the potential link between carbon prices and GDP is not included).

Because SADEM has been developed in-house, it offers the flexibility to be further modified and improved. For this Biennial Transparency Report, recent additions include:

- modelling of grid-scale batteries that can support peak demand and firming
- additional data-centre load
- reduced expectations of natural gas demand, in line with new information on reduced supply projections
- incorporation of new fuel switching satellite models, which allow direct incorporation of the potential impacts of the National Policy Statement for Greenhouse Gas Emissions from Industrial Process Heat
- top-down modelling of peak demand, so SADEM does not reflect shifts in peak demand that might occur due to shifts in underlying energy demand unless this is specified exogenously
- use of historical emission factors to estimate future emissions based on activity. However, inherent uncertainty exists around the impact of new energy developments, particularly (for instance) the location and nature of future geothermal fields and the technologies used to extract and generate electricity from geothermal fluids.

2.5.5.3.2 Transport

Methodology

Transport emissions have been estimated through the following approaches.

The Ministry of Transport's Vehicle Fleet Model (VFM) has been used to project emissions from road transport. The VFM projects the composition of future motor vehicle fleets on the road, their vehicle kilometres travelled, energy use (fuel and electricity) and GHG emissions up to 2055.[186]

For domestic aviation emissions, the Ministry of Transport models fuel use as the product of passenger numbers, average distance (kilometres) travelled per passenger and average fuel use per passenger kilometre. The model projects emissions by applying an emission factor to the estimated fuel use.

No specific projection models have been developed for emissions from rail, domestic navigation or other transport categories because of their small scale. Emissions from these modes are assumed to remain at the 2022 levels.

The VFM estimates emission impacts of policy measures in the WEM primarily based on the difference in electric vehicle (EV) uptake rates between the scenarios with and without the policy measures. Vehicle purchase price elasticities are also used when estimating the impacts of the Clean Car Standard on purchasing decisions. Additionally, travel price elasticities are used to estimate the impact of the NZ ETS on light vehicle travel.

2.5.5.3.3 Strengths and weaknesses of models or approach

Vehicle Fleet Model

The VFM uses a bottom-up approach, that is, emissions are estimated and projected at the detailed level of vehicle categories. New Zealand-specific data are used, including on vehicle fleet composition and travel patterns. In particular, real-world fuel use data in New Zealand are used.

Due to the long-time horizon, significant uncertainty is associated with its long-term projections. This uncertainty is particularly evident for projections for the uptake of electric heavy vehicles as a result of limited data and information availability.

Aviation

A new aviation model has been developed, representing a significant improvement over the previous approach, which assumed that emissions would remain at the same level as the past historical year for all future years. However, its methodology remains relatively simple and there is a high level of uncertainty regarding the recovery of air travel demand from the COVID-19 pandemic and other factors affecting the aviation industry.

2.5.5.3.4 Industrial Processes and Product Use

Methodology

For the IPPU sector, projections of CO_2, CH_4 and PFC emissions are estimated largely by holding emissions constant where facilities are assumed to be at production capacity and reducing emissions when site closures are expected to occur. The methanol production facilities Motunui 1 and Motunui 2 are projected to decrease production as natural gas availability declines before closing in 2029. The Waitara Valley Plant (idled in 2021) is assumed to stay

[186] See Ministry of Transport. 2024. Vehicle Fleet Model documentation 202405.

closed. The New Zealand Steel facility is projected to install a new electric arc furnace from 2027, and new coal and electricity use estimates for steelmaking have been applied. The subsequent increase in electricity demand is modelled separately in the Energy sector.

Projected emissions of sulphur hexafluoride and nitrous oxide were modelled from forecast activity informed by historical trends and relationships to population and economic growth.

Projections of HFC emissions were prepared through an assessment of the volume and composition of the stockpile of HFC gases in New Zealand and estimates on New Zealand's projected drawdown, reuse, destruction and emissions of those gases. This assessment considered historical trends and analysis on the impact of the Kigali Amendment phase-down, international equipment changes resulting from the European Union's fluorinated gas regulations, emissions pricing, stakeholder transition plans and likely new technology shifts.

Strengths and weaknesses of models or approach

The compilation of HFC emissions includes a highly detailed assessment process for different sectors and uses of HFCs. The approach used is a considerable revision and improvement from previously prepared projections. However, a high level of uncertainty still exists because there are many interacting factors, limited domestic and international evidence, and a significant ongoing policy programme to address HFC emissions.

The mitigation impact of emissions pricing under the NZ ETS is not quantified for non-HFC IPPU emissions. This includes the estimated mitigation impact of the phase-down of free allocation of units to large trade-exposed industrial emitters within the NZ ETS.

Historically, imports and exports of bulk HFCs and equipment containing HFCs have fluctuated significantly from year to year. For example, stockpiling of bulk imported fluorinated gases is suspected to have occurred from 2010 to 2012, before the January 2013 introduction of fluorinated gases into the NZ ETS, and around 2016 to 2017 in response to increasing NZ ETS prices and the prospect of a Kigali Amendment phase-down permit system. These types of fluctuations distort year-to-year importation and consumption data that are used to inform historical and projected IPPU emissions.

The impact of an NZ ETS price under the WEM scenarios has been assessed for different refrigeration sectors for HFCs. However, these impacts are highly uncertain because the evidence base is limited for the elasticity of refrigerant usage with respect to an emissions price.

With high uncertainties in cumulative HFC emissions estimates, uncertainties in total abatement estimates will be higher again. Consequently, attribution estimates are highly uncertain.

2.5.5.3.5 Agriculture

Methodology

Forecasting of future agricultural activity is estimated using several modelling tools and assumptions then inserted into the agricultural GHG inventory model to obtain emissions projections out to 2050. The same methodology and country-specific emission factors used in the compilation of Inventory 2024 have been used in producing these projected agricultural emissions.

The WEM productivity and animal population inputs for the four major livestock categories (dairy, sheep, deer and beef cattle) are modelled by the Pastoral Supply Response Model (PSRM), which is also used for the Situation and Outlook for Primary Industries quarterly reports.

The PSRM is the Ministry for Primary Industries' internal econometric model for forecasting production from the pastoral sector. The PSRM models livestock numbers and agricultural production (slaughter weights, milk, wood production) at the national level, which are representative of biological constraints and investment decisions made by land owners or land managers. Factors that influence investment decisions include forecast prices and biological factors, such as actual livestock numbers and the lifecycle of animals, to constrain the rate of change. It is also constrained by climate trends and the amount of pastoral land available in New Zealand. A significant driver of pastoral land-use change is afforestation, which is modelled externally to the PSRM.

Between 2023 and 2028, the WEM scenario is based on the animal population and productivity estimates published in the July 2024 Situation and Outlook for Primary Industries, with adjustments to account for population data available in August 2024.

Improvements in productivity (per cow milk yield, butterfat and protein content of milk, lambing per cent, average animal weights and carcass weights) were taken from the Situation and Outlook for Primary Industries estimates for 2023 to 2050.

From 2029, dairy populations are estimated as a percentage reduction from the 2028 value. This is based on an assumed level of dairy land-use change to horticultural activities (including arable cropping) and settlements through urban expansion, and the expected effects of the Essential Freshwater package and the cap on synthetic nitrogen fertiliser use (see table 2.5.2, for more detail).

From 2029, sheep, beef cattle and deer populations were calculated using a percentage change in stock from 2028 based on the forestry-driven, stock change analysis. Afforestation numbers are taken from the projections compiled for the LULUCF sector. Spatial analysis, historical data and trends, and advice from subject matter experts were used to determine impacts on sheep, beef cattle and deer populations.

Fertiliser use was projected forward from the 2023 value using PSRM land-use area projections. The portion of fertiliser use by industry (based on the 2017 Agricultural Production Census) is used to calculate fertiliser by land-use type.

Other inputs used either a constant value (2022 input) or a linear forecast using the 1990 to 2022 data.

Emissions outputs were further modified to account for the impact of emissions reduction technologies.

Table 2.5.12: Projected change in emissions, production and animal numbers between 2022 and 2035 under a 'with existing measures' scenario for dairy, sheep and beef cattle

Projected change in emissions by activity (Mt CO_2e)		
	Dairy	Sheep and beef cattle
2022	21.5	18.2
2035	20.8	16.4
Change 2020–35 (%)	–3%	–10%

Projected change in stock units		
	Dairy cattle	**Sheep and beef cattle**
2022	5,930	44,238
2035	5,631	39,382
Change 2020–35 (%)	–5%	–11%

Strengths and weaknesses of models or approach

Table 2.5.13: Models used for Agriculture sector projections, with strengths and weaknesses

Approach or model	Type and characteristics of approach or model	Purpose	Strengths and weaknesses
Pastoral Supply Response Model (PSRM)	Econometric model	To estimate input values for the emissions model (especially for with existing measures)	Use of economic modelling and expert opinion
Adoption and Diffusion Outcome Prediction Tool (ADOPT)[187]	ADOPT incorporates sets of factors that studies have shown to commonly influence the rate and peak level of adoption within a population	To estimate peak adoption of mitigation technologies and generate adoption curves for different pricing scenarios	Use of expert opinion. Considers many aspects influencing uptake
Stocking rate and adjustment for afforestation	Linear programming and simple Excel calculation	To estimate the change in livestock numbers due to afforestation	Mathematically robust, based on industry data. Novel method still in development
Input adjustments for policies and measures	Simple Excel-based calculation based on research and advice from subject matter experts	Adjusting the with existing measures inputs to account for land-use change due to afforestation	Accounts for interactions between the effects of different policies and measures. Can only account for impacts seen in present activity data
Agriculture Inventory Model	Bottom-up estimates-based inventory model	Calculates emissions from inputs	Uses same calculations as inventory model
Adjustment for mitigation technology	Simple R-based calculation	Adjusts emissions outputs to account for the impact of mitigation technologies	Simple implementation. Unsophisticated accounting of mitigation stacking

2.5.5.3.6 Waste

Methodology

All categories in the Waste sector are modelled using a bottom-up approach, estimating emissions at the category level as reported in the Inventory. This is done by projecting activity data and applying the national GHG inventory waste models to estimate emissions.

Some methods for projecting activity data have been revised for the Biennial Transparency Report. Several policies and measures have been quantified in the Waste sector and use a variant of the model for existing measures that incorporates the alternative activity data and/or emission factors. Table 2.5.14 provides details on the methods used for projecting each category in the Waste sector.

[187] CSIRO. *ADOPT: Adoption Diffusion Outcome Prediction Tool*. Retrieved 29 November 2024.

Table 2.5.14: Methods for projecting activity data and/or emissions in the Waste sector, 2023–50

Category in the Waste sector	Gas(es)	Method for projecting activity data or emissions	Strengths	Weaknesses
Managed landfills	CH_4	Waste tonnage is projected by correlating historical GDP with total waste disposed and extending the correlation into the future. Other parameters are held constant Variants of this model using modified activity data and/or parameters are used to estimate the effects of some existing measures	Models project waste volumes using a robust mathematical model drawing mainly on recent historical trends, the effect of an increasing waste levy and current policy direction	Projection of activity data is sensitive to the latest historical waste tonnages that have been affected by multiple factors, including the COVID-19 pandemic and Cyclone Gabrielle,[188] and could distort the longer-term projection
Unmanaged farm fills	CH_4	Logarithmic extrapolation of farm counts from 2002 to 2017, which in turn drives overall waste tonnages on farms as per the Greenhouse Gas Inventory	Based on plausible long-term trend in farm counts	Assumes that waste volume per farm is constant
Unmanaged non-municipal fills	CH_4	Waste tonnages are held constant into the future at 2015 levels, based on the available historical data	Plausible projection based on limited available data	Does not account for potential changes in industry activity into the future
Uncategorised landfills	CH_4	Activity data ended in 2010, however, emissions continue to occur and are projected using the first order decay model in the Greenhouse Gas Inventory	Uses first order decay model from the Greenhouse Gas Inventory	Relies on historical activity data being accurate
Composting	CH_4, N_2O	The activity data are modelled from 1990 based on an assumed growth curve, consistent with limited actual data where available, and assumed changes into the future. Variants of this model using modified activity data and/or parameters are used to estimate the effects of some existing measures	Assumptions are tied to actual data	Limited actual data results in heavy reliance on assumed growth curve
Anaerobic digestion	CH_4	A model based on IPCC Tier 1 methods is used to estimate projected emissions for anaerobic digestion based on assumed waste tonnages	Applies Greenhouse Gas Inventory methods	Activity data is limited, as anaerobic digestion plants have historically been co-located on industrial sites for specific applications and have not been accessible to the domestic market and processing facilities
Incineration	CO_2, CH_4, N_2O	Constant activity assumed since 2007	Simple, consistent with the Greenhouse Gas Inventory	Assumes the incineration rate is constant

188 Cyclone Gabrielle was a severe tropical cyclone that devastated parts of the North Island of New Zealand in February 2023.

Category in the Waste sector	Gas(es)	Method for projecting activity data or emissions	Strengths	Weaknesses
Open burning	CO_2, CH_4, N_2O	Uses activity data modelled for farm fills, noting that half of the activity data are landfilled and half are burned	Simple, consistent with the Greenhouse Gas Inventory	Assumes the same amounts of waste are burned and buried
Domestic wastewater	CH_4, N_2O	The quantity of domestic wastewater is dependent on the national population, using the latest emission factor as calculated in the Inventory, which is held constant for projections	Uses Inventory methods and reflects projected population changes	Assumes no changes in wastewater treatment processes
Industrial wastewater	CH_4, N_2O	The quantity of industrial wastewater is dependent on industrial production. Projected production for meat and dairy industries is based on projected industry data. The remaining industries are held constant at 2022 levels	Tracks known changes in activity in accordance with the Greenhouse Gas Inventory	Assumes emission factors and some activity data are constant

Note: CH_4 = methane; CO_2 = carbon dioxide; GDP = gross domestic product; IPCC = Intergovernmental Panel on Climate Change; N_2O = nitrous oxide.

2.5.5.3.7 Tokelau

Methodology

Tokelau's emissions were projected using a hybrid of a top-down and bottom-up approach. The model used is an extension of the Inventory model and assumptions on future emissions trends were made.

Strengths and weaknesses of models or approach

The model used for Tokelau's emissions projection uses a hybrid of a top-down and bottom-up approach, which includes the use of time series activity data and sector-specific assumptions. There is a high degree of uncertainty in assumptions made for future trends in each sector that are based on a combination of historic trends and/or expert opinion on future emissions trends. For example, future public electricity and heat emissions are highly dependent on solar panels being operational again.

2.5.5.3.8 Land Use, Land-Use Change and Forestry

Methodology

Projected emissions and removals from the LULUCF sector are calculated using methodologies consistent with those used within Inventory 2024.[189] Activity data and emission factors used in Inventory 2024 comprise the historical time series (1990 to 2022) used in this report. The modelling takes a bottom-up approach to projecting the WEM projections. Each LULUCF policy and measure is calculated on an individual basis using a bottom-up approach.

189 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

Main assumptions

The main drivers and assumptions used in the LULUCF projections are detailed below.

Pre-1990 natural forests

New Zealand's pre-1990 natural forest is separated into two sub-categories: pre-1990 regenerating forest and pre-1990 tall forest. Carbon stock changes of these forest categories are reported in the Inventory. In 2022, the pre-1990 natural forest estate was a net sink, sequestering around –1.44 Mt CO_2. The regenerating component of the pre-1990 forest estate was a net sink whereas the tall forest component was a net source of emissions.

Activity data and emission factors for New Zealand's pre-1990 natural forest from the Inventory are used for the historical time series 1990 to 2022. Pre-1990 natural forest projections from 2023 to 2035 assume the continued rate of change for pre-1990 tall and regenerating natural forests.[190]

The rate of carbon stock change in pre-1990 tall forest is –0.01 ± 0.19 tonnes of carbon per hectare per year, while for pre-1990 regenerating forest, the rate of change is 0.43 ± 0.51 tonnes of carbon per hectare per year. The uncertainty in the report's estimate has been applied to the lower and upper removal scenarios to represent sensitivity in measurement, sampling and model uncertainty.

Pre-1990 planted forest and sustainable forest harvesting

In 1990, pre-1990 planted forests were a net sink, sequestering around –22.3 Mt CO_2. This has decreased to around –12.6 Mt CO_2 in 2022, due to an increase in rates of harvesting. The activity data and emission factors from Inventory 2024,[191] combined with projections of harvesting and replanting, are used to determine pre-1990 planted forest emissions and removals from 2023 to 2050.

Projections of pre-1990 planted forest harvest are sourced from the *Wood Availability Forecast – New Zealand 2021 to 2050* (the Wood Availability Forecast).[192] Almost all forest harvesting in New Zealand (99.9 per cent) occurs in planted production forests.[193] Planted forest harvesting area, age and net emissions from 1990 to 2022 are sourced from Inventory 2024. Projections are modelled from historical forest plantings and assume a target rotation length of 28 years to 30 years.

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190 Carbon stocks in tall pre-1990 natural forest have previously been reported as being in steady state because the annual net change is not statistically significant (Paul T, Kimberley MO, Beets PN. 2021. Natural forests in New Zealand – a large terrestrial carbon pool in a national state of equilibrium. *Forest Ecosystems* 8(34). New Zealand received a recommendation from the Assessment Review Report (L.18, UNFCCC. 2020. FCCC/ARR/2019/NZL) to review this position and to report the losses and associated uncertainty occurring in this forest class regardless of the statistical significance. Therefore, the pre-1990 natural forest carbon stock change per hectare estimate has been reported since the 2022 Inventory submission.

191 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment, section 6.3.

192 Ministry for Primary Industries. 2021. *Wood Availability Forecast – New Zealand 2021 to 2060*. Wellington: Ministry for Primary Industries.

193 Consistent with the 2022 Greenhouse Gas Inventory (section 6.3), any harvesting that occurs in natural forests is captured within the natural forest carbon stock and stock change estimates. Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

Afforestation and sustainable forest harvesting

Historical post-1989 forest activity data and emission factors are sourced from Inventory 2024. Estimated post-1989 planted forest age-class data from Inventory 2024 are combined with projected afforestation scenarios from 2023, and the 2021 Wood Availability Forecast, to estimate emissions and removals out to 2050. The 2021 Wood Availability Forecast indicates that harvest levels will increase over the 2020s, which is reflected in the LULUCF projections of higher net emissions over this period.

Projected afforestation scenarios from 2023 onwards are based on the University of Canterbury's School of Forestry report, 2021 and 2023 Afforestation and Deforestation Intentions Survey, for the upper, central and lower removal scenarios respectively.[194] The 2023 report shows exotic afforestation intentions estimated at 58,400 hectares in 2023 and intentions to establish 45,400 hectares in 2024. The survey also reported native forest afforestation estimated at 7,800 hectares in 2023 and intentions of 9,000 hectares in 2024, which then decreased to around 6,000 hectares per year by 2025.

Harvested wood products

New Zealand's planted forests are dominated by radiata pine. Its wood is used in a range of applications including timber-frame construction, packaging, plywood, medium-density fibreboard, posts and poles, and mechanical and chemical pulping. The methodology used to estimate net emissions from harvested wood products over the projected period can be found in the Inventory.

Harvested wood product projections are based on the amount of timber expected to be produced from the projected harvesting rates. The uncertainty in these estimates is predominantly driven by the uncertainty in harvest projections, changes to current export or domestic product demand and updated carbon decay functions.

Deforestation

Historical planted and natural forest deforestation activity data and emission factors are sourced from the Inventory. Projections of planted production forest deforestation are sourced from the 2023 Afforestation and Deforestation Intentions Survey.[195] With most of New Zealand's planted forestry estate privately owned, the three deforestation scenarios reflect the impact of land-use economics, carbon emissions unit price, and central and local government policies. Projections of pre-1990 natural forest deforestation are based on historical trends.[196]

Projected post-1989 deforestation is based on research and analysis completed by the University of Canterbury in 2018[197] and the 2023 Afforestation and Deforestation Intentions

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194 Manley B. 2022. *Afforestation and Deforestation Intentions Survey 2021: Final report*. Prepared for the Ministry for Primary Industries by Professor B Manley, School of Forestry, University of Canterbury. Wellington: Ministry for Primary Industries. Manley B. 2024. *Afforestation and Deforestation Intentions Survey 2023: Final report*. Prepared for the Ministry for Primary Industries by Professor B Manley, School of Forestry, University of Canterbury. Wellington: Ministry for Primary Industries.

195 Manley B. 2022. *Afforestation and Deforestation Intentions Survey 2021: Final report*. Manley B. 2024. *Afforestation and Deforestation Intentions Survey 2023: Final report*.

196 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment, table 6.3.7.

197 Manley B. 2018. *Intentions of forest owners following harvest of post-1989 forests*. MPI Technical Paper No: 2018/55. Wellington: Ministry for Primary Industries.

Survey. However, significant uncertainty still exists in the amount and timing of post-1989 deforestation. Continued research in this area is needed to increase our understanding of the drivers and timing of deforestation for land owners and its impact on emissions.

Harvesting

Harvesting projections are based on the 2021 Wood Availability Forecasts (scenario 3). Variations in the level and timing of harvest have the largest impact on the projections. Continued research on and analysis of future harvesting rates and the impact of current policies, measures and drivers are needed, given harvesting is the main driver of emissions and holds the highest area of uncertainty.

Forest yields

Forest yields (the rate of carbon accumulation per age) can also contribute to variations in emissions and removals. The yield table estimates used for these projections were kept consistent with the Inventory 2024 estimate. It is possible that these yields will change in the future (with a predicted increase through time), however, this potential source of uncertainty was not incorporated into these projections.

Non-CO_2 emissions

Historical non-CO_2 emissions are sourced from the Inventory. Non-CO_2 emissions are not a significant source of emissions for New Zealand's LULUCF sector, with projections based on historical trends.

Strengths and weaknesses of models or approach

Uncertainty has been included in the projections using scenarios that incorporate variations in harvest, afforestation, deforestation, harvested wood products, and pre-1990 natural forest sequestration rates. Variation in the projections can be influenced by a changing economic climate, the carbon price and harvested wood products, and future implemented policies that might affect the forestry sector or emissions targets. Even with completed external research and analysis, the level of uncertainty in future harvest ages and rotation lengths remains high and is a significant area of uncertainty within the 2024 projections.

Afforestation and deforestation rates are challenging and difficult to predict. Afforestation rates have been surveyed out to 2030 and then extrapolated to 2050. Regular updates of the model and results are needed to ensure the afforestation projections factor in the most current data, assumptions and drivers.

2.5.5.4 Whole-of-economy emissions projections methodology (Emissions in New Zealand model)

The ENZ model has two main functions:

1. to project economic and emissions outcomes of New Zealand's economic sectors that produce GHG emissions
2. to provide insight into how such outcomes may vary given variations in future 'state-of-the world' drivers (eg, future technology, commodity prices) or policy settings.

The ENZ model projects the future economic and emissions outcomes of decisions that range from whether households buy an EV or internal combustion engine (ICE) vehicle to whether land owners switch from sheep and beef cattle farming to forestry. In many cases, these decisions can be endogenous (ie, defined by activity within the model), where decision-makers are assumed to choose the least-cost option driven by relative prices (eg, EV versus ICE vehicle purchase prices). In other cases, the decisions are exogenously specified (ie, defined as an external assumption that is an input to the model) given the current lack of information on key drivers (eg, the costs of zero-emissions aircraft). Areas that allow for endogenous decisions can also be exogenously specified.

Carbon prices are an important feature of the model. These can be exogenously specified or endogenously determined by solving for a carbon price trajectory that will achieve a specified emissions objective.

2.5.5.4.1 Primary assumptions and inputs

ENZ uses the same macroeconomic assumptions as in each sector-based model for population, GDP and New Zealand Carbon Price (table 2.5.3). These are 'global' assumptions in ENZ, which means they are consistent across each module described below.

Additional macroeconomic assumptions are also used in some ENZ modules including New Zealand fossil gas wholesale price, gas reserves, world oil/coal/liquid natural gas prices, and New Zealand dollar–United States dollar exchange rate. Some of these assumptions are also used in sector-based models and are consistent where applicable.

ENZ also incorporates recent data and market information inputs. These include:

- Inventory 2024 data, incorporating methodology updates in addition to updated activity data and revised forestry expectations
- an emissions price path in which carbon prices continue to rise to $75 in 2028 but then fall to a long-run price of $50 from 2035 (all in 2023 dollar values), due to the role forestry is expected to play in the NZ ETS over the medium to long term.

2.5.5.4.2 Model structure

ENZ comprises three modules that, together, model the economic and emissions outcomes for New Zealand across all emissions-producing sectors. The modules are as follows.

1. Land and Waste module (LnW): The 'Land' module covers agricultural and forestry activities and the 'Waste' module covers emissions from waste, landfills and wastewater.
2. Transport modules: Covers the transport sector including land (road and rail), aviation (domestic and international) and marine (domestic and international).
3. Heat, Industry and Power module (HIP): models the rest of the economy, including residential, commercial and industrial activities and the Energy and IPPU sectors.

2.5.5.5 Module methodologies

2.5.5.5.1 Land and Waste module

Agriculture

The LnW module projects agricultural emissions by:

1. estimating emissions from dairy and sheep and beef cattle without emissions reduction measures

2. estimating the impact and costs of emissions reduction measures
3. calculating regional and national emissions totals using projected emissions from dairy and sheep and beef cattle and the impact of emissions reduction measures
4. calculating emissions from fertiliser use.

Emissions from dairy and sheep and beef cattle are calculated by first estimating future land-use change between pastoral farming (dairy, sheep and beef cattle) and forestry and horticulture. The module uses exogenously specified land areas undertaking pastoral farming activities in conjunction with sector-based projections of pastoral stocking rates to estimate the number of dairy cattle or sheep and beef cattle stock units. Emissions from dairy cattle and sheep and beef cattle stock units are calculated out to 2050 using 'sector-based' projections of emissions per unit of production (milk or meat). Emissions per cattle head are split into three categories: enteric, manure and agricultural soils.

Next, the extent of the uptake, and the consequent emissions reduction, from emissions mitigation measures (eg, supporting uptake of mitigation technologies) are projected and aligned to the three above categories. The cost and effectiveness of the measures are exogenously specified. The module accounts for the fact that the cost and effectiveness of a measure will also be affected by the extent to which other measures have been taken up.

The impact of emissions mitigation measures is calculated on a per-animal basis and then multiplied by the projected dairy cattle and sheep and beef cattle stock units on a per-animal basis, to determine regional and national emissions totals.

Projected fertiliser emissions are calculated using projections of land area for different land uses (eg, horticulture) in conjunction with projections of farm management practices until 2050. Projections of farm management practices include estimates of dry matter consumption (feed) and fertiliser use.

Forestry

The LnW module uses future hectares of native and exotic afforestation and deforestation for pre-1990 and post-1989 forests, which are exogenously specified, to determine biomass changes and total land area under forest. Emissions and removals by forests are calculated using land areas afforested and deforested in an activity-based averaging approach, using age-based carbon yield tables, soil carbon and biomass carbon emission factors from the Inventory. The methodology matches and therefore produces the same results as the forestry sector-based projections model.

Waste

The LnW module projects waste emissions across three categories: solid waste disposal, biological treatment of diverted waste streams, and open burning/incineration. Wastewater treatment and discharge emissions are treated as exogenous and come from the sector-based projections in the aggregated projections of waste emissions across all categories.

Emissions from solid waste disposal are calculated from actual and projections of solid waste generation at municipal and non-municipal landfills since 1950 in a first order decay model. This model accounts for landfill waste placement, the reduction and diversion of waste, and the decomposable degradable organic carbon accumulated, decomposed and generated from all waste. The model also accounts for landfill gas capture via landfill gas capture efficiency and coverage.

Transport module

The transport module projects road, air and sea emissions separately and are aggregated together to produce projections of transport emissions to 2050.

Road

The transport module projects road transport emissions by determining the fuel usage required for future kilometres travelled for a given balance of different vehicle types. First, ENZ projects future vehicle kilometres travelled by exogenously specifying the demand for transport services on a per capita or per GDP basis and exogenously specifying a mode-split for transport services. The vehicle types needed to meet future vehicle kilometres travelled are then estimated across different road transport categories to derive the number of vehicles needed in each road transport category in New Zealand's road fleet.

Scrappage (the number of vehicles scrapped in a year) is then modelled by accounting for the underlying growth in vehicle numbers from the population or GDP. Scrappage is used in conjunction with projections of the number of vehicles in each road transport category to determine the number of vehicles entering New Zealand's road fleet. ENZ then models what fuel type purchasers choose between (eg, ICE and EV), based on the total cost of ownership. The balance of ICE and EV is then used to estimate emissions using the projected fuel consumption for those vehicle kilometres travelled.

Air

The transport module projects aviation transport emissions by projecting future aviation fuel usage from the demand for future air seat kilometres over different travel types (eg, domestic and international travel on regional, short-haul or long-haul flights). Air seat kilometres per travel types are disaggregated by different aircraft (eg, 787 for international long-haul flights) and used to calculate a projection for liquid aviation fuel. This fuel projection is used to estimate emissions using fuel-specific emissions factors (including sustainable aviation fuel where applicable).

Sea

The transport module projects sea transport emissions from future marine and rail fuel usage, which uses estimates of the future demand of marine and rail shipping and the demand for transport oil.

2.5.5.5.2 Heat, Industry and Power module

Projected emissions for the non-transport energy and IPPU sectors are modelled from the HIP module.

Projected non-transport energy and IPPU emissions are calculated using projections of future levels of activity, energy demand, energy supply, future energy efficiency, carbon price, the potential supply of biomass (from the LnW module) and access to biomass for gas switching. Projections of future energy demand and future activity are based on exogenous projections of population and economic growth. Energy and electricity demand, energy efficiency and supply of biomass projections are used as inputs into models that project energy needs for specific industrial segments (eg, steel, methanol) and different energy end uses (eg, residential heating). Biofuels, oil and coal are also modelled in the HIP module but at a more basic level.

2.5.6 Sensitivity analysis for the ‘with existing measures’ scenario

2.5.6.1 Sensitivity methodology

The sensitivity methodology under the WEM scenario is consistent with the overall WEM projections modelling approach. This is such that the Tokelau and LULUCF reporting sectors use sector-based models to produce ‘high’ and ‘low’ WEM scenarios and the Energy, Transport, IPPU, Agriculture and Waste sectors use ENZ.

2.5.6.2 Sensitivity analysis from the Emissions in New Zealand model

The sensitivity analysis from the ENZ model has the following underlying assumptions varied to produce ‘high’ and ‘low’ emissions projections for each sector (table 2.5.15).

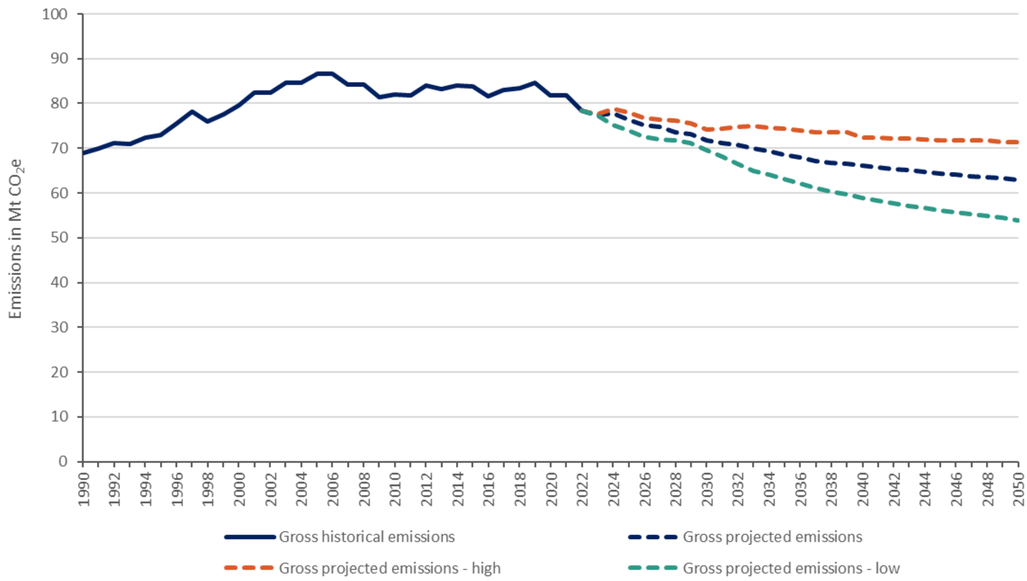
Table 2.5.15: Sensitivity analysis assumptions from the Emissions in New Zealand model

Assumption varied	Low	High
Carbon price	Rise to $70 and stay at that level	Fall to $35 and stay at that level
Oil and coal prices	Higher	Lower
Gas prices	No change	Lower
Methanol production	Train 1 stays closed	Trains close in 2030 and 2040
Population and GDP growth	Low	High
Battery prices	Larger cost reductions	Smaller cost reductions
International EV prices	Lower	Higher
EV supply constraints	Reduced	No change
Vehicle kilometres travelled	No increase	Increase
Livestock numbers	Lower stocking rate	Higher stocking rate
Afforestation and deforestation levels	Higher/lower	Lower/higher
Waste	Lower tonnage and more diversion	Higher tonnage and more diversion, LFG 20%

Note: EV = electric vehicle; GDP = gross domestic product; LFG = landfill gas capture.

Table 2.5.16 and figure 2.5.14 show high and low gross WEM emissions scenarios based on those different assumptions and reflect the Energy, Transport, IPPU, Agriculture and Waste sectors only.

Figure 2.5.14: Gross greenhouse gas emissions under the 'with existing measures', high- and low-emissions scenarios, 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.5.16: Projected gross emissions under 'with existing measures', high- and low-emissions scenarios, 1990–2050 (Mt CO_2e)

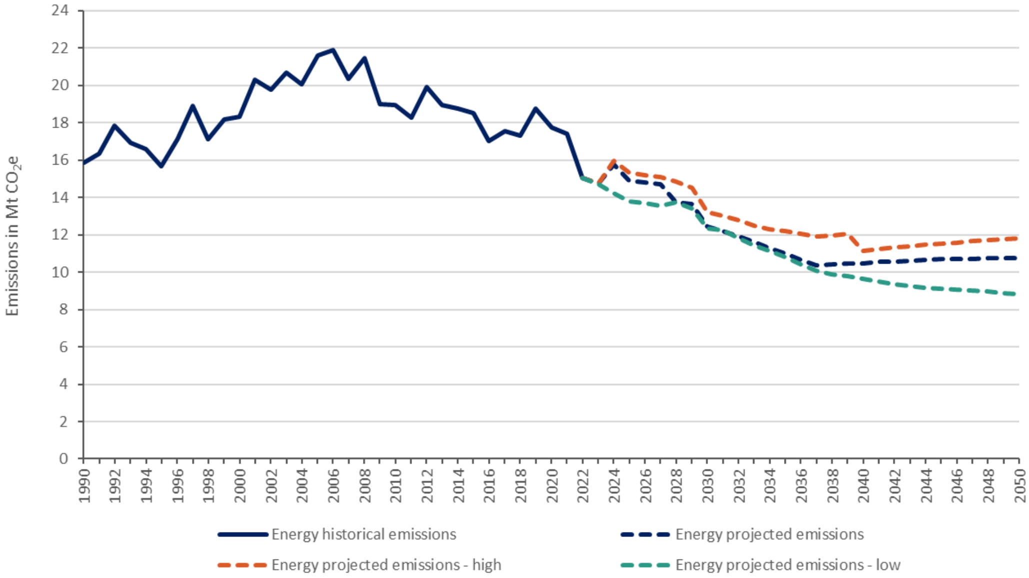
Scenario	1990	2020	2025	2030	2035	2040	2045	2050
High emissions	69.0	81.9	78.1	74.1	74.3	72.4	71.9	71.3
With existing measures central	69.0	81.9	76.5	71.7	68.6	66.1	64.4	62.9
Low emissions	69.0	81.9	74.0	69.5	63.0	59.0	56.1	53.9

Table 2.5.17 and figure 2.5.15 show high and low WEM Energy sector emissions scenarios based on those different assumptions.

Table 2.5.17: Projected Energy sector emissions under 'with existing measures', high- and low-emissions scenarios, 1990–2050 (Mt CO_2e)

Scenario	1990	2020	2025	2030	2035	2040	2045	2050
High emissions	15.9	17.7	15.3	13.2	12.2	11.2	11.5	11.8
With existing measures central	15.9	17.7	14.9	12.4	11.0	10.5	10.7	10.7
Low emissions	15.9	17.7	13.8	12.3	10.8	9.6	9.1	8.8

Figure 2.5.15: Greenhouse gas emissions under the 'with existing measures', high- and low-emissions scenarios in the Energy sector, 1990–2050



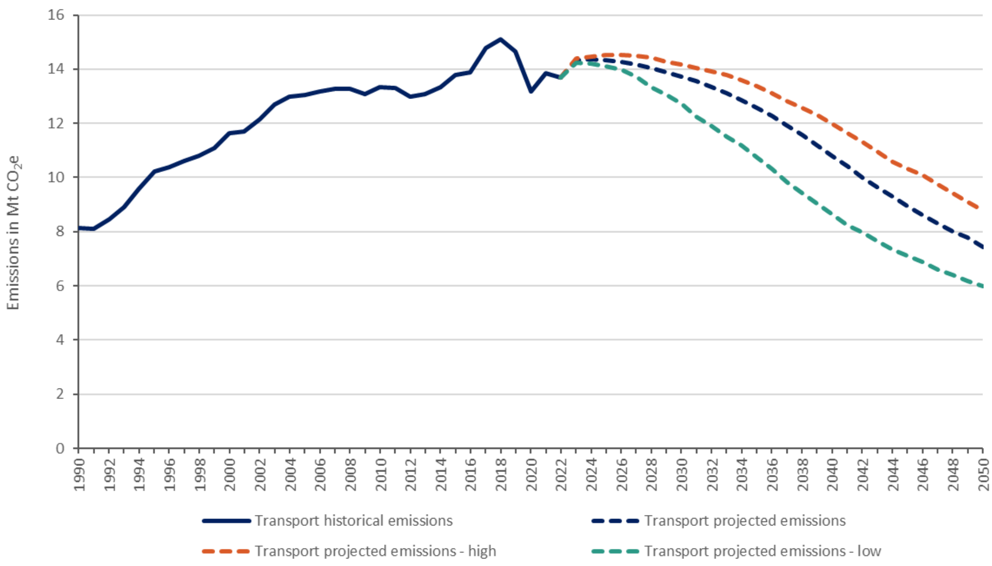
Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.5.18 and figure 2.5.16 show high and low WEM Transport sector emissions based on those different assumptions.

Table 2.5.18: Projected Transport sector emissions under 'with existing measures', high- and low-emissions scenarios, 1990–2050 (Mt CO_2e)

Scenario	1990	2020	2025	2030	2035	2040	2045	2050
High emissions	8.1	13.2	14.5	14.2	13.4	12.0	10.3	8.8
With existing measures central	8.1	13.2	14.3	13.7	12.6	10.8	8.9	7.4
Low emissions	8.1	13.2	14.1	12.7	10.7	8.7	7.1	6.0

Figure 2.5.16: Greenhouse gas emissions under the 'with existing measures', high- and low-emissions scenarios in the Transport sector, 1990–2050



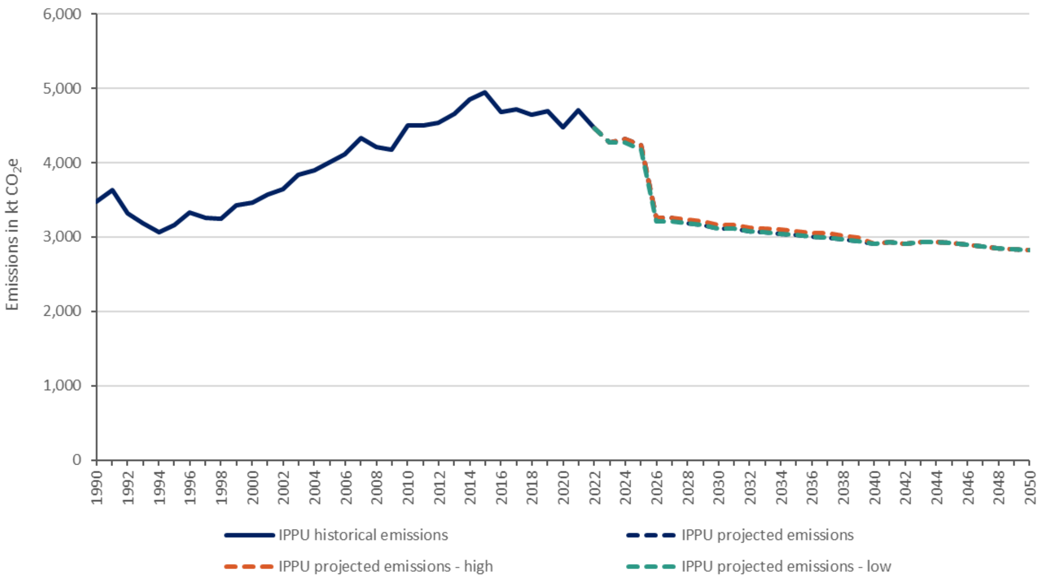
Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

Figure 2.5.17 and table 2.5.19 show high and low WEM IPPU sector emissions scenarios based on those different assumptions.

Table 2.5.19: Projected IPPU sector emissions under 'with existing measures', high- and low-emissions scenarios, 1990–2050 (kt CO_2e)

Scenario	1990	2020	2025	2030	2035	2040	2045	2050
High emissions	3,478	4,480	4,230	3,163	3,083	2,908	2,917	2,829
With existing measures central	3,478	4,480	4,230	3,113	3,032	2,908	2,917	2,829
Low emissions	3,478	4,480	4,180	3,113	3,032	2,908	2,917	2,829

Figure 2.5.17: Greenhouse gas emissions under the 'with existing measures', high- and low-emissions scenarios in the IPPU sector, 1990–2050



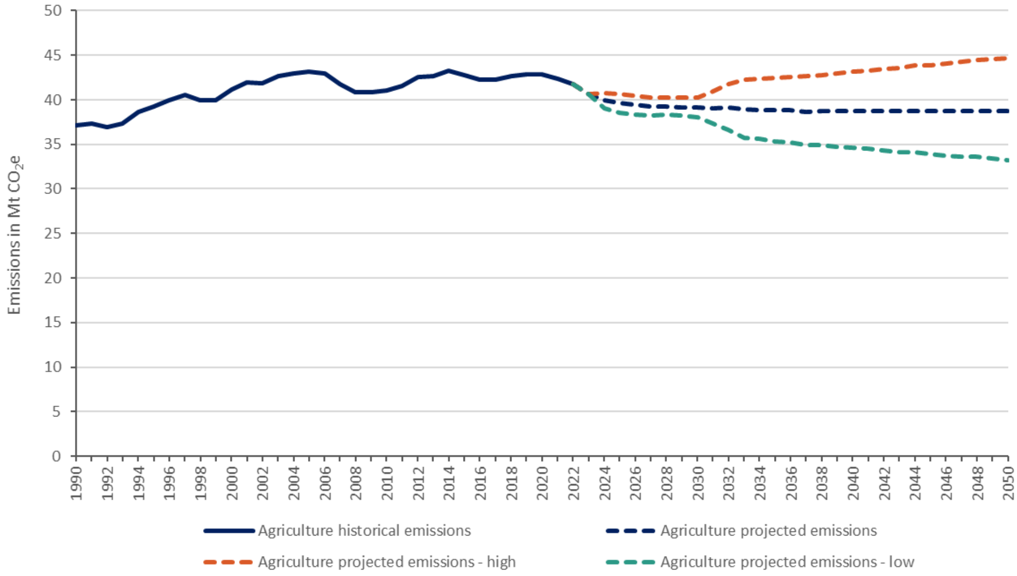
Note: IPPU = Industrial Processes and Product Use; kt CO_2e = kilotonnes of carbon dioxide equivalent.

Table 2.5.20 and figure 2.5.18 show high and low WEM Agriculture sector emissions scenarios based on those different assumptions.

Table 2.5.20: Projected emissions from the Agriculture sector, under 'with existing measures', high- and low-emissions scenarios, 1990–2035 (Mt CO_2e)

Scenario	1990	2020	2025	2030	2035	2040	2045	2050
High emissions	37.1	42.9	40.6	40.3	42.5	43.2	43.9	44.7
With existing measures central	37.1	42.9	39.6	39.1	38.8	38.7	38.8	38.8
Low emissions	37.1	42.9	38.5	38.0	35.3	34.7	33.9	33.3

Figure 2.5.18: Greenhouse gas emissions under the 'with existing measures', high- and low-emissions scenarios in the Agriculture sector, 1990–2050



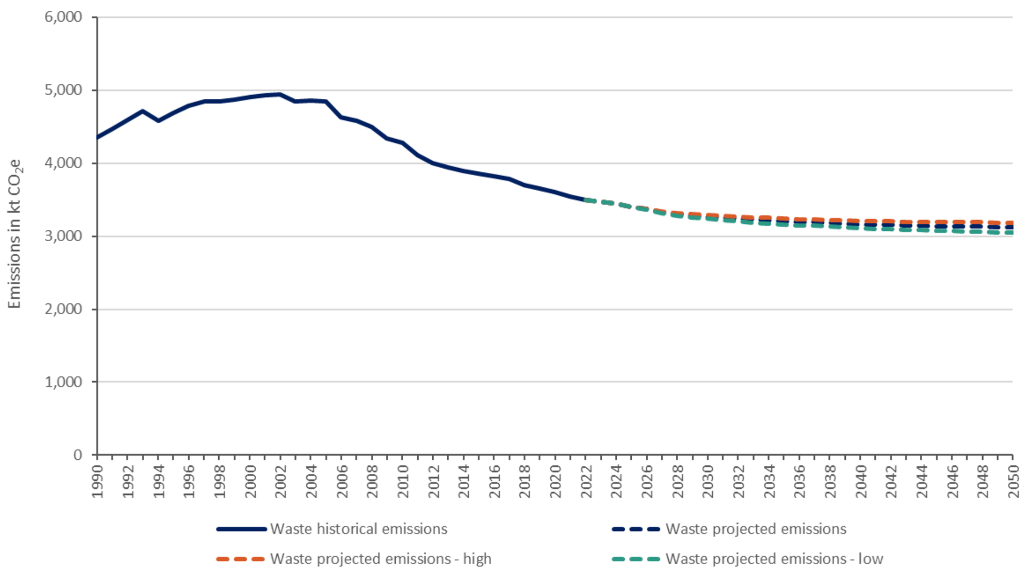
Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.5.21 and figure 2.5.19 show high and low WEM Waste sector emissions scenarios based on those different assumptions.

Table 2.5.21: Projected Waste sector emissions under 'with existing measures', high- and low-emissions scenarios, 1990–2050 (kt CO_2e)

Scenario	1990	2020	2025	2030	2035	2040	2045	2050
High emissions	4,357	3,630	3,403	3,290	3,243	3,209	3,191	3,186
With existing measures central	4,357	3,630	3,403	3,266	3,205	3,163	3,137	3,124
Low emissions	4,357	3,630	3,403	3,238	3,161	3,111	3,073	3,045

Figure 2.5.19: Greenhouse gas emissions under the 'with existing measures', high- and low-emissions scenarios in the Waste sector, 1990–2050



Note: Kt CO_2e = kilotonnes of carbon dioxide equivalent.

2.5.6.3 Sensitivity analysis using sector-based models

2.5.6.3.1 Tokelau

No quantitative sensitivities were produced for Tokelau for the Biennial Transparency Report.

2.5.6.3.2 Land Use, Land-Use Change and Forestry (LULUCF reporting)

As with projections of emissions for any sector, the LULUCF sector is sensitive to the underlying assumptions used. It is challenging to arrive at absolute values of future rates of afforestation, deforestation, harvesting, pre-1990 natural forest sequestration and harvested wood products. Projections of activity data and emission factors are based on external research and analysis, with a range of upper and lower removals estimates to reflect the variability in predictions (table 2.5.22).

The sensitivity of the LULUCF WEM projections to underlying assumptions of afforestation, deforestation, harvesting, pre-1990 natural forest sequestration and harvested wood products is described in section 2.6.3.2. The methods used for determining the carbon impact of the NZ ETS and government forestry initiatives are briefly described below.

New Zealand Emissions Trading Scheme

The impact the NZ ETS has had on afforestation and deforestation varied between 2008 and 2022, depending on the carbon price at the time.

The assessment of the historical and projected impact is primarily based on annual evaluation surveys, research and modelling conducted by the University of Canterbury's School of Forestry.[198] Surveys conducted by the university are used to estimate the amount of deforestation that would occur 'with' and then 'without' the existence of the NZ ETS. The deforestation estimates 'without the NZ ETS' were correlated with historical and projected deforestation rates to determine the impact of the NZ ETS at that time.

In calculating the impact of the NZ ETS on afforestation, only afforestation since the establishment of the NZ ETS in 2008 is considered as being attributable. This creates a distinction between forests that were established before and after the NZ ETS came into effect and ensures only forests established as a direct result of that initiative are included. Research and analysis conducted by the University of Canterbury are used to estimate the impact of the NZ ETS carbon price on afforestation rates in New Zealand.[199]

The research findings provide estimated afforestation 'with' and 'without' carbon prices and are used as a measure of the 'additional' afforestation since 2008 that can be attributed to the establishment of the NZ ETS. The results of this research were then correlated with afforestation rates and carbon prices from 2008 to 2022, and 'with existing measures' projections from 2023 to 2050, to determine the impact that carbon price has had on afforestation.

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198 Manley B. 2024. *Afforestation and Deforestation Intentions Survey 2023: Final report*. Prepared for the Ministry for Primary Industries by Professor B Manley, School of Forestry, University of Canterbury. Wellington: Ministry for Primary Industries.

199 Manley B. 2019. *Impacts of Carbon Prices on Forest Management*. Prepared for the Ministry for Primary Industries by Professor B Manley, School of Forestry, University of Canterbury. Wellington: Ministry for Primary Industries.

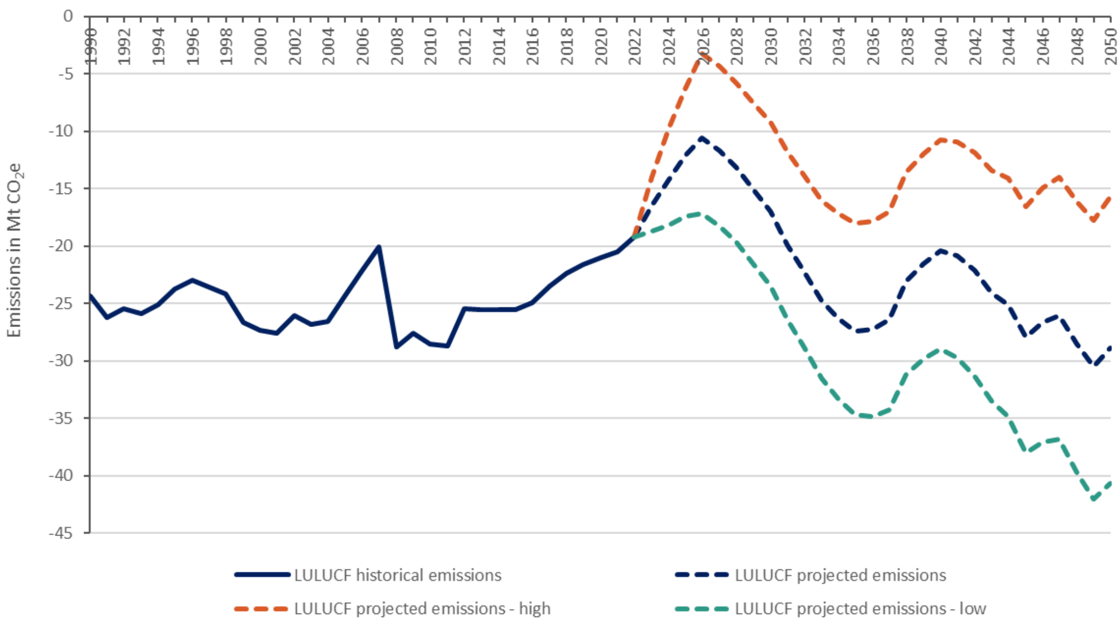
2.5.6.3.3 Government-funded forestry initiatives

Afforestation as a direct result of government forestry initiatives includes those from the Afforestation Grant Scheme, Permanent Forest Sink Initiative, Sustainable Land Management Hill Country Erosion Programme, Erosion Control Funding Programme and the One Billion Trees Programme. See section 2.4 for further details of these government-funded forestry initiatives. Net removal estimates are based on methodologies in the Inventory and simulate forest growth using activity data on forest area, age and species.

Table 2.5.22: Projected net LULUCF removals under 'with existing measures', lower removals and upper removals scenarios, 1990–2050 (Mt CO_2e)

Scenario	1990	2020	2025	2030	2035	2040	2045	2050
Lower removals (high-emissions scenario)	−24.3	−21.1	−6.3	−9.2	−18.0	−10.8	−16.6	−15.7
With existing measures	−24.3	−21.1	−12.2	−17.0	−27.4	−20.4	−27.9	−28.9
Upper removals (low-emissions scenario)	−24.3	−21.1	−17.4	−23.5	−34.7	−29.0	−38.0	−40.7

Figure 2.5.20: Projected net LULUCF removals under 'with existing measures', lower removals and upper removals scenarios, 1990–2050



Note: LULUCF = Land Use, Land-Use Change and Forestry; Mt CO_2e = million tonnes of carbon dioxide equivalent.

2.5.7 'Without measures' scenario

2.5.7.1 Projected gross and net greenhouse gas emissions and removals, under the 'without measures' scenario

New Zealand's historical and projected gross GHG emissions for the WOM scenario are shown in figure 2.5.21[200] and the WOM scenario is defined in table 2.5.23. The WOM scenario is

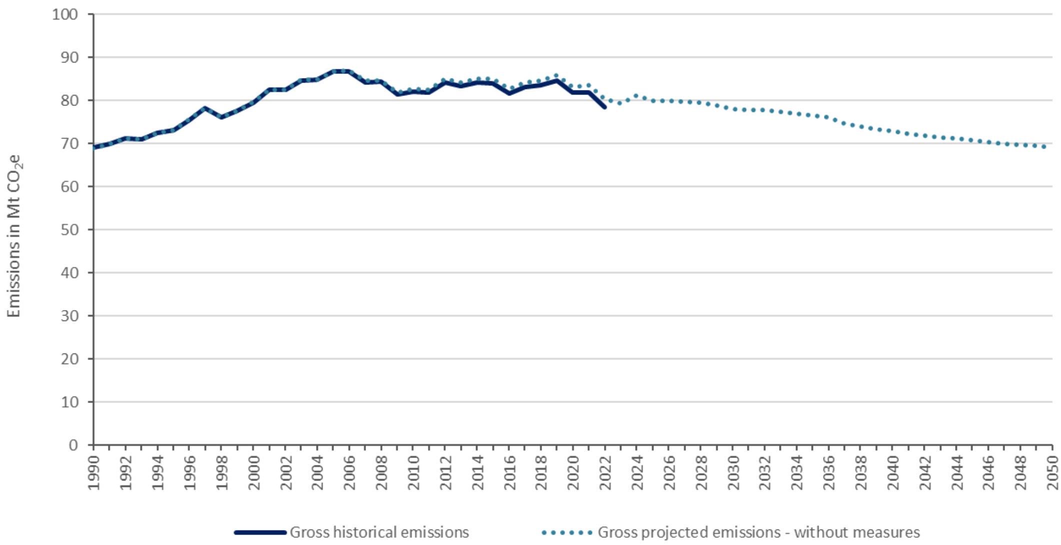
200 Net emissions are gross emissions combined with emissions and removals from the LULUCF sector.

calculated using sector-based modelling methods only and does not employ the ENZ model. ENZ was not used to produce the WOM scenario due to time constraints between producing the WEM projections for this section and adding new functionality to the ENZ model to hindcast emissions for the WOM scenario. Comparisons between the WEM and WOM projections should consider differences in WEM and WOM modelling methodologies, because WEM and WOM differences may also reflect methodological impacts in addition to the impact of policies and measures in the WEM scenario.

Table 2.5.23: Description of 'without measures' scenario

Scenario	Description	Notes
Without measures scenario	Excludes all implemented, adopted and planned policies and measures to the extent possible	This scenario acts as a reference scenario against which with existing measures can be compared, however, without measures and with existing measures are calculated using different modelling approaches and so caution is needed when comparisons are made

Figure 2.5.21: Greenhouse gas emissions for the 'without measures' scenario for gross emissions (total without LULUCF), 1990–2050

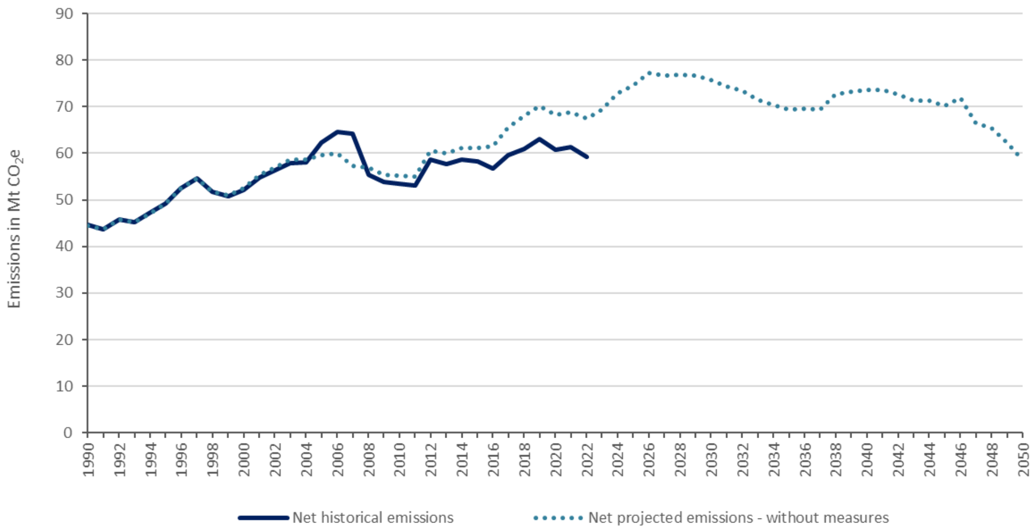


Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

New Zealand's gross emissions (not including emissions and removals from the LULUCF sector) under the WOM scenario are projected to be 78.0 Mt CO_2e (13.4 per cent above 1990 levels) in 2030 and 69.0 Mt CO_2e (0.3 per cent above 1990 levels) in 2050 (figure 2.5.21).

New Zealand's net emissions (including emissions and removals from the LULUCF sector) under the WOM scenario are projected to be 75.7 Mt CO_2e (70.1 per cent above 1990 levels) in 2030 and 58.4 Mt CO_2e (31.1 per cent above 1990 levels) in 2050 (figure 2.5.22).

Figure 2.5.22: Greenhouse gas emissions for the 'without measures' scenario for net emissions (total with LULUCF), 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

The gross emissions projections in this section are a component of the indicator used in the measurement of progress towards New Zealand's NDC1 under the Paris Agreement.

The projections of gross emissions and net emissions (including emissions and removals from the LULUCF sector) are summarised by sector and gas in table 2.5.24 for the WOM scenario.

Table 2.5.24: New Zealand greenhouse gas emissions and removals under 'without measures' scenario, 1990–2050 (Mt CO_2e)

	Historical							Projected					
	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Sector													
Energy	15.9	15.7	18.3	21.6	18.9	18.5	17.7	15.5	14.2	13.7	11.7	11.4	11.2
Transport	8.1	10.2	11.6	13.0	13.3	13.8	13.2	14.6	14.3	13.3	11.4	9.3	7.7
IPPU	3.37	3.16	3.47	3.98	4.41	5.02	4.68	4.92	4.70	4.50	4.32	4.29	4.23
Agriculture	37.1	39.3	41.3	43.2	41.2	43.0	43.3	40.8	40.8	41.0	41.3	41.5	41.8
LULUCF	–24.3	–23.8	–27.1	–27.1	–27.5	–23.8	–15.0	–5.4	–2.3	–7.2	0.6	–0.6	–10.6
Waste	4.36	4.69	4.90	4.85	4.76	4.53	4.25	4.11	4.11	4.12	4.13	4.15	4.16
Tokelau	0.003	0.003	0.004	0.005	0.005	0.004	0.004	0.005	0.005	0.004	0.004	0.004	0.004
Gas, excluding net emissions from LULUCF sector													
CO_2	25.5	28.0	32.2	37.4	34.8	35.8	34.0	33.3	31.7	30.2	26.4	23.9	22.1
CH_4	37.5	39.0	40.9	41.6	40.1	40.6	40.1	38.0	37.7	37.9	38.2	38.5	38.7
N_2O	5.0	5.8	6.2	6.9	6.7	7.1	7.4	7.0	7.1	7.1	7.1	7.1	7.1
HFCs	0.00	0.03	0.23	0.62	0.93	1.28	1.55	1.64	1.50	1.30	1.12	1.09	1.02
PFCs	0.82	0.14	0.08	0.06	0.04	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05
SF_6	0.00	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

	Historical							Projected					
	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Gas, including net emissions from LULUCF sector													
CO_2	1.2	4.2	5.2	10.3	7.4	12.0	19.0	27.9	29.4	23.0	27.0	23.3	11.4
CH_4	37.5	39.0	40.9	41.6	40.1	40.6	40.1	38.0	37.7	37.9	38.2	38.5	38.7
N_2O	5.0	5.8	6.2	6.9	6.7	7.1	7.4	7.0	7.1	7.1	7.1	7.1	7.1
HFCs	0.00	0.03	0.23	0.62	0.93	1.28	1.55	1.64	1.50	1.30	1.12	1.09	1.02
PFCs	0.82	0.14	0.08	0.06	0.04	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05
SF_6	0.00	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Total excl LULUCF	**68.8**	**73.0**	**79.6**	**86.7**	**82.6**	**84.9**	**83.2**	**80.0**	**78.0**	**76.6**	**72.9**	**70.7**	**69.0**
Total incl LULUCF	**44.5**	**49.2**	**52.5**	**59.6**	**55.2**	**61.1**	**68.2**	**74.6**	**75.7**	**69.4**	**73.5**	**70.1**	**58.4**

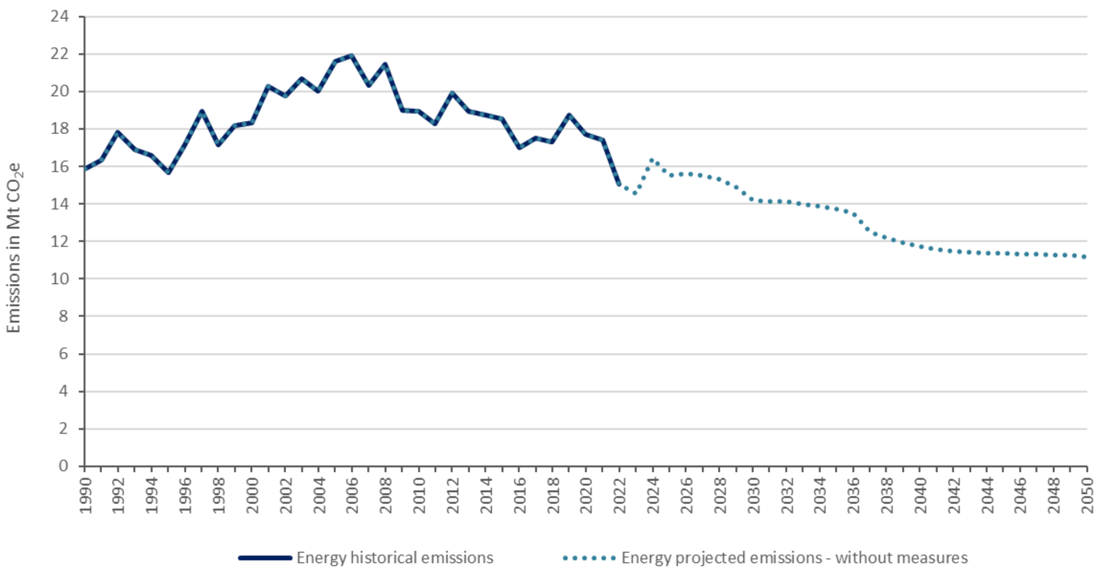
Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; IPPU = Industrial Process and Product Use; LULUCF = Land Use, Land-Use Change and Forestry; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

2.5.7.2 Emissions projections by sector, under the 'without measures' scenario

2.5.7.2.1 Energy (excluding Transport)

Emissions from the Energy sector under the WOM scenario are projected to decrease to 14.2 Mt CO_2e by 2030 (10.6 per cent below 1990 levels and 5.5 per cent below 2022 levels) and to 11.2 Mt CO_2e by 2050 (29.8 per cent below 1990 levels and 25.8 per cent below 2022 levels). Figure 2.5.23 presents historical GHG emissions from 1990 to 2022 and projected GHG emissions under the WOM scenario out to 2050 for the Energy sector. Table 2.5.25 presents the WOM scenario by gas in five-yearly increments.

Figure 2.5.23: Greenhouse gas emissions for the 'without measures' scenario in the Energy sector, 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.5.25: Historical and projected Energy sector emissions by gas under the 'without measures' scenario, 1990–2050 (Mt CO_2e)

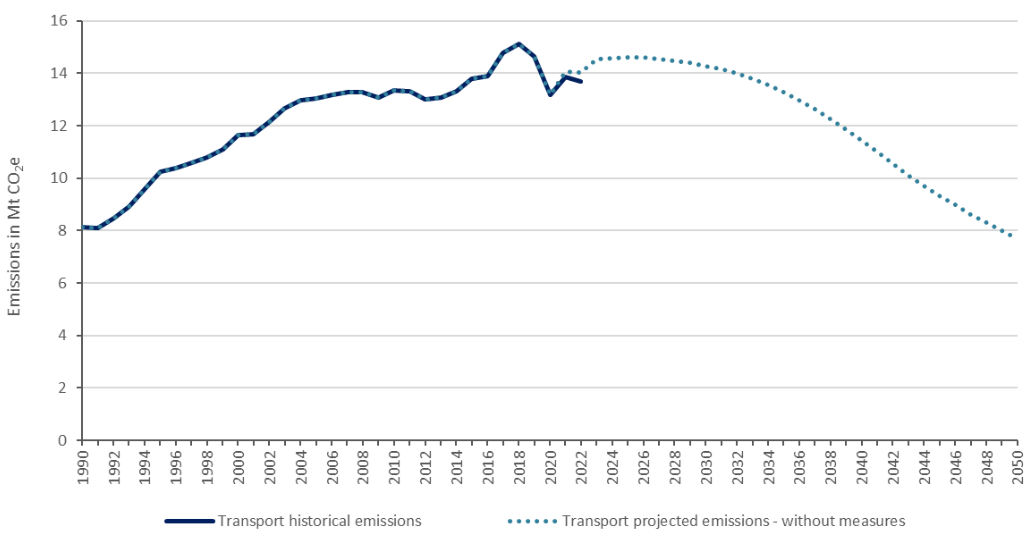
	Historical							Projected					
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
CO_2	14.6	14.4	17.0	20.2	17.3	17.5	17.0	14.8	13.5	13.0	11.0	10.6	10.4
CH_4	1.2	1.1	1.3	1.2	1.5	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.6
N_2O	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	**15.9**	**15.7**	**18.3**	**21.6**	**18.9**	**18.5**	**17.7**	**15.5**	**14.2**	**13.7**	**11.7**	**11.4**	**11.2**

Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.7.2.2 Transport

Emissions from the Transport sector under the WOM scenario are projected to increase to 14.3 Mt CO_2e by 2030 (75.9 per cent above 1990 levels and 1.9 per cent above 2022 levels) and to decrease to 7.7 Mt CO_2e by 2050 (5.3 per cent below 1990 levels and 45.2 per cent below 2022 levels). Figure 2.5.24 presents historical GHG emissions from 1990 to 2022 and projected WOM GHG emissions out to 2050 for the Transport sector. Table 2.5.26 presents the WOM scenario by gas in five-yearly increments.

Figure 2.5.24: Greenhouse gas emissions for the 'without measures' scenario in the Transport sector, 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.5.26: Historical and projected Transport sector emissions by gas under the 'without measures' scenario, 1990–2050 (Mt CO_2e)

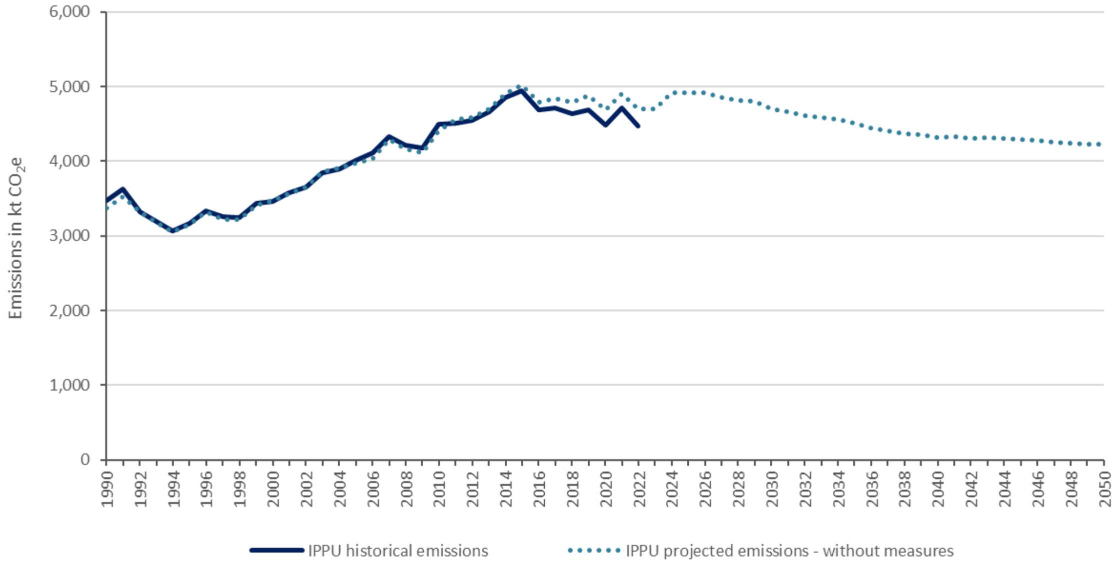
	Historical							Projected					
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
CO_2	7.9	10.0	11.4	12.8	13.1	13.6	13.1	14.5	14.2	13.2	11.3	9.3	7.6
CH_4	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N_2O	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	**8.1**	**10.2**	**11.6**	**13.0**	**13.3**	**13.8**	**13.2**	**14.6**	**14.3**	**13.3**	**11.4**	**9.3**	**7.7**

Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.7.2.3 Industrial Processes and Product Use

Emissions from the IPPU sector under the WOM scenario are projected to increase to 4.7 Mt CO_2e by 2030 (39.5 per cent above 1990 levels and 0.01 per cent above 2022 levels) and to decrease to 4.2 Mt CO_2e by 2050 (25.4 per cent above 1990 levels and 10.1 per cent below 2022 levels). Figure 2.5.25 presents historical GHG emissions from 1990 to 2022 and projected WOM GHG emissions out to 2050 for the IPPU sector. Table 2.5.27 presents the WOM scenario by gas in five-yearly increments.

Figure 2.5.25: Greenhouse gas emissions for the 'without measures' scenario in the IPPU sector, 1990–2050



Note: IPPU = Industrial Processes and Product Use; kt CO_2e = kilotonnes of carbon dioxide equivalent.

Table 2.5.27: Historical and projected IPPU sector emissions by gas under the 'without measures' scenario, 1990–2050 (kt CO_2e)

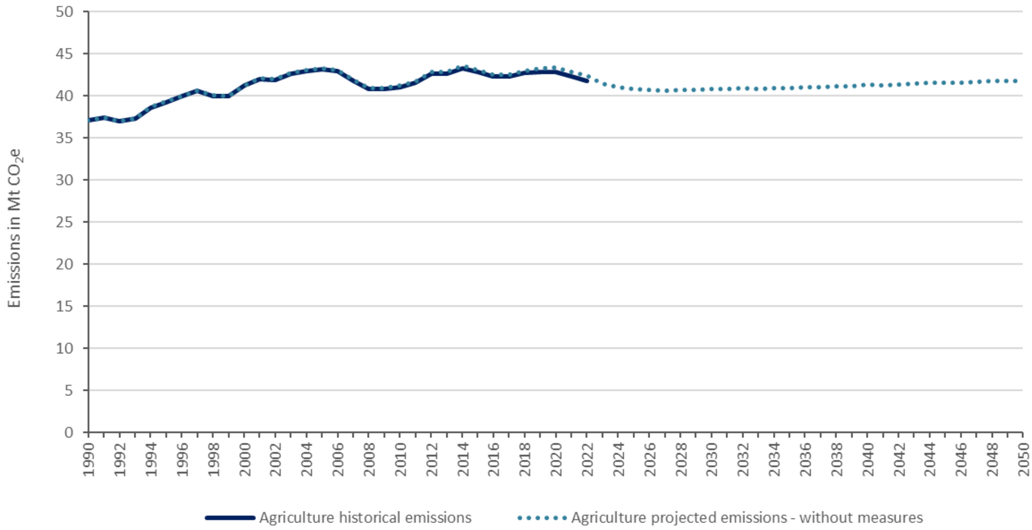
	Historical						Projected						
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	2,520	2,814	2,922	3,209	3,319	3,503	2,868	3,011	3,011	3,011	3,011	3,011	3,011
CH_4	31	89	155	22	53	120	108	98	0	0	0	0	0
N_2O	0	70	55	40	47	53	66	104	123	123	123	123	123
HFCs	0	26	235	618	926	1,279	1,548	1,638	1,498	1,302	1,116	1,090	1,024
PFCs	818	139	85	62	43	53	79	51	51	51	51	51	51
SF_6	0	22	20	26	24	17	17	19	16	16	16	16	16
Total	**3,369**	**3,160**	**3,472**	**3,977**	**4,412**	**5,024**	**4,685**	**4,699**	**4,919**	**4,699**	**4,504**	**4,317**	**4,291**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

2.5.7.2.4 Agriculture

Emissions from the Agriculture sector under the WOM scenario are projected to decrease to 40.8 Mt CO_2e by 2030 (9.8 per cent above 1990 levels and 3.9 per cent below 2022 levels) and to 41.8 kt CO_2e by 2050 (12.6 per cent above 1990 levels and 1.5 per cent below 2022 levels). Figure 2.5.26 presents historical GHG emissions from 1990 to 2022 and projected WOM GHG emissions out to 2050 for the Agriculture sector. Table 2.5.28 presents the WOM scenario by gas in five-yearly increments.

Figure 2.5.26: Greenhouse gas emissions for the 'without measures' scenario in the Agriculture sector, 1990–2050



Note: Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.5.28: Historical and projected Agriculture sector emissions by gas under the 'without measures' scenario, 1990–2050 (Mt CO_2e)

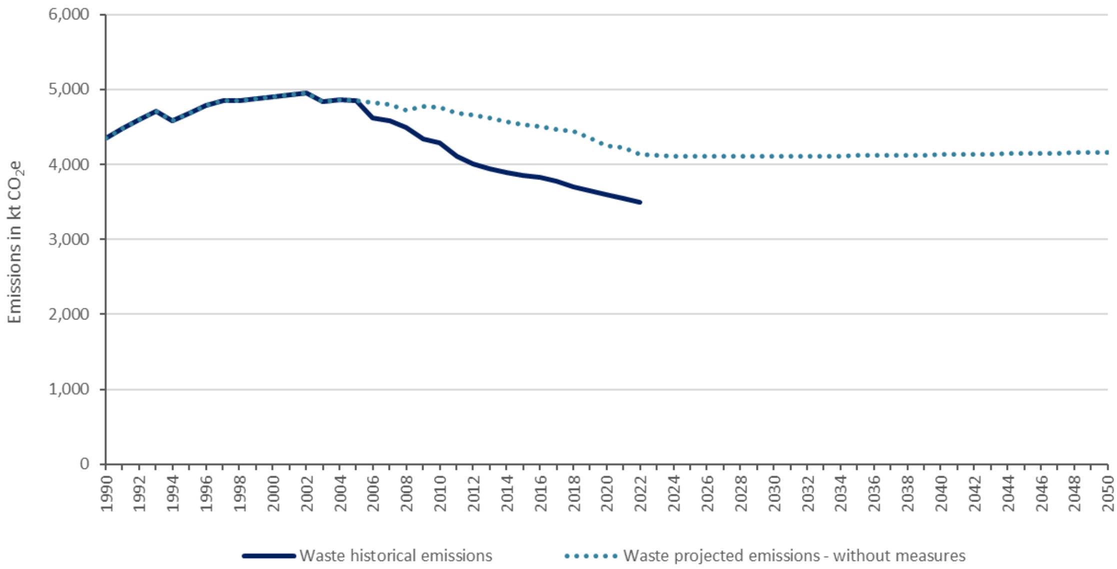
	Historical							Projected					
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	0.3	0.6	0.8	1.1	1.0	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9
CH_4	32.1	33.3	34.7	35.7	33.9	35.3	35.4	33.4	33.3	33.5	33.8	34.0	34.2
N_2O	4.7	5.4	5.7	6.5	6.3	6.7	7.0	6.5	6.6	6.6	6.7	6.7	6.7
Total	**37.1**	**39.3**	**41.3**	**43.2**	**41.2**	**43.0**	**43.3**	**40.8**	**40.8**	**41.0**	**41.3**	**41.5**	**41.8**

Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.7.2.5 Waste

Emissions from the Waste sector under the WOM scenario are projected to decrease to 4.1 Mt CO_2e by 2030 (5.7 per cent below 1990 levels and 0.7 per cent below 2022 levels) and to increase to 4.2 kt CO_2e by 2050 (4.4 per cent below 1990 levels and 0.7 per cent above 2022 levels). Figure 2.5.27 presents historical GHG emissions from 1990 to 2022 and projected WOM GHG emissions out to 2050 for the Waste sector. Table 2.5.29 presents the WOM scenario by gas in five-yearly increments.

Figure 2.5.27: Greenhouse gas emissions for the 'without measures' scenario in the Waste sector, 1990–2050



Note: Kt CO_2e = kilotonnes of carbon dioxide equivalent.

Table 2.5.29: Historical and projected Waste sector emissions by gas under the 'without measures' scenario, 1990–2050 (kt CO_2e)

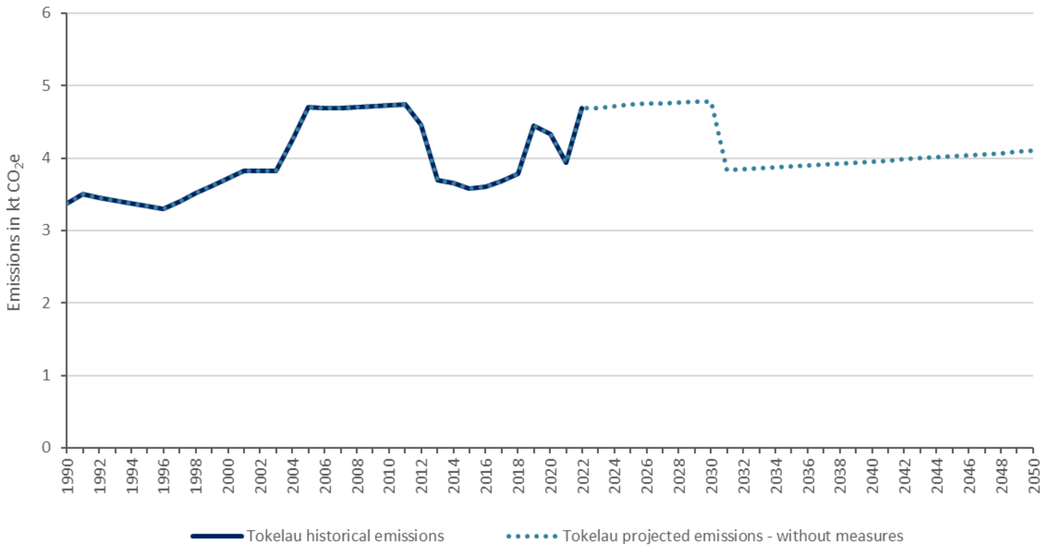
	Historical						Projected						
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	154	132	145	116	105	97	87	85	106	120	124	125	125
CH_4	4,103	4,449	4,645	4,620	4,538	4,302	4,019	3,902	3,849	3,827	3,825	3,834	3,846
N_2O	100	104	114	112	116	131	149	151	157	163	168	172	175
Total	**4,357**	**4,685**	**4,905**	**4,848**	**4,760**	**4,530**	**4,254**	**4,138**	**4,112**	**4,110**	**4,116**	**4,130**	**4,146**

Note: CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.5.7.2.6 Tokelau

Emissions from Tokelau under the WOM scenario are projected to increase to 4.78 kt CO_2e by 2030 (41.8 per cent above 1990 levels and 2.1 per cent above 2022 levels) and to 4.10 kt CO_2e by 2050 (21.6 per cent above 1990 levels and 12.5 per cent below 2022 levels). Figure 2.5.28 presents historical GHG emissions from 1990 to 2022 and projected WOM GHG emissions out to 2050 for Tokelau. Table 2.5.30 presents the WOM scenario by gas in five-yearly increments.

Figure 2.5.28: Tokelau's greenhouse gas emissions for the 'without measures' scenario, 1990–2050



Note: Kt CO_2e = kilotonnes of carbon dioxide equivalent.

Table 2.5.30: Tokelau's historical and projected emissions by gas under the 'without measures' scenario, 1990–2050 (kt CO_2e)

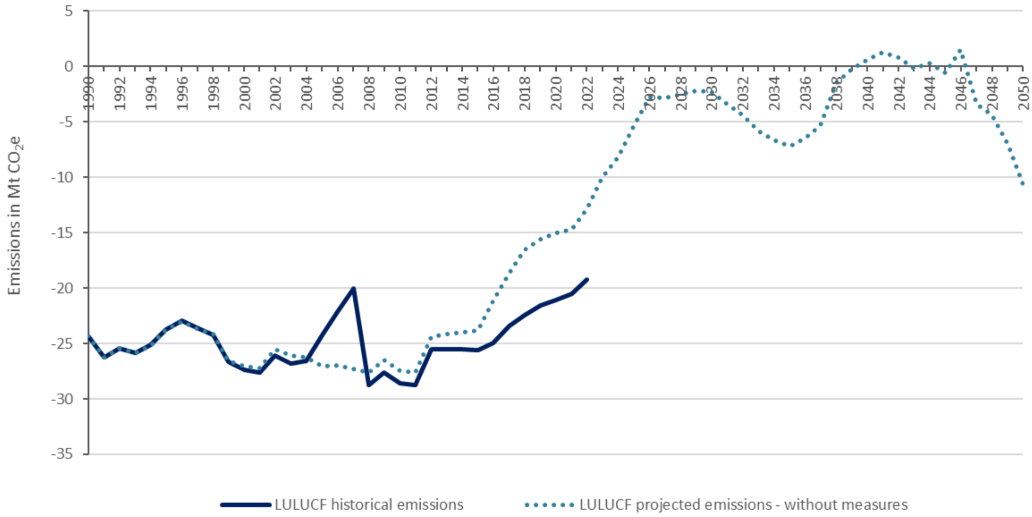
	Historical							Projected					
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	1.3	1.4	1.5	2.4	2.5	1.6	2.4	2.8	2.9	2.9	2.1	2.2	2.3
CH_4	2.0	1.9	2.2	2.2	2.0	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
N_2O	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HFCs	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total	**3.4**	**3.3**	**3.7**	**4.7**	**4.7**	**3.6**	**4.3**	**4.7**	**4.7**	**4.8**	**3.9**	**4.0**	**4.0**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

2.5.7.2.7 Land Use, Land-Use Change and Forestry (LULUCF) reporting

Emissions from the LULUCF reporting sector under the WOM scenario are projected to decrease to –2.3 Mt CO_2e by 2030 (90.5 per cent below 1990 levels and 82.0 per cent below 2022 levels) and to –10.6 kt CO_2e by 2050 (56.3 per cent below 1990 levels and 17.3 per cent below 2022 levels). Figure 2.5.29 presents historical GHG emissions from 1990 to 2022 and projected WOM GHG emissions out to 2050 for the LULUCF reporting sector. Table 2.5.31 presents the WOM scenario by CO_2 emissions in five-yearly increments.

Figure 2.5.29: Greenhouse gas emissions for the 'without measures' scenario in the LULUCF sector, 1990–2050



Note: LULUCF = Land Use, Land-Use Change and Forestry; Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.5.31: Historical and projected LULUCF sector emissions and removals by gas under the 'without measures' scenario, 1990–2050 (Mt CO_2e)

	Historical						Projected						
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
CO_2	–24.3	–23.8	–27.1	–27.1	–27.5	–23.8	–15.0	–5.4	–2.3	–7.2	0.6	–0.6	–10.6
Total	**–24.3**	**–23.8**	**–27.1**	**–27.1**	**–27.5**	**–23.8**	**–15.0**	**–5.4**	**–2.3**	**–7.2**	**0.6**	**–0.6**	**–10.6**

Note: CO_2 = carbon dioxide.

2.5.7.3 Methodologies for the 'without measures' scenario

The WOM scenario for all sectors is calculated using the same sector-based models described in section 2.5.5.3 and does not apply the ENZ model.

2.5.7.3.1 Energy

The WOM scenario for the Energy sector is calculated by removing modifications made to reflect emissions mitigation policy impacts. The NZ ETS carbon price is set to $0, fuel switching assumptions associated with policies are reduced, and specific industry and capital expenditure adjustments are reversed.

2.5.7.3.2 Transport

The WOM projections start from 2021 for the Transport sector because the main transport policies, such as the Clean Car Discount Scheme and public transport bus decarbonisation, were introduced in 2021, and the Clean Car Standard in 2023. The NZ ETS price was very low and the impact of the road user charges exemption for EVs is considered very small before 2021. In addition, going back further would introduce extra uncertainty due to simulation of road vehicle scrappage and registration patterns.

2.5.7.3.3 Industrial Processes and Product Use

The WOM scenario for the IPPU sector is calculated by modifying impacts to HFC emissions from policy settings. For HFC emissions, the WOM scenario does not include impacts from the Kigali Amendment phase-down and assumes no NZ ETS price, as well as negligible recycled imports, and only includes internationally driven technology shifts.

2.5.7.3.4 Agriculture

The WOM scenario for the Agriculture sector adjusts population and productivity estimates in both historical and projected years, to remove the estimated impact of NZ ETS-driven afforestation and other afforestation schemes. Sheep, beef cattle and deer populations were calculated using a percentage change in stock based on the forestry-driven, stock change analysis.

The impact of the Essential Freshwater package and nitrogen fertiliser cap was removed by adjusting relevant livestock, production and fertiliser use data.

2.5.7.3.5 Waste

The WOM scenario for the Waste sector is calculated by establishing a central WEM emissions pathway and then estimating the annual emissions reductions achieved by each policy influencing it. These reductions are then added back to the WEM pathway to generate the WOM pathway.

2.5.7.3.6 Tokelau

Tokelau's emissions were projected using a hybrid of a top-down and bottom-up approach. The model used is an extension of the Inventory model and assumptions on future emissions trends were made. The same methodology was used in the Fifth Biennial Report. However, assumptions have been updated and the projections are based off Inventory 2024 data.

2.5.7.3.7 Land Use, Land-Use Change and Forestry (LULUCF reporting)

An accurate estimate of the WOM scenario is developed by subtracting each LULUCF policy and measure from the WEM scenario. Each LULUCF policy and measure is calculated on an individual basis using a bottom-up approach and the methods for determining the impact of each policy and measure are described in section 2.5.5.3. Specific policy and measure exclusions are:

- the WOM scenario excludes the estimated historical and projected effects of the NZ ETS and government forestry initiatives on net LULUCF removals
- the WOM scenario excludes the estimated impact of the NZ ETS on levels of afforestation and on pre-1990 planted forest deforestation
- the WOM scenario also assumes the exclusion of afforestation as a direct result of government forestry initiatives, such as the Afforestation Grant Scheme, Permanent Forest Sink Initiative, Sustainable Land Management Hill Country Erosion Programme, Erosion Control Funding Programme and the One Billion Trees Programme.

2.6 Projections of indicators necessary to track progress made in implementing and achieving Nationally Determined Contributions

Key messages

New Zealand's first Nationally Determined Contribution (NDC1) is a point year target to reduce net greenhouse gas emissions to 50 per cent below gross 2005 levels by 2030, managed as a multi-year emissions budget. The budget provisionally equates to 579 million tonnes of carbon dioxide equivalent (Mt CO_2e) over 2021 to 2030.

Progress made in implementing and achieving New Zealand's NDC1 is measured using a net target accounting approach.

New Zealand monitors its NDC1 progress using an indicator of annual net target accounting emissions.

New Zealand's net target accounting emissions are projected to be 668.2 Mt CO_2e across 2021 to 2030, 89.2 Mt CO_2e higher than the NDC1 provisional budget of 579 Mt CO_2e. This does not include the impact of second emissions reduction plan policies and updated data, which are projected to reduce this gap further to 84.0 Mt CO_2e. These updates were unable to be included as the Biennial Transparency Report applied an earlier cut-off date for modelling assumptions compared with the second emissions reduction plan.

New Zealand is making progress toward achieving NDC1 through domestic action and is also exploring cooperation opportunities under Article 6 of the Paris Agreement. Although New Zealand does not have agreements to purchase internationally transferred mitigation outcomes, New Zealand is progressing partnerships that could enable the future use of international carbon markets.

2.6.1 Introduction

Under the Paris Agreement, progress in implementing and achieving Nationally Determined Contributions (NDCs) is based on self-determined indicators. New Zealand's indicator of annual net target accounting emissions is applied to monitor NDC progress (see section 2.3.2 and methodology in section 2.3.4). This section describes New Zealand's projections of that indicator.

New Zealand's definition of net target accounting emissions includes all gross emissions as reported in New Zealand's Greenhouse Gas Inventory (the Inventory), a subset of Land Use, Land-Use Change and Forestry (LULUCF) emissions and removals that are derived from eligible activities, known as LULUCF target accounting quantities. It may also include cooperative approaches that involve the use of internationally transferred mitigation outcomes. Net target accounting emissions are designed to be compatible with New Zealand's international net emissions targets under which only additional action is accounted for.

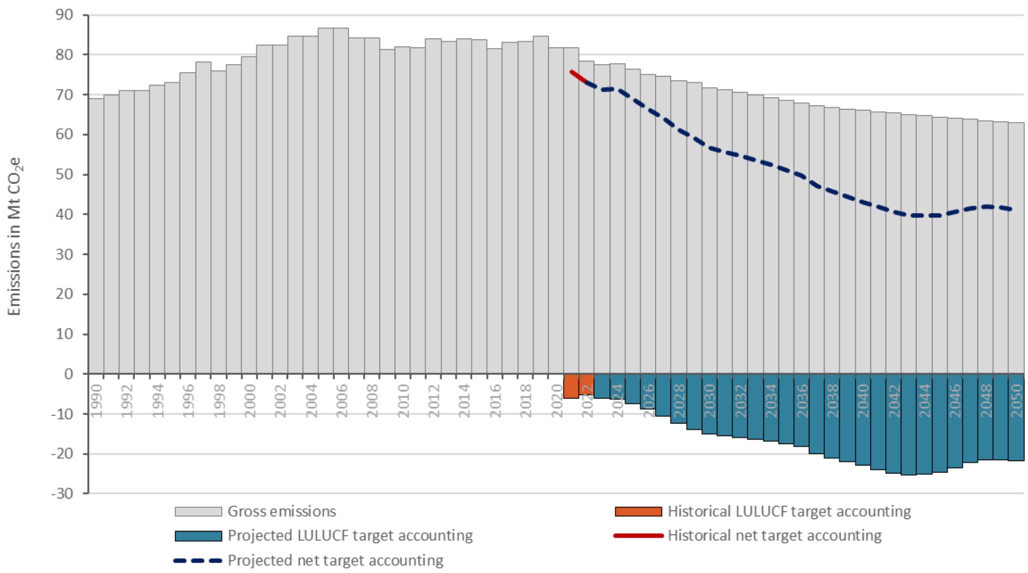
Projections of gross emissions are covered in detail in section 2.5, with a summary in section 2.6.3.1. The trends in projections and methodology for projections of LULUCF target accounting quantities are described in section 2.6.3.2.

2.6.2 Summary of projections and indicator

The projections of gross emissions are described in section 2.5 for the 'with existing measures' (WEM) and 'without measures' scenarios. For New Zealand's indicator of annual net target accounting emissions, only the WEM scenario is projected.

Figure 2.6.1 shows annual net target accounting emissions and the two components, namely gross emissions from 1990 and LULUCF target accounting quantities from 2021 onwards, using the WEM scenario. Gross emissions are shown over the historical period (1990 to 2022), with projections from 2023 to 2050, in line with the presentation of projections in section 2.5. LULUCF target accounting quantities and net target accounting emissions are shown for the historical period (2021 to 2022) and for the projected period (2023 to 2050).

Figure 2.6.1: Annual net target accounting emissions and components, 'with existing measures' scenario, 1990–2050



Note: LULUCF = Land Use, Land-Use Change and Forestry; Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.6.1 summarises annual net target accounting emissions from 2020 to 2030 and on a five-yearly basis for 2035 and 2040. Emissions and accounting quantities are provided for the 2020 year, to provide transparency of the emissions budget calculation.

Table 2.6.1: New Zealand net target accounting emissions, 'with existing measures' scenario, 2020–2050 (Mt CO_2e)

	Historical			Projected											
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	2045	2050
Gross emissions	81.9	81.8	78.4	77.4	77.9	76.5	75.1	74.7	73.5	73.2	71.7	68.6	66.1	64.4	62.9
LULUCF target accounting quantities	−6.2	−6.1	−5.3	−6.2	−6.3	−7.4	−8.8	−10.5	−12.4	−14.0	−15.0	−17.4	−22.9	−24.7	−21.8
Annual net target accounting emissions	**75.7**	**75.7**	**73.1**	**71.3**	**71.5**	**69.1**	**66.3**	**64.2**	**61.1**	**59.1**	**56.7**	**51.2**	**43.2**	**39.7**	**41.2**

Note: Columns may not total due to rounding. LULUCF = Land Use, Land-Use Change and Forestry.

Under the WEM scenario, New Zealand's net target accounting estimates are projected to be 69.1 million tonnes of carbon dioxide equivalent (Mt CO_2e) in 2025, 56.7 Mt CO_2e in 2030, 51.2 Mt CO_2e in 2035, 43.2 Mt CO_2e in 2040, 39.7 Mt CO_2e in 2045 and 41.2 Mt CO_2e in 2050.

New Zealand's net target accounting emissions are projected to be 668.2 Mt CO_2e across 2021 to 2030, 89.2 Mt CO_2e higher than the NDC1 provisional budget of 579 Mt CO_2e. This does not include the impact of second emissions reduction plan policies and updated data, which are projected to reduce this gap further to 84.0 Mt CO_2e. These updates were unable to be included as the Biennial Transparency Report applied an earlier cut-off date for modelling assumptions compared with the second emissions reduction plan.

The projections of gross and net emissions (including LULUCF target accounting quantities) are summarised by sector and by gas in table 2.6.2 for the WEM scenario.

Table 2.6.2: New Zealand's net target accounting emissions by sector under the 'with existing measures' scenario 2005–2050 (Mt CO_2e)

	Historical				Projected					
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Sector										
Energy	21.6	18.9	18.5	17.7	14.9	12.4	11.0	10.5	10.7	10.7
Transport	13.0	13.3	13.8	13.2	14.3	13.7	12.6	10.8	8.9	7.4
IPPU	4.01	4.50	4.94	4.48	4.23	3.11	3.03	2.91	2.92	2.83
Agriculture	43.1	41.0	42.8	42.9	39.6	39.1	38.8	38.7	38.8	38.8
LULUCF Target Accounting	–	–	–	−6.2	−7.4	−15.0	−17.4	−22.9	−24.7	−21.8
Waste	4.85	4.28	3.86	3.60	3.40	3.27	3.21	3.16	3.14	3.12
Tokelau	0.005	0.005	0.004	0.004	0.005	0.005	0.004	0.004	0.004	0.004
Gas, excluding net emissions from LULUCF target accounting pre-2020										
CO_2	37.4	34.8	35.8	34.0	24.4	13.0	8.0	0.1	-3.3	-1.8
CH_4	41.5	39.5	39.7	39.0	36.3	35.4	35.1	35.1	35.1	35.1
N_2O	6.9	6.7	7.1	7.4	7.2	7.1	7.1	7.0	7.0	7.0
HFCs	0.65	1.01	1.20	1.34	1.13	1.04	0.96	0.83	0.84	0.75
PFCs	0.06	0.04	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05

	Historical				Projected					
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
SF_6	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Total excl LULUCF target accounting	**86.6**	**82.1**	**83.9**	**81.9**	**76.5**	**71.7**	**68.6**	**66.1**	**64.4**	**62.9**
Total incl LULUCF target accounting	**–**	**–**	**–**	**75.7**	**69.1**	**56.7**	**51.2**	**43.2**	**39.7**	**41.2**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; IPPU = Industrial Processes and Product Use; LULUCF = Land Use, Land-Use Change and Forestry; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

2.6.3 Projections of components of the indicator

The indicator, annual net target accounting emissions, is made up of three components:

1. gross emissions
2. LULUCF target accounting quantities (a subset of Land Use, Land-Use Change and Forestry emissions and removals)
3. may include cooperative approaches that involve the use of internationally transferred mitigation outcomes.

This section provides details of the trends and methodology for projections of each component.

2.6.3.1 Gross emissions

2.6.3.1.1. Trends

Trends in New Zealand's historical gross emissions are described in section 2.5.2.

Details of the historical trends by sector in New Zealand's gross emissions are provided in sections 2.5.4.1 (Energy), 2.5.4.2 (Transport), 2.5.4.3 (Industrial Processes and Product Use), 2.5.4.4 (Agriculture), 2.5.4.5 (Waste) and 2.5.4.6 (Tokelau).

2.6.3.1.2 Methodology

The methodology for projections of emissions sources of New Zealand's gross emissions is provided by sector in section 2.5.5.3 for Energy, Transport, Industrial Processes and Product Use, Agriculture, Waste and Tokelau.

2.6.3.2 Land Use, Land-Use Change and Forestry target accounting quantities

The projections for LULUCF target accounting quantities differ from the LULUCF sector emissions covered in section 2.5. This is because New Zealand is applying accounting rules to the LULUCF sector.

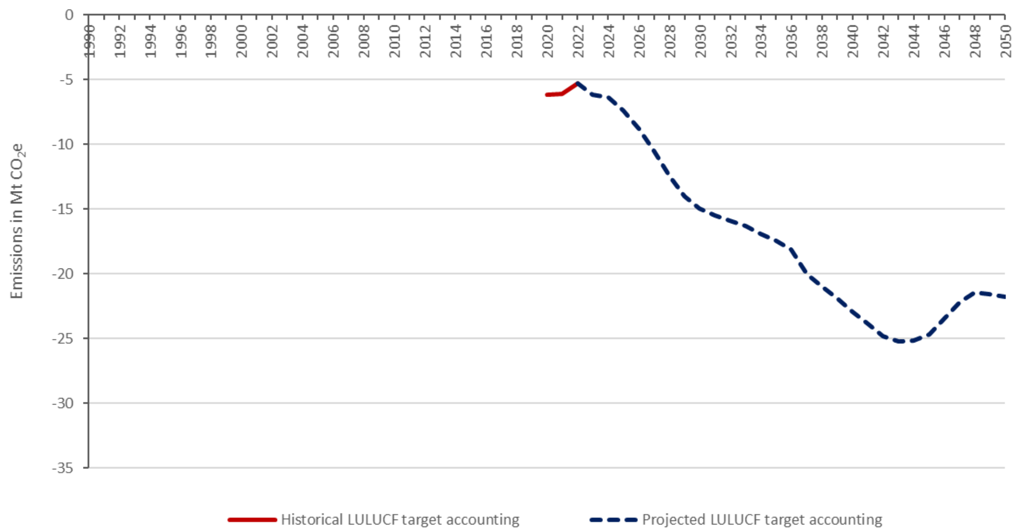
LULUCF target accounting projections are used to assess the net additional impact on the atmosphere of carbon fluxes from eligible activities[201] that occur during the period covered by the emissions reduction commitment. Similar LULUCF target accounting rules were applied for measuring progress towards New Zealand's previous Kyoto Protocol targets, and a modified version of the Kyoto Protocol accounting rules is being applied for tracking progress towards the first Nationally Determined Contribution (NDC1). It is also used for reporting against New Zealand's domestic net zero target by 2050 and tracking progress to meet domestic emissions budgets.

The methodology being applied to obtain New Zealand's LULUCF target accounting quantities is set out in sections 2.3.4.2, 2.3.4.3, 2.3.4.4 and 2.3.4.5. The LULUCF target accounting projections presented here only include emissions and removals from the following eligible activities: *Afforestation and reforestation* and *Deforestation*. While we are also accounting for *Forest management* activities, net emissions from these activities are expected to be as projected in the Forest Reference Level, against which these activities are accounted for. More detail on the accounting methodology for LULUCF target accounting projections can be found later in this section and annex 2.

2.6.3.2.1 Trends

Historical and projected net LULUCF target accounting quantities are shown in figure 2.6.2. The decrease from around 2023 can be attributed to total projected afforestation of around 851,500 hectares over 2023 to 2050 and around 1,822 hectares per year of projected deforestation from 2023. The projected increase in the 2040s can largely be attributed to production forests first planted in the early 2020s reaching their long-term average carbon stock and no longer contributing removals under *Afforestation and reforestation*.

Figure 2.6.2: Historical and projected net LULUCF target accounting quantities ('with existing measures' scenario), 2020–2050



Note: LULUCF = Land Use, Land-Use Change and Forestry; Mt CO_2e = million tonnes of carbon dioxide equivalent.

[201] Eligible activities refer to Land Use, Land-Use Change and Forestry (LULUCF) activities for which accounting methods have been developed by the Intergovernmental Panel on Climate Change (see IPCC 2014, 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol, Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). Switzerland: IPCC.

Projections for carbon dioxide, methane and nitrous oxide are provided in table 2.6.3. The trend in historical and projected net LULUCF target accounting quantities is predominantly driven by net removals of carbon dioxide. The emissions of methane and nitrous oxide have a small effect on the net total.

Table 2.6.3: Historical and projected LULUCF target accounting quantities by gas under the 'with existing measures' scenario, 2020–2050 (Mt CO_2e)

	Historical	Projected					
Gas	2020	2025	2030	2035	2040	2045	2050
CO_2	–6.3	–7.5	–15.1	–17.6	–23.1	–24.8	–21.9
CH_4	0.02	0.02	0.02	0.02	0.02	0.02	0.02
N_2O	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Total	**–6.2**	**–7.4**	**–15.0**	**–17.4**	**–22.9**	**–24.7**	**–21.8**

Note: LULUCF target accounting quantities are provided for the 2020 year for transparency of the emissions budget calculation. CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide.

2.6.3.2.2 Methodology

The forest carbon model, long-term carbon stock averages, deforestation and afforestation data sources, assumptions and results that, together, produce LULUCF target accounting projections are described here and in the following sections.

The method for developing LULUCF target accounting projections applies a forest carbon model based on a forest growth simulation. The growth simulation models how much carbon will be sequestered in a forest over its lifetime and takes account of established forests plus projected afforestation. The growth simulation for post-1989 forests begins at 1990 and applies national carbon yield tables that provide carbon stock and change estimates by age on a per-hectare basis.

The LULUCF target accounting projections model for post-1989 forests tracks the area planted and deforested over time. It generates annual estimates of carbon stock and carbon stock change (change in stored carbon within a forest as the forest grows) by multiplying the area planted by the carbon yield per hectare. This method estimates post-1989 forest net emissions from growth and forest management practices, including pruning and harvest, and net emissions from all deforestation activities.

The growth simulation for post-1989 forest starts at 1990, which allows for legacy carbon emissions and removals from land-use changes that have occurred between 1990 and 2022 to be included in the projections from 2023 to 2050. Starting the growth simulation in 1990 also allows for the long-term average carbon stock to be tracked for production forests (see 'Long-term average carbon stock' below).

The modelling also includes non-carbon dioxide emissions, soil carbon stock changes, all vegetation and biomass change due to *Afforestation and reforestation* and *Deforestation* activities. This is consistent with the 2006 Intergovernmental Panel on Climate Change Guidelines for LULUCF sector reporting.[202]

[202] IPCC. 2006. Eggleston HS, Buendia L, Miwa K, Ngara T, Tanabe K (eds). *2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 1. General Guidance and Reporting.* IPCC National Greenhouse Gas Inventories Programme. Japan: Institute for Global Environmental Strategies for IPCC.

Projections of emissions from *Forest management* activities in pre-1990 forests have not been modelled. Their contribution to the LULUCF target accounting quantities is assumed to be zero at this stage because they are expected to be consistent with the Forest Reference Level that has been calculated for NDC1. *Forest management* activities will be accounted for against the Forest Reference Level at the end of the NDC1 period.

2.6.3.2.3 Main assumptions

Long-term average carbon stock

The long-term average carbon stocks and transition ages for post-1989 forests are based on research completed by Scion in 2024.[203] The long-term average carbon stock is calculated by averaging the overall contribution that a newly established forest will contribute towards removing carbon dioxide from the atmosphere over multiple rotations, that is, after harvest residues and harvested wood products from previous rotations have stabilised. The long-term average carbon stock used in the projections is 206.7 tonnes carbon per hectare reached at 23 years. For more information on the calculation of the long-term average carbon stock refer to section A2.3.2.

Deforestation

Deforestation emissions are accounted for in full.

Based on the 2023 *Afforestation and Deforestation Intentions Survey Report*,[204] it is projected that between 90 hectares and 225 hectares of pre-1990 planted forest could be deforested each year from 2023.

Pre-1990 natural forest deforestation estimates assume natural forest deforestation continues based on historical rates of deforestation. Pre-1990 natural forest deforestation is projected to occur based on the average of the last four years reported in *New Zealand's Greenhouse Gas Inventory 1990–2022* (Inventory 2024).[205] Lower and upper pre-1990 natural forest deforestation scenarios assume a +/–50 per cent variation from the WEM scenario (table 2.6.4) and are used for sensitivity analysis purposes.

Post-1989 forest deforestation projections are based on owners' intentions and the research completed by the University of Canterbury in 2018.[206] Post-1989 forest deforestation is assumed to be limited to production forests and forests planted between 1990 and 2007, because more recent plantings (from 2008 onwards) that include carbon revenue (New Zealand Units issued for carbon sequestration from forests registered in the New Zealand Emissions Trading Scheme (NZ ETS) are assumed to have a more permanent management plan. No post-1989 forest deforestation is assumed to occur after 2036. The WEM scenario assumes 3.8 per cent of post-1989 production forest planted between 1990 and 2007 could be deforested. Post-1989 forest

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203 Wakelin SJ, Paul TSH, West T, Dowling LJ. Unpublished. Reporting New Zealand's Nationally Determined Contribution under the Paris Agreement using Averaging Accounting for Post-1989 Forests. Scion.

204 Manley B. 2024. *Afforestation and Deforestation Intentions Survey 2023: Final report*. MPI Technical Paper No: 2024/14. Prepared for the Ministry for Primary Industries by Professor B Manley, School of Forestry, University of Canterbury. Wellington: Ministry for Primary Industries.

205 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

206 Manley B. 2018. *Intentions of Forest Owners Following Harvest of Post-1989 Forests*. MPI Technical Paper No: 2018/55. Wellington: Ministry for Primary Industries.

deforestation is assumed to occur at the normal clear-fell optimal age of 28 years. All carbon in biomass is accounted for as an instantaneous emission at the time of deforestation.

Table 2.6.4: Projected deforestation scenarios from 2023 onwards (hectares per year)

Forest type	Upper removals	'With existing measures' scenario	Lower removals
Pre-1990 planted forest	90	120	225
Post-1989 planted forest	690	1,010	2,380
Post-1989 native forest	59	117	176
Pre-1990 native forest	287	575	862
Total deforestation	**1,126**	**1,822**	**3,644**

Permanent forests

The WEM projections in section 2.5 factor in that some post-1989 production forests will not be harvested at the optimal harvest age and, instead, will have extended rotations or will be managed as permanent forests. The LULUCF target accounting projections presented in this section factor in that a proportion of the smaller-sized post-1989 forests planted between 1990 and 2018 will grow on beyond the optimal harvest age. This is based on Ministry for Primary Industries-funded research of owners' intentions completed by the University of Canterbury in 2018.[3]

The research found around 6.1 per cent of the post-1989 forest estate established between 1990 and 2018 is either unlikely to be harvested in the future or the forest will be managed for other purposes. In the LULUCF target accounting projections, these post-1989 forests are not treated under the long-term average carbon stock accounting approach but, rather, under a stock change[207] accounting approach. Estimates of permanent afforestation from 2019 to 2050 are based on the *Afforestation and Deforestation Intentions Survey* reports.[208]

Afforestation

Historical estimates from 1990 to 2022 are sourced from Inventory 2024, while projections from 2023 are based on the annual *Afforestation and Deforestation Intentions Survey* reports.[209]

207 With stock change accounting, New Zealand accounts for short-term changes in forest carbon. The carbon will increase as the forest grows and decrease when it is cleared.

208 The Forest Management Reference Level is a value of annual net emissions and removals from *Forest management*, against which the net emissions and removals reported for *Forest management* can be compared for accounting purposes. Guidance on how to construct the Forest Management Reference Level is provided in Appendix II to Decision 2/CMP.6 contained in the United Nations Framework Convention on Climate Change document FCCC/KP/CMP/2010/12/Add.1 (see United Nations Framework Convention on Climate Change. Part One: Proceedings Contents. United Nations, 2010.). An overview of approaches, methods and elements used in construction of Forest Management Reference Levels is provided in section 2.7.5.1 of the *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. IPCC. 2014. Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Switzerland: IPCC.

209 Currently commissioned to the University of Canterbury School of Forestry. Manley B. 2024. *Afforestation and Deforestation Intentions Survey 2023: Final report*.

Afforestation projections from 2023 to 2030 are based on a combination of the 2021 and 2023 *Afforestation and Deforestation Intentions Survey* reports and then extrapolated to 2050 assuming similar policies and measures apply.[210] The 2021 *Afforestation and Deforestation Intentions Survey* findings are used to estimate the upper afforestation scenario from 2027, while the 2023 survey is used to estimate afforestation from 2023 to 2026 and the lower projection scenario. This approach factors in recent carbon price fluctuations in the NZ ETS and market uncertainty.

Limitations

These afforestation, reforestation and deforestation projections should only be used to estimate the amount that LULUCF could contribute towards New Zealand's NDC1 target and are based on policy settings as of May 2024. These projections exclude the impact of forest management, because its contribution towards NDC1 is assumed to be zero at this stage.

Sensitivity analysis

The LULUCF target accounting projections are based on land-use statistics, scientific knowledge, policies that influence land-use decision-making, as well as external research and evidence. However, projections are by their nature uncertain. The main areas of uncertainty within the LULUCF target accounting projections are in predicting future levels and timing of harvest, which is essential for determining the long-term average carbon stock and projecting future levels of afforestation and deforestation.[211]

Three sensitivity scenarios are modelled to help illustrate the impacts of this uncertainty. Upper and lower scenarios are modelled around a central WEM scenario.

(a) **Upper removals:** This scenario assumes total afforestation of around 1,062,000 hectares over 2023 to 2050. This scenario assumes around 1,126 hectares of deforestation per year from 2023.

(b) **WEM:** This scenario assumes total afforestation of around 851,500 hectares of forest establishment over 2023 to 2050. This scenario assumes around 1,822 hectares of deforestation per year from 2023.

(c) **Lower removals:** This scenario assumes total afforestation of around 640,700 hectares of forest establishment over 2023 to 2050. This scenario assumes around 3,644 hectares of deforestation per year from 2023.

Figure 2.6.3 and table 2.6.5 show historical and projected LULUCF target accounting quantities from 2020 to 2050. Historical estimates are provided for 2020 to 2022. The lower and upper projection scenarios reflect the sensitivity in projecting future rates of afforestation and deforestation.

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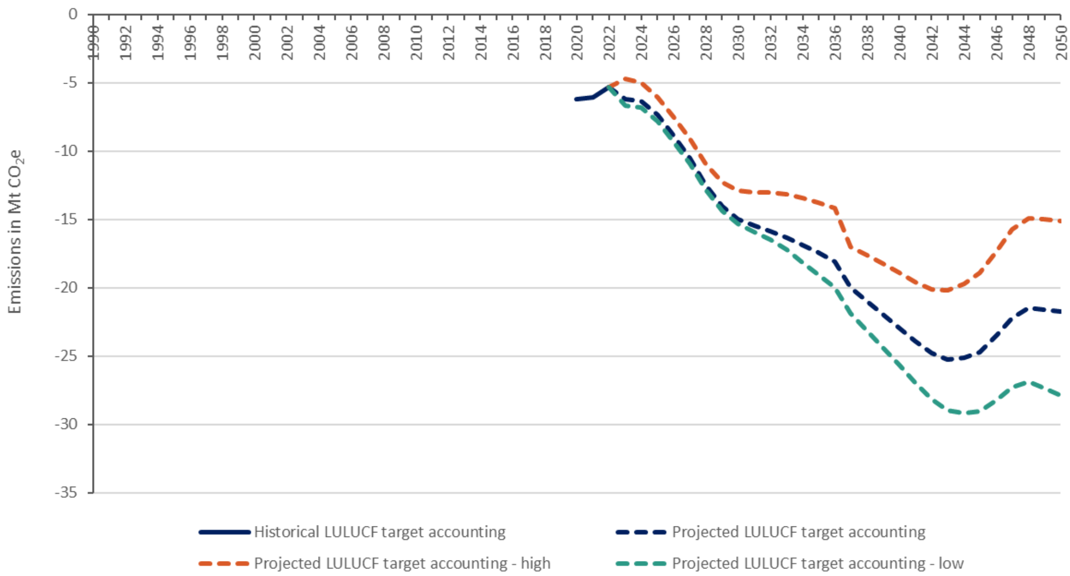
210 Manley B. 2022. *Afforestation and Deforestation Intentions Survey 2021: Final report*. Prepared for the Ministry for Primary Industries by Professor B Manley, School of Forestry, University of Canterbury. Wellington: Ministry for Primary Industries. Manley B. 2024. *Afforestation and Deforestation Intentions Survey 2023: Final report*.

211 Main factors that can influence future afforestation and deforestation are land availability and price, land owner preferences, the impact of carbon price, seedling and labour availability, requirement for Overseas Investment Office approval, government policy and local council regulation. The projections also do not consider the complex interaction between supply and demand for New Zealand Emissions Trading Scheme units (called New Zealand Units or NZUs), which could affect future carbon prices and, therefore, afforestation rates.

Figure 2.6.3: Historical and projected LULUCF target accounting quantities under 'with existing measures', lower and upper removals scenarios, 2020–2050



Note: LULUCF = Land Use, Land-Use Change and Forestry; Mt CO_2e = million tonnes of carbon dioxide equivalent.

Table 2.6.5: Historical and projected LULUCF target accounting quantities under 'with existing measures', lower and upper removals scenarios, 2020–2030 (Mt CO_2e)

Scenario	Historical 2020	Projected 2025	2030	2035	2040	2045	2050
Lower removals (high-emissions scenario)	–	−6.0	−12.9	−13.7	−18.9	−18.9	−15.1
With existing measures	−6.2	−7.4	−15	−17.4	−22.9	−24.7	−21.8
Upper removals (low-emissions scenario)	–	−7.8	−15.3	−19	−25.7	−29.1	−27.9

2.6.3.3 Cooperative approaches that involve the use of Internationally Transferred Mitigation Outcomes

New Zealand is actively exploring cooperation opportunities under Article 6 of the Paris Agreement, although no agreements are currently in place to purchase internationally transferred mitigation outcomes for NDC1. New Zealand's focus is on establishing partnerships that foster capacity building and lay the groundwork for potential future access to international carbon markets. Updates on progress will be included in upcoming biennial transparency reports.

Chapter 3

Information related to climate change impacts and adaptation under Article 7 of the Paris Agreement

Key messages

The Climate Change Response Act 2002 sets out New Zealand's process for assessing climate risk, developing action plans and monitoring the implementation and effectiveness of those plans.

The Government's current priorities are to strengthen New Zealand's preparation for the impacts of climate change and to clarify the roles and responsibilities involved in adapting to climate change as well as the response to the costs of adaptation.

New Zealand is projected to warm further by 2090, with more hot days and fewer cold days across the country over the next decades.

The Climate Change Chief Executives Board monitors the progress of implementation of the first National Adaptation Plan. Its first progress report, covering January 2023 to June 2023, found that 66 per cent of actions actively being implemented were on track for delivery.

In August 2024, the Climate Change Commission released a report on the implementation and effectiveness of the first National Adaptation Plan. The Government will respond to this report.

This chapter also serves as New Zealand's third Adaptation Communication under the Paris Agreement.

3.1 Introduction

This chapter provides information on New Zealand's approach to adapting to the impacts of climate change. It covers institutional arrangements and adaptation strategies and policies. It also includes progress on implementation, monitoring and evaluation, and case study highlights. It also outlines projected impacts of climate change on New Zealand, alongside information on risks and vulnerability.

3.2 National circumstances, institutional arrangements and legal frameworks

3.2.1 National circumstances

See section 2.1 for details on national circumstances that may affect New Zealand's adaptive capacity.

3.2.2 Institutional arrangements

3.2.2.1 Institutional framework

New Zealand is founded on a partnership between the Crown and indigenous New Zealanders, Māori, through te Tiriti o Waitangi (the Treaty of Waitangi) signed in 1840. See section 2.1.8 for further detail on New Zealand's institutional framework.

3.2.2.2 Institutional arrangements for adaptation

All New Zealanders have a role to play in adapting to the impacts of climate change.

- Central government establishes regulatory and institutional settings that support effective adaptation. It also facilitates the availability of information and data, and central government agencies work together to drive sustainable and effective risk-informed decisions.
- Local government is at the centre of risk management planning and response because most hazard events occur at the local or regional scale.
- Māori play a unique role in adaptation as Tiriti partners, tangata whenua (people of the land) and kaitiaki (guardians).
- Businesses need to strengthen their resilience to climate risks, including risks to their assets.
- The research and scientific community can contribute to adaptation because adaptation decisions must be based on the best available science.

Table 3.1 outlines key examples of institutional arrangements in New Zealand that support adaptation.

Table 3.1: Key institutional arrangements for adaptation in New Zealand

Role	Institutional arrangement
Assessing climate impacts	Universities, consultancies and Crown research institutes, such as the National Institute of Water and Atmospheric Research (NIWA), Manaaki Whenua Landcare Research, Scion and GNS Science, have a role in assessing climate impacts. For example, NIWA monitors water and weather patterns. It provides climate services and resources for understanding climate and climate change, and conducts research on a range of climate variables.
Climate change at sector level	One of the four priority focus areas of the first national adaptation plan (NAP1)[212] is to embed climate resilience in all government strategies and policies. Chapters 6–10 of NAP1 set out actions and future work programmes, which broadly align with the domains identified in the first National Climate Change Risk Assessment.[213]
Decision-making	The Minister of Climate Change is responsible for setting the overall direction for climate change policy, including the adaptation response. The Ministry for the Environment provides the administrative support for this portfolio. Ministers across a number of portfolios are responsible for cross-sector matters relevant to climate change response. This includes the delivery of their actions in national adaptation plans (NAPs).
Coordination, addressing cross-cutting issues, adjusting priorities and activities	Climate change is a cross-cutting issue of relevance to almost all government agencies. The Climate Change Chief Executives Board (the Board) oversees the implementation of NAPs, supporting the Climate Priorities Ministerial Group (see section 3.5.1). The Board is responsible for overseeing overall implementation of the NAP, periodically assessing its sufficiency and advising where course corrections are needed.

212 Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington. Ministry for the Environment.

213 Climate change is also a driver for many risks on the all-of-government *National Risk Register*, which is led by the Department of the Prime Minister and Cabinet, and governed by the National Hazards Board and National Security Board.

Role	Institutional arrangement
Planning and coordination	The Government directs adaptation work at the local and regional levels through the Resource Management Act 1991 and Local Government Act 2002. Since November 2022, councils have been required to have regard to the NAP when making or changing policy statements or plans.
Data governance	Statistics about New Zealand's atmosphere and climate come from the Environmental Reporting Series, which Stats NZ and the Ministry for the Environment produce. Twenty atmosphere and climate indicators support the series reports with technical information and interactive maps and graphs.[214]
Monitoring, reporting and evaluating	The Board provides quarterly reporting to the cross-ministerial group on delivery of climate change work programmes. It also produces six-monthly updates on how the implementation of the NAP is progressing. The Government and the Climate Change Commission (the Commission)[215] have the power to request information on the adaptation preparedness of policy and service delivery organisations.[216] The Minister of Climate Change has made two such requests, one in 2020 and one in 2024. Under the Climate Change Response Act 2002, the Commission is responsible for delivering progress reports on the Government's National Adaptation Plan every two years, and National Climate Change Risk Assessments every six years (starting in 2026). Section 6.9.1 of the Eighth National Communication Report outlines the monitoring, reporting and evaluation mechanisms and the governance and oversight structures set out in the Climate Change Response Act 2002.

Source: Updated based on Ministry for the Environment. 2022. *New Zealand's Eighth National Communication*. Wellington: Ministry for the Environment.

3.2.3 Process for adaptation policies and strategies

In 2019, the amendments to the Climate Change Response Act 2002 set out the adaptation process for regularly assessing climate risks, planning to manage those risks, assessing implementation and evaluating the effectiveness of the actions in reducing risk and provision to adjust actions (figure 3.1).

The Act also sets out what must be included in National Climate Change Risk Assessments (NCCRAs), national adaptation plans (NAPs) and progress reports. It specifies the Climate Change Commission's (the Commission's) roles of providing independent expert advice on adaptation as well as producing progress reports on the implementation and effectiveness of the NAP.[217] These provisions determine the requirements for formulating, implementing, publishing and updating New Zealand's adaptation policies and strategies.

214 For further information, see Ministry for the Environment and Stats NZ. 2023. *New Zealand's Environmental Reporting Series: Our atmosphere and climate 2023*. Wellington: Ministry for the Environment.

215 See section 3.1.3 on the Climate Change Commission's role and section 3.6.1 on its first report on the implementation and effectiveness of New Zealand's first national adaptation plan.

216 Section 5ZW(8) of the Climate Change Response Act 2002 sets out the policy and service delivery organisations that are subject to this request.

217 See sections 5ZP to 5ZV in the Climate Change Response Act 2002.

Figure 3.1: New Zealand's adaptation process

Source: Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington. Ministry for the Environment, p 24.

3.2.4 Legal framework

3.2.4.1 Climate adaptation legislation

The Climate Change Response Act 2002 is the key piece of climate change legislation in New Zealand. In 2019, the Climate Change Response (Zero Carbon) Amendment Act brought the need to prepare for, and adapt to, the effects of climate change into its purpose and included new provisions on the process for adaptation policies and strategies (figure 3.1).

The adaptation process includes undertaking regular risk assessments, developing NAPs and then implementing, independently monitoring and evaluating them, and adjusting actions. This process aligns with the adaptation policy cycle set out in the framework for the global goal on adaptation.[218]

The Climate Change Response Act 2002 also requires New Zealand's emissions reduction plans to include a multi-sector strategy to meet emissions budgets and improve the ability of those sectors to adapt to the effects of climate change.

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218 The Global Goal on Adaptation under article 7.1 of the Paris Agreement is aimed at "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change" (p 9).

3.2.4.2 Other legislation and instruments

New Zealand has other pieces of legislation that are relevant to adaptation at national and sub-national levels. They involve statutory responsibilities, including local government functions and duties, relating to natural hazards and climate risks. Specifically, they cover:

- land-use planning under the Resource Management Act 1991, including national direction and the national monitoring system
- civil defence, as outlined in the Civil Defence Emergency Management Act 2002 and civil defence emergency management group plans
- flood control and river management, and asset management based on the Soil Conservation and Rivers Control Act 1941 and councils' long-term plans and infrastructure strategies developed under the Local Government Act 2002
- building regulation based on the Building Act 2004
- disclosure of hazard information, as required by the Local Government Official Information and Meetings Act 1987
- management of the coastal environment under the New Zealand Coastal Policy Statement 2010, a national policy statement made under the Resource Management Act 1991
- reducing the impact of natural hazards on people, property, and the community under the Natural Hazards Insurance Act 2023, as well as contributing to the management of the financial risk to the Crown of providing natural hazard cover. The Natural Hazards Commission, Toka Tū Ake, is the Crown entity responsible for this objective.

For more information on government functions and responsibilities, see section 2.1.1.

The Severe Weather Emergency Legislation Act (SWELA) and the Severe Weather Emergency Recovery Legislation Act (SWERLA) were passed into law on 20 March 2023 to support the response and recovery after Cyclone Gabrielle, Cyclone Hale and the Auckland Anniversary floodings in January and early February 2023. SWERLA enables secondary legislation called Orders in Council (OICs) to grant exemptions from, modify or extend any legislation or provisions of specific legislation. The Ministry for the Environment has developed several OICs in response to requests from the community and local government.

3.3 Impacts, risks and vulnerabilities

3.3.1 Climate modelling, projections and scenarios

3.3.1.1 Current climate

In the past 100 years, New Zealand's climate has warmed by 1.1 degrees Celsius. New Zealand is experiencing more hot days and fewer cold days: 2022 was the warmest year on record, surpassing previous records set in 2021 and 2016, while 2023 is now the second-warmest year on record.[219]

Higher temperatures change aspects of the physical environment and weather patterns, presenting new and greater risks to the wellbeing of people and communities and their ways of life, buildings and infrastructure, the natural environment and economy. Since 1960, rainfall

219 NIWA. 2024. *Annual Climate Summary 2023.* Retrieved 15 October 2024.

has mostly increased in the south and decreased in the north of New Zealand while changes in extreme rainfall are mixed.[220] Globally, sea-level rise is accelerating, with an average rise rate of 3.7 millimetres per year between 2006 and 2018.[221] The sea level rose 0.2 metres on average around New Zealand between 1901 and 2020.[222]

3.3.1.2 Future climate change

The latest climate change projections for New Zealand are based on the Intergovernmental Panel on Climate Change's (IPCC's) Sixth Assessment Report (AR6). The National Institute of Water and Atmospheric Research (NIWA) and the Ministry for the Environment published these climate projections[223] in June 2024, which have been updated since New Zealand's Eighth National Communication. In summary, projected changes are as follows.

- The average annual temperature in New Zealand was 10.5 degrees Celsius in the 1995–2014 period. Annual average temperatures across the country are projected to range between 0.3 degrees Celsius (shared socio-economic pathway[224] (SSP) 1-2.6) and 1.2 degrees Celsius (SSP3-7.0) warmer by 2030, between 0.6 and 2.2 degrees Celsius warmer by 2050, and between 0.7 and 4.7 degrees Celsius warmer by 2090.
- More hot days – days when maximum daily temperatures are over 25 degrees Celsius – are projected for most of New Zealand. Projected changes are greatest for the north and east North Island. For example, the Far North District (the northernmost part of the North Island) is projected to experience between 21 and 87 more hot days on average each year by 2090.
- Fewer frost days – where minimum daily temperatures are below 0 degrees Celsius – are projected in the west and south of the South Island. For example, the Mackenzie District (central South Island) is projected to experience the greatest decline in frost days per year, with an average of between 15 and 54 fewer frost days each year by 2090.
- The North Island, particularly in the north and the east, is projected to have less annual rainfall by 2090, as are the north and the east of the South Island. However, the west and south of the South Island are projected to have more annual rainfall by 2090. For example, the Southland District (the southernmost part of the South Island) is projected to receive on average between 5 and 8 per cent more annual rainfall by 2090.
- More very rainy days – where daily rainfall exceeds 25 millimetres – are expected for many regions, especially in the Westland District (on the west coast of the South Island), which is projected to experience between 3 and 5 more very rainy days on average by

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220 Intergovernmental Panel on Climate Change. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Intergovernmental Panel on Climate Change.

221 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*. Cambridge: Intergovernmental Panel on Climate Change.

222 This occurred, on average, across the four main port records. See Stats NZ. 2022. *Coastal sea-level rise*. Retrieved 15 October 2024.

223 Ministry for the Environment. 2024. *New Zealand Climate Projections Dataset.* Retrieved 15 October 2024.

224 Shared socio-economic pathway (SSP) scenarios are global emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC). For further explanation of their use in New Zealand's climate projections, refer to: *Understanding climate variables and scenarios used in the projections*.

2090. However, the Gisborne District (in the northeastern North Island) is projected to experience between 0 and 2 fewer very rainy days on average by 2090.

- Drought exposure is projected to increase over the east and decrease in the west of the North and South Islands. For example, the Kaikōura District (in the northeastern South Island) is projected to experience an increase in drought exposure by 2090.
- Windy days – days when maximum wind speed is more than 10 metres per second – are expected to decrease per year for much of the North Island and increase per year in most of the South Island by 2090. For example, Dunedin City (in the southeastern South Island) is projected to experience between 5 and 6 more windy days per year on average by 2090. Wellington City (on the southwestern tip of the North Island) is projected to experience between 2 more and 5 fewer windy days per year on average by 2090.[225]

3.3.2 Climate change impacts

This section summarises the observed and potential future impacts of climate change in New Zealand.

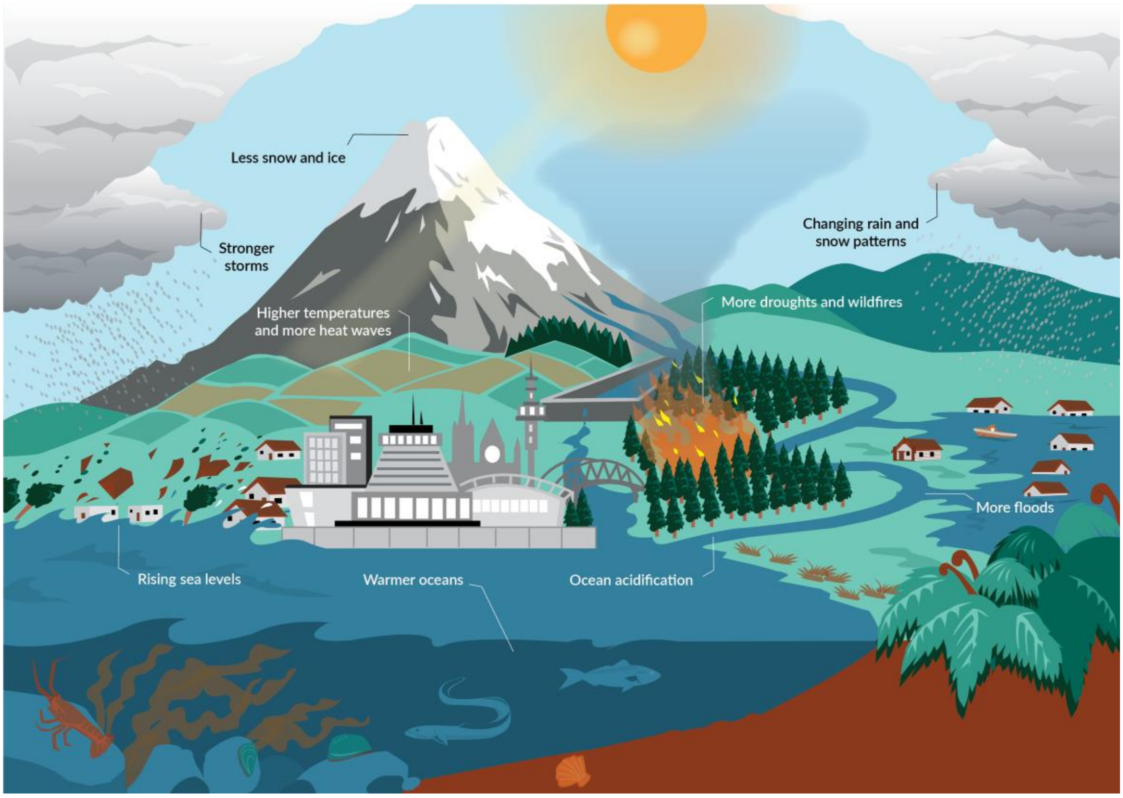
The climate impacts of the latest climate change projections for New Zealand are consistent with previous projections. Figure 3.2 illustrates the projected impacts.

The IPCC report *Climate Change 2022: Impacts, Adaptation and Vulnerability*[226] identified key climate risks that have the potential to be severe, such as the loss of kelp forests in southeast New Zealand due to ocean warming, marine heatwaves and overgrazing by climate-driven range extensions of herbivore fish and urchins, and the loss of natural and human systems in low-lying coastal areas due to sea-level rise.

225 Ministry for the Environment. 2024. *New Zealand Climate Projections Dataset.*

226 Lawrence J, Mackey B, Chiew F, Costello MJ, Hennessy K, Lansbury N, Nidumolu UB, Pecl G, Rickards L, Tapper N, Woodward A, Wreford A. 2022. Australasia. In: Intergovernmental Panel on Climate Change. *Climate Change 2022: Impacts, adaptation and vulnerability*. See sections 11.3.2 and 11.3.5.

Figure 3.2: Summary of projected impacts of climate change on New Zealand



Source: Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan.* Wellington: Ministry for the Environment. p 22.

By 2100, absolute sea level in New Zealand is projected to increase on average by 0.44 metres under SSP1-2.6 and by 0.83 metres under SSP5-8.5. Under SSP5-8.5H+ (the upper bound of the likely range, 83rd percentile of SSP5-8.5), sea level in New Zealand is projected to increase on average by 1.09 metres by 2100.[227]

New Zealand lies on a dynamic plate boundary. For this reason, it is vital to provide projections that combine subsidence and uplift rates at the coast (vertical land movement) with the climatic drivers of sea-level rise, which either amplify or reduce the rate and magnitude of that movement.

The NZ SeaRise programme published updated, down-scaled projections for sea-level rise in New Zealand at 2-kilometre resolution.[228] These projections incorporate vertical land movement rates, which have a direct impact on local sea-level projections along New Zealand's coastlines. These projections show ongoing land subsidence will bring forward the timing of when a specific sea-level threshold is reached locally, compared with stable or uplifting areas.

227 Ministry for the Environment. 2022. *Interim guidance on the use of new sea-level rise projections*. Wellington: Ministry for the Environment. See table 1 on page 15 of the Interim guidance. Note that updated guidance is available: *Coastal hazards and climate change guidance*.

228 For more information, see NZ SeaRise. Predicting sea-level rise for Aotearoa New Zealand. Retrieved 15 October 2024.

Land that is uplifting locally or regionally will experience a slower rise in the sea level relative to the rising land. The Ministry for the Environment's 2024 report *Coastal hazards and climate change guidance* provides national guidance for planners and decision-makers on the use of sea-level rise projections and on how to adapt to climate change in the coastal environment.[229]

Major climate impacts are already occurring throughout New Zealand. These were detailed in Chapter 11: Australasia in the IPCC report *Climate Change 2022: Impacts, Adaptation and Vulnerability.*[230] Table 3.2 also provides an overview of these observed climate impacts. The following are some examples.

- The frequency, severity and duration of extreme weather events are increasing, which impacts many aspects of society. For example, Cyclone Gabrielle, Cyclone Hale and Auckland Anniversary floodings in January and early February 2023 caused widespread devastation to communities, land and infrastructure in the North Island.
- The frequency, severity and duration of extreme wildfire weather conditions are mixed but have increased in the northeast.
- Sea surface temperatures increased by 0.2 degrees Celsius per decade from 1981 to 2018.
- Among the 30 sites monitored across New Zealand, the number of frost days decreased at 12 sites, while the number of warm days increased at 19 sites and the number of heatwave days increased at 18 sites between 1972 and 2019.
- Glacier volume has decreased 33 per cent since 1977.
- Marine species populations have shifted towards the South Pole in terms of both their numbers and distribution, and extensive coral bleaching events and loss of temperate kelp forests have occurred. All of these impacts are due to ocean warming and marine heatwaves across the region.

Sea-level rise presents a significant concern for hapori Māori (Māori communities), particularly those living in coastal areas. Approximately 14 per cent of Māori households are in areas highly susceptible to coastal inundation due to projected sea-level rise.[231]

Research for the Deep South Science Challenge in 2020 projected that around 10,000 houses in Auckland, Wellington, Christchurch and Dunedin could become uninsurable by 2050 because of coastal flooding from sea-level rise.[232] New Zealand has considerable residential building exposure to fluvial or pluvial flood hazards, with an estimated NZ$218 billion total replacement value for 441,384 buildings identified in flood hazard areas.[233]

Figure 3.3 provides a timeline of some of the extreme weather events Aotearoa New Zealand has experienced since 2018. These events include storms, flooding, severe droughts, wildfires, landslides and marine heatwaves. They are becoming more frequent and more severe due to climate change.

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229 Ministry for the Environment. 2024. *Ngā Pūmate Takutai me te Ārahitanga Huringa Āhuarangi: Coastal Hazards and Climate Change Guidance*. Wellington: Ministry for the Environment.

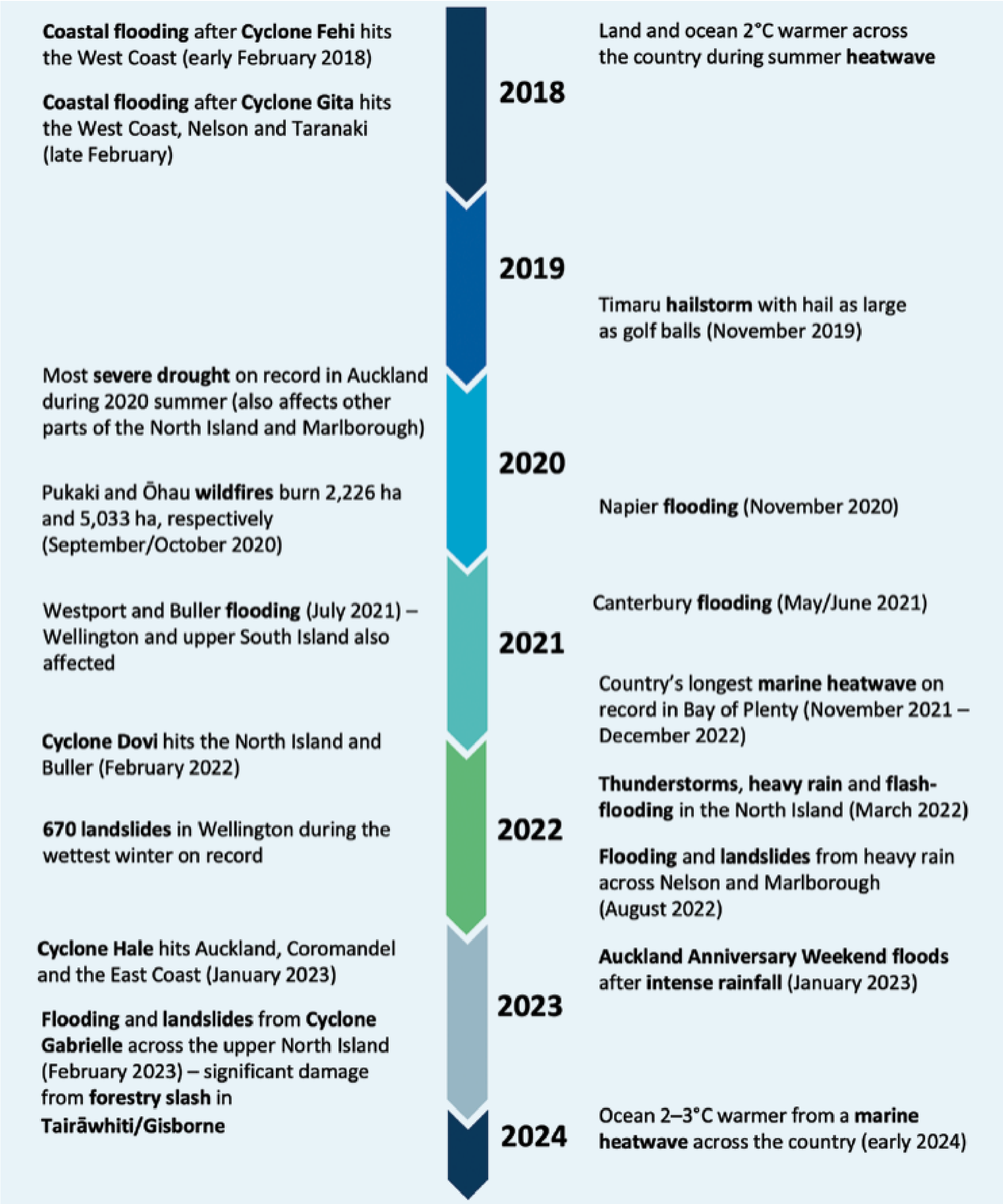
230 Lawrence et al. 2022. Australasia.

231 Te Puni Kōkiri. 2023. *Understanding Climate Hazards for Hapori Māori: Insights for Policy Makers*. Retrieved 15 October 2024.

232 Deep South Challenge. 2020. *Insurance Retreat: Sea Level Rise and the Withdrawal of Residential Insurance in Aotearoa New Zealand.* Report for the Deep South National Science Challenge.

233 Paulik R, Zorn C, Wotherspoon L, Sturman J. 2023. Modelling national residential building exposure to flooding hazards. *International Journal of Disaster Risk Reduction* 94: 103826. doi.org/10.1016/j.ijdrr.2023.103826

Figure 3.3: Timeline of some of the extreme weather events New Zealand has experienced since 2018



Source: Climate Change Commission. 2024. *Progress Report: National Adaptation Plan: Assessing Progress on the Implementation and Effectiveness of the Government's First National Adaptation Plan*, p 26.

Table 3.2: The observed and projected climate change impacts on domains in New Zealand

Domain	Observed impacts	Projected impacts
Natural environment	Climate change has significantly impacted New Zealand's ecosystems. Introduced mammalian predator numbers have increased due to greater food availability, putting pressure on native ecosystems. Coastal species' distribution and fish lifecycles have altered due to warming waters and ocean acidification. Rainfall patterns have shifted, with precipitation decreasing in the north but increasing in the southwest, while extreme rainfall events have intensified. Notably, southern glaciers have shrunk by one-third since 1977, underscoring the substantial impacts on the country's environments.	Due to warming, invasive terrestrial species will likely continue to increase in numbers, range and predation on native species. Native forest carbon storage will initially improve but later decrease due to drought. Wildfires may enable fire-resistant introduced plants to replace non-fire-resistant natives. Increased rainfall, drought and temperatures will negatively impact freshwater wetlands and species, while saltwater may intrude into coastal wetlands. River flows will reduce in the north but increase in the south, potentially enabling increased movement of invasives, sediments and pollutants. Rising seas, warming and extreme weather will further alter marine species' distribution and abundance, along with ecosystem services, as intertidal zones shrink.
Primary industries	Droughts have had negative impacts across agricultural sectors. For example, extreme heat is detrimental to livestock welfare and can reduce growth and reproduction rates, as well as causing death. Pasture production is changing in response to climate-related factors. Heavy rain events may result in slips, pasture inundation, destruction of on-farm infrastructure and loss of stock. Although evidence of climate change impacts on crops and forest growth patterns remains limited, some impacts have been noted. For example, a decreased winter chill has contributed to both an early harvest for the kiwifruit industry and elevated energy (refrigeration) demands. Climate change has resulted in habitat loss and distribution shifts for fisheries species. Aquaculture (eg, farmed salmon) experienced significant losses during a heatwave.	The seasonality of pasture growth rates may be affected more than their yield. Changing temperature and rainfall patterns may increase winter yields of some crops but reduce the yield of others that rely on winter chill. An overall decline in crop yield and quality is expected with rising temperatures. Land and on-farm infrastructure may suffer increased damage due to heavy precipitation events. Higher carbon dioxide is anticipated to contribute to increased productivity of pine (*Pinus radiata*) plantations. Warmer temperatures and extreme weather events will negatively impact livestock productivity and welfare. Distributions of invasive pests and diseases will change and new incursions will occur. Climate change may negatively affect beneficial insects. The aquaculture industry will likely be able to reduce exposure to changing climatic conditions more easily than wild fisheries; however, a decline in shellfish yields is expected as these are vulnerable to ocean acidification.
Built environment	Gradual changes to the climate and extreme weather events are having increasing effects on human settlements and the infrastructure that provides the essential services underpinning New Zealand's economy and society. For example: • sea-level rise is a risk to many urban centres and critical infrastructure, including transport and water networks, and major ports and airports	Urban centres, other settlements and infrastructure are expected to experience more detrimental effects due to climate change. • An estimated NZ$25.5 billion of assets will be exposed to a 1-metre sea-level rise. By 2050, infrastructure (eg, transport, water, electricity and telecommunication networks, ports, airports and landfills) close to the coast or rivers will be at increased risk.

Domain	Observed impacts	Projected impacts
	• changing rainfall patterns impact dam levels and, in turn, electricity generation and potable water supply • extreme weather is more frequently disrupting energy transmission and distribution, telecommunications and transport networks. Because of the interdependencies between different parts of New Zealand's infrastructure, an outage in one sector or region has cascading impacts across the rest of the infrastructure system – disrupting services like payment systems and health services. Impacts are often disproportionate, felt in particular by those least able to adapt. The result is to exacerbate existing inequities and in turn increase pressure on health and social support services. The 12 costliest floods in the decade to 2017 led to costs for damage related to climate change that amounted to almost 30 per cent (NZ$140.48 million) of total insured losses. Around 750,000 New Zealanders live near rivers and in coastal areas already exposed to extreme flooding. These areas include major urban centres and in total contain 500,000 buildings worth more than NZ$145 billion.[234]	• Extreme weather events will become increasingly frequent, impacting homes, buildings and infrastructure directly. They will also impact supply chains, making it more difficult for New Zealand to access the goods and services needed to build, maintain and repair the built environment. • Electricity heating demands are predicted to decrease slightly, due to higher temperatures and improved energy efficiency. Changes in rainfall patterns and snow cover will make hydro-generation less reliable. When that reduced reliability is coupled with a predicted net increase in electricity demand, significant additional generation capacity will be required.[235] New Zealand has renewable generation potential (particularly wind and geothermal resources) to meet the majority of this demand in a way that is consistent with emissions reduction targets.[236] These disruptions may increase the risk of lower productivity and less social cohesion, making New Zealand less attractive to investors, as well as impacting lives and livelihoods.
Economic sector	Because New Zealand's tourism sector relies on natural attractions and outdoor activities, climate change is already affecting tourism. For example, the Fox Glacier and Franz Josef Glacier have retreated (around 700 metres since 2008) and heavy rainfall has damaged the Great Walks, closing some. Climate change poses significant risks to the financial sector. For example, insured losses due to extreme weather events amounted to almost NZ$1 billion between 2013 and 2020, which was 0.4 per cent of gross domestic product.	Climate change is likely to have continued widespread negative effects on tourism. For example, the volume of the South Island glaciers is expected to reduce further and snow skiing will be negatively affected. The finance sector will also be exposed to greater risks. The Reserve Bank of New Zealand found that modelled dividends were projected to be nearly 40% lower and profits 25% lower by 2050. However, the modelled scenario did not threaten bank solvency or financial stability, with banks able to maintain their capital ratios.[239]

234 Ministry for the Environment and Stats NZ. 2023. *Our atmosphere and climate 2023*.

235 Purdie J. 2022. *Climate Change Impacts on New Zealand Hydro Catchment Inflows & Wind Speeds*. Prepared for the Ministry of Business, Innovation and Employment by ClimateWorks Ltd. Wellington: Ministry of Business, Innovation and Employment.

236 Ministry of Business, Innovation and Employment. 2024. *Electricity Demand and Generation Scenarios: Results summary*. Wellington: Ministry of Business, Innovation and Employment.

239 Adams-Kane J, Nicholls K, West T. 2024. Climate Stress Test results. *Reserve Bank of New Zealand* Bulletin 87(5).

Domain	Observed impacts	Projected impacts
	Adverse weather and transport network disruption are already increasingly cited as reasons for supply chain disruption.[237] As a result of Cyclone Gabrielle, Cyclone Hale and the Auckland Anniversary floodings, primary industries experienced an estimated loss of output of NZ$400 million to NZ$600 million over the first half of 2023. An average of NZ$100 million loss per year is also anticipated in future due to loss of capital assets.[238]	Factors such as flooding, fire and soil damage will contribute to lower property values, higher insurance costs and challenges in servicing loans. Supply chains are likely to be disrupted by acute hazards such as flooding, fire and landslides, or gradual changes such as sea-level rise, changes in seasonality, drought and erosion.[240] The value of buildings exposed to coastal inundation could increase by NZ$2.55 billion for every 0.1-metre increment in sea level. More information is needed on distributional impacts, the rate of change of costs over time, and the economic implications of delayed action.
Health and communities	Severe weather events and increasing temperatures are linked to negative health impacts. New Zealand has experienced an increasing incidence of introduced diseases, such as dengue fever. Rural communities, including many Māori communities living in rural and remote locations, are particularly vulnerable to the impacts of climate change due to road closures and power cuts. Sites of cultural significance, including marae (meeting houses) and urupā (burial grounds), are vulnerable and have been affected. Rural communities have experienced cumulative impacts of climate change – particularly where they rely on one sector, for example, tourism or agriculture, as their main economic activity. Droughts, flooding events and extreme wind conditions can threaten animal welfare and cause financial and emotional stress for rural communities and households.	Altered rainfall, floods, heat stress, air pollution and diseases are expected to have negative effects on human health. For example, allergies, drinking water contamination and toxic freshwater blooms may become more common. Socio-economic status will influence the extent to which people are vulnerable to these effects. Health inequities are projected to increase due to climate change. Negative impacts on culturally significant sites, fauna and flora increase the risks to Māori wellbeing and cultural identity. Sea-level rise will affect coastal and low-lying Māori land, in turn putting marae and urupā at risk.

Source (unless otherwise stated): Intergovernmental Panel on Climate Change. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Intergovernmental Panel on Climate Change.

237 Business Continuity Institute. 2019. *BCI Supply Chain Resilience Report 2018*. Caversham: Business Continuity Institute.

238 Treasury. 2023. *Impacts from the North Island Weather Events*. Retrieved 15 October 2024.

240 Ministry for the Environment. 2020. *National Climate Change Risk Assessment for Aotearoa New Zealand: Main report– Arotakenga Tūraru mō te Huringa Āhuarangi o Aotearoa: Pūrongo whakatōpū*. Wellington: Ministry for the Environment.

3.3.3 Assessment of risks and vulnerability to climate change

In 2019, the Government published *Arotakenga Huringa Āhuarangi: A Framework for the National Climate Change Risk Assessment for Aotearoa New Zealand* to support a consistent approach to defining and assessing risks from climate change at local, regional and national levels.[241]

The framework provides the means to evaluate risks and opportunities from climate change in terms of their nature, severity and urgency using a variety of information sources. It includes a three-stage approach to assessing and comparing risks with templates and guidance materials to help users in following the methodology. The framework was applied in the first National Climate Change Risk Assessment (NCCRA1) in 2020, which provides a national overview of how New Zealand may be affected by climate-related hazards.[242]

The risk assessment was undertaken over three stages, as table 3.3 summarises.

Table 3.3: Three stages of the first National Climate Change Risk Assessment, 2020

Stage	Objectives	Method	Output
Stage 1: First-pass risk screen	Consider high-level climate change risks and opportunities for New Zealand. Evaluate risks and opportunities to prioritise for more detailed assessment in stage 2.	Identify risks across five value domains: human, natural environment, economy, built environment and governance; and opportunities. For each risk, define the consequence, urgency ratings[243] and research priorities.[244]	48 priority risks (rated extreme and major) and four opportunities were identified at the end of stage 1. These were taken for detailed assessment in stage 2 and consideration of adaptation and decision urgency in stage 3. Documented in the interim report.
Stage 2: Detailed risk assessment	Further examine risks rated extreme and major. Refined risks and opportunities for adaptation and decision urgency ratings in stage 3.	Assess exposure, vulnerability and consequence of risks rated extreme and major at the end of stage 1.[245] Review and adjust preliminary findings and scoring.	43 priority risks and four opportunities refined at the end of stage 2. This was mainly as a result of merging similar risks. 10 most significant risks were identified from the two most urgent risks in each domain. Documented in the main report.

241 Ministry for the Environment. 2019. *Arotakenga Huringa Āhuarangi: A Framework for the National Climate Change Risk Assessment for Aotearoa New Zealand*. Wellington: Ministry for the Environment.

242 Ministry for the Environment. 2020. *National Climate Change Risk Assessment for Aotearoa New Zealand: Main report*.

243 Urgency ratings were based on exposure, adaptive capacity and sensitivity.

244 Opportunities were not assessed for exposure, vulnerability and consequence, but in terms of decision urgency (in stage 3).

245 Risks in the governance domain were assessed in terms of adaptive capacity and their interrelationships with risks in other domains.

Stage	Objectives	Method	Output
Stage 3: Adaptation and decision urgency	Assess existing and planned adaptation actions to identify risks needing the most urgent action. Finalise scoring and priority risks and opportunities.	Review existing and planned adaptation actions and the extent to which risks and opportunities are being addressed at a high level. Generate adaptation and urgency ratings for each priority risk and opportunity. Highlight where more action is needed or where there is a research priority.	43 priority risks (rated extreme and major) and four opportunities were finalised at the end of stage 3. 10 most significant risks were finalised from the two most urgent risks in each domain. Documented in the main report and supplementary technical report.[246]

At the end of stage 3, the NCCRA1 identified 43 priority risks and four opportunities New Zealand will face from climate change to 2026.

The 43 risks and opportunities were grouped according to five value domains: human, natural environment, economy, built environment and governance. The 10 most significant risks were identified from the two most urgent risks in each domain (figure 3.4).

The *National Climate Change Risk Assessment: Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa – Method report* provides further details of three stages of NCCRA1.[247]

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246 Ministry for the Environment. 2020. *National Climate Change Risk Assessment for New Zealand – Arotakenga Tūraru mō te Huringa Āhuarangi o Aotearoa: Technical report – Pūrongo whaihanga*. Wellington: Ministry for the Environment.

247 Ministry for the Environment. 2020. *National Climate Change Risk Assessment for New Zealand – Arotakenga Tūraru mō te Huringa Āhuarangi o Aotearoa: Method report – Pūrongo whakararangi*. Wellington: Ministry for the Environment.

Figure 3.4: The 10 most significant risks New Zealand will face from climate change, 2020–26

Natural

Risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea-level rise and extreme weather events.

Risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.

Human

Risks to social cohesion and community wellbeing from displacement of individuals, families and communities due to climate change impacts.*

Risks of exacerbating existing inequities and creating new and additional inequities due to differential distribution of climate change impacts.*

Economy

Risks to governments from economic costs associated with lost productivity, disaster relief expenditure and unfunded contingent liabilities due to extreme events and ongoing, gradual changes.

Risks to the financial system from instability due to extreme weather events and ongoing, gradual changes.

Built

Risks to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise.*

Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise.*

Governance

Risks of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.

Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation.

* The risk has disproportionate impacts on Māori.

Source: Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington. Ministry for the Environment, p 37.

Other risk assessments include the following.

- **Local government risk assessments**. The Government produced guidance for local government organisations to follow when conducting their own local climate risk assessments.[248] It sets out a step-by-step process to carry out local risk assessments and provides resources and sample templates. This complements guidance for local government on managing coastal hazards and climate change,[249] which has been updated in 2024 to reflect the latest science.

248 Ministry for the Environment. 2021. *He kupu ārahi mō te aromatawai tūraru huringa āhuarangi ā-rohe: A guide to local climate change risk assessments*. Wellington: Ministry for the Environment.

249 Ministry for the Environment. 2024. *Coastal hazards and climate change guidance*.

- **Sector-level risk assessments**. The Government has a public–private partnership to develop sector climate change scenarios and roadmaps for key sectors. The Aotearoa Circle is undertaking a collaboration involving major sector leaders, Government, environmental non-government organisations, iwi representatives and the research community. So far, the partners have developed climate change scenarios and roadmaps for sectors such as transport, energy, agriculture, tourism, seafood and marine.[250]

Legal mechanisms are another way of obtaining information from organisations on climate risk.

- **Climate-related disclosures.** The Government passed legislation in 2023 that made climate-related disclosures mandatory for around 200 financial institutions in New Zealand, which involves analysing and publicly disclosing their climate-related risks and opportunities each year. New Zealand was the first in the world to implement such legislation. Improving transparency and revealing climate-related information within financial markets will help the country's financial system to become more resilient.
- **Power to request adaptation information.** The Government in 2020 and 2024 has requested information on adaptation preparedness from organisations with policy or service delivery functions under the Climate Change Response Act 2002. The information provides an indication of the effectiveness of actions to reduce climate risks.

3.4 Adaptation priorities and barriers

3.4.1 Domestic priorities and progress towards those priorities

In August 2022, New Zealand released the NAP1 in response to the risks identified in the NCCRA1. This was the first step towards meeting the Government's long-term vision and goals for a climate-resilient New Zealand. The plan was built on recommendations of the Climate Change Adaptation Technical Working Group report from 2018 and drew on the latest science from the IPCC (AR6 WGI and WGII reports).

Four priority areas underpin NAP1.

- **Priority 1: Enabling better risk-informed decisions.** Information, guidance, tools and methodologies are needed to enable good decisions. All New Zealanders need to be making decisions that take into account climate change across all aspects of their lives. This priority area is focused on actions to provide information, scenarios and guidance to help New Zealanders assess the exposure and vulnerability of their homes, businesses and communities to current and future climate hazards. Some actions apply to all New Zealanders while others are targeted at specific sectors and groups.
- **Priority 2: Driving climate-resilient development in the right locations.** During the transition to new systems, councils need to avoid locking in inappropriate land use or closing off adaptation pathways. This priority area is focused on ensuring decision-making frameworks for planning and infrastructure investment guide climate-resilient development in the right locations and account for changing risks.
- **Priority 3: Adaptation options including managed retreat.** Many communities are already under threat from natural hazard events in New Zealand, and this threat will increase over time due to climate change. This priority area is focused on councils and communities

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[250] Aotearoa Circle. 2024. *Reports & Resources*. Retrieved 17 July 2024.

working together to reduce risk through social networks and nature-based and hard-engineering solutions; through upgrades to existing buildings and infrastructure to withstand more extreme climatic conditions; through managed retreat (when necessary); and by being better prepared.

- **Priority 4: Embedding climate resilience in all government strategies and policies.** To embed climate resilience in all government strategies, this priority area is focused on five outcome areas: natural environment, homes, buildings and places, infrastructure, communities, and economy and finance. These areas are broadly consistent with those identified in the NCCRA.

In August 2024, the Climate Change Commission released a report[251] on the implementation and effectiveness of NAP1 (see section 3.7). The Government is required to publish a response to the Commission's report.

3.4.1.1 The adaptation framework

The Government is developing an adaptation framework to strengthen how New Zealand prepares for the effects of climate change. The adaptation framework is expected to cover ways to:

- minimise expected long-term costs
- wherever possible, provide predictable, principled and rules-based responses and funding support, if any, to property owners
- improve climate risk and response information flows
- address market failures and support market efficiency
- give people the incentive and the ability to manage risk.

It aims to help New Zealand prepare for the impacts of climate change and to clarify both the Government's response to adaptation challenges and the roles of insurers, local government and other groups.

The current scope of the adaptation framework is aligned with the first three priority areas in NAP1 as it is focused on:

- improving the way information is shared, so all actors in the system can make informed decisions about how they manage climate risks
- setting out the Government's approach to sharing adaptation costs
- clarifying what investment is available both for managing climate risks and during recovery from events
- making roles and responsibilities clear.

This work will help deliver on a number of current actions in NAP1. The Government will also consider if new legislation is required.

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[251] Climate Change Commission. 2024. *Progress Report: National Adaptation Plan (August 2024): Assessing progress on the implementation and effectiveness of the Government's first national adaptation plan*. Wellington: Climate Change Commission.

As part of the work on the adaptation framework, Parliament's Finance and Expenditure Committee has conducted an inquiry into climate adaptation and has provided recommendations for guiding objectives and principles for the adaptation framework.[252] This inquiry builds on the Environment Committee's previous inquiry into climate adaptation.

3.4.2 Adaptation challenges and gaps, and barriers to adaptation

3.4.2.1 Challenges and gaps in adaptation

The Commission recognises a number of challenges for adaptation in New Zealand in its August 2024 progress report on the implementation and effectiveness of the NAP[253] (see section 3.6.1).

3.4.2.2 Knowledge, information and data gaps

The NCCRA1 identified knowledge, information and data gaps. To address these gaps, NAP1 prioritised research themes out to 2028.[254] Table 3.4 outlines these gaps and associated actions. The prioritised research themes, however, will not close all the identified gaps and additional actions will be required beyond 2028.

Table 3.4: Gaps in adaptation and actions to address them

Identified gaps	Research themes prioritised to address gaps
• Coordinated and readily accessible biological inventories and datasets describing the distribution and status of ecosystems and species • The relationship between social vulnerabilities, cultural heritage and climate change, along with impacts on Māori social, cultural, spiritual and economic wellbeing • How climate change will affect the banking and insurance sectors, and the flow-on effects on the financial system • Consistent hazard information for assessing the exposure of the built environment at a national scale • The interdependencies and shared risks between infrastructure sectors • A coordinated, comprehensive research platform, to ensure research is available to inform effective adaptation • The full range of opportunities and better understanding of those already identified • The current and future barriers to adaptation	• Collate and complete priority data on risk (vulnerability, hazards, exposure) • Provide open-access data, accessible to a variety of audiences • Design, implement and share research platforms • Transform data into knowledge about ecosystems and community vulnerability to changing conditions and extreme events • Support mātauranga Māori and kaupapa Māori research, including the development of iwi and Māori climate data and information • Monitor and evaluate the effects of policy and interventions • Monitor and evaluate ecosystems, sensitivity and adaptive capacity

Source: Updated based on Ministry for the Environment. 2022. *New Zealand's Eighth National Communication*. Wellington: Ministry for the Environment.

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252 At the time of writing this report, the Finance and Expenditure Committee had recently (1 October 2024) published its final report: Finance and Expenditure Committee. 2024. *Inquiry into Climate Adaptation*. Wellington: New Zealand House of Representatives.

253 Climate Change Commission. 2024. *Progress Report: National Adaptation Plan*.

254 Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*, p 176.

3.4.2.3 Barriers to adaptation

Table 3.5 outlines barriers to adaptation from a range of key sources. These include the report *Adaptation Preparedness: 2024 Update*,[255] submissions to the climate adaptation inquiries,[256, 257] *Community-led Retreat and Adaptation Funding: Issues and Options*,[258] *Report of the Expert Working Group on Managed Retreat*,[259] NAP1[260] and NCCRA1.[261]

Table 3.5: Barriers to adaptation

Source	Specific barriers
Risk	• Increasing risk from natural hazards • Risks to wellbeing and increased marginalisation within communities • Strong incentive for development in at-risk area
Information, data, tools and expertise	• Lack of consistent, coordinated and accessible data and information • Lack of awareness of impacts and efforts to adapt within communities • Limited tools or methods for engaging decision-makers and communities • Limited resources, expertise or staff to undertake adaptation planning
Legislation and regulation	• Adaptation system not well integrated with other legislative structures • The resource management system inhibits the ability to enable adaptation actions • Challenges that limit the ability to retreat pre-event and a lack of an enduring system • No government oversight of how adaptation policies are integrated into local adaptation planning • Local government faces risk of liability for planning decisions
Costs	• No clear national direction on the process for, and sharing the cost of carrying out local adaptation planning • Significant costs and outdated measures for acquiring land or purchasing hazardous properties that are at risk of climate change
Investment	• Reactive and ad hoc approach to funding adaptation focuses on short-term adaptation needs and reduces incentives for long-term adaptation • Lack of funding, resourcing and capacity to carry out adaptation activities • Local government lacks the resources to tackle adaptation on its own

255 Ministry for the Environment. 2024. *Adaptation preparedness: 2024 update: A summary of responses to the second information request from reporting organisations under the Climate Change Response (Zero Carbon) Amendment Act 2019*. Wellington: Ministry for the Environment.

256 For the submissions from the Finance and Expenditure Committee inquiry, see New Zealand Parliament. Finance and Expenditure. Retrieved 15 October 2024.

257 Environment Committee. 2024. *Environment Committee Inquiry into Climate Adaptation – Summary of Submissions*.

258 Ministry for the Environment. 2023. *Community-led retreat and adaptation funding: Issues and options*. Wellington: Ministry for the Environment.

259 Expert Working Group on Managed Retreat. 2023. *Report of the Expert Working Group on Managed Retreat: A Proposed System for Te Hekenga Rauora/Planned Relocation*. Wellington: Expert Working Group on Managed Retreat.

260 Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*.

261 Ministry for the Environment. 2020. *National Climate Change Risk Assessment for Aotearoa New Zealand: Main report*.

Source	Specific barriers
Roles and responsibilities	• Lack of clarity on institutional roles and response mechanisms • Challenge of balancing adaptation work with other priorities, including business-as-usual work
Complexity	• Multiple adaptation actions may be needed at any one time • Multiple circumstances need to be considered – Disproportionate impacts on communities (eg, iwi/Māori, women and children, elderly, disabled and lower socio-economic communities) – Types of property (eg, private homes, second homes, rental property, commercial and industrial property) – Ownership arrangements (eg, Māori land, Crown land, those who do not own property) – Impacts on critical infrastructure (eg, water, wastewater, telecommunications, energy, transportation and health)

Barriers to climate adaptation specific to Māori

Climate change will disproportionately impact on Māori interests, values, practices and wellbeing.[262] Māori social, cultural, spiritual and economic wellbeing faces risks from loss and degradation of lands and waters, and from loss of species and biodiversity. Other risks include those to social cohesion and community wellbeing from displacement, and risks of creating or exacerbating inequities due to the unequal impacts of climate change.

The following are key barriers for Māori.

- A significant amount of whenua Māori (land) and many significant cultural sites, such as marae, urupā, ancient gardens and healing places, are on coastlines and in lowland areas exposed to flooding, erosion and sedimentation. As a result, hapū and iwi in some areas have a higher degree of exposure to climate hazards, while they vary in their capacity to adapt.[263]

- Hapū and iwi have strong connections to their traditional rohe. A considerable amount of Māori land is under collective ownership. For this reason, it is necessary to ensure land is not inappropriately gifted or exchanged in areas where Māori have no rights, interests or whakapapa.[264]

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262 Environment Committee. 2024. *Environment Committee Inquiry into Climate Adaptation: Summary of Submissions*.

263 Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan: Table of actions*. Wellington: Ministry for the Environment.

264 Environment Committee. 2024. *Environment Committee Inquiry into Climate Adaptation: Summary of Submissions*.

3.5 Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies

3.5.1 New Zealand's adaptation strategies and policies

New Zealand is committed to achieving its adaptation goals to reduce its vulnerability to the impacts of climate change, enhance adaptive capacity and consider climate change at all levels, and to strengthen its resilience.

3.5.1.1 National strategies and policies

Table 3.6 gives an overview of New Zealand's national adaptation strategies and policies.

Table 3.6: National adaptation strategies and policies

Strategy or policy	Description
Climate Strategy	The Climate Strategy sets out the Government's approach to how it will deliver on New Zealand's climate goals. The Strategy is focused on five pillars to reduce the impacts of climate change and prepare for its future effects.[265] These pillars are: infrastructure is resilient and communities are well prepared; credible markets support the climate transition; clean energy is abundant and affordable; world-leading climate innovation boosts the economy; and nature-based solutions address climate change. While adaptation is important across all pillars, the main focus is on these three pillars: infrastructure is resilient and communities are well prepared; world-leading climate innovation boosts the economy; and nature-based solutions address climate change.
Long-term adaptation strategy	The long-term adaptation strategy encourages all New Zealanders to work together now to understand climate risks and take action to manage them. Adaptation will also bring new opportunities. The strategy's vision is that people, places and systems are resilient and able to adapt to the effects of unavoidable climate change in a fair, low-cost and ordered manner.[266] The goals that underpin New Zealand's long-term adaptation strategy are to: • reduce vulnerability to the impacts of climate change • enhance adaptive capacity and consider climate change in decisions at all levels • strengthen resilience to climate change. These goals are aligned with the Global Goal on Adaptation under Article 7 of the Paris Agreement.[267]
First National Adaptation Plan (2022–28) (NAP1)	NAP1 is the first step towards meeting the Government's long-term vision and goals for a climate-resilient New Zealand. This plan is consistent with and more detailed than the Climate Change Strategy.

265 Ministry for the Environment. 2024. *Responding to a changing climate: The Government's climate strategy*. Retrieved 13 November 2024.

266 Ministry for the Environment. 2022. *Adapting to climate change: Our long-term strategy.*

267 The Global Goal on Adaptation under Article 7.1 of the Paris Agreement is aimed at "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change" (p 9).

Strategy or policy	Description
	NAP1 contains 127 actions[268] across 30 government agencies and responds to the risks identified in the first National Climate Change Risk Assessment (NCCRA). Actions in the plan are identified as critical, supporting or proposed. The plan sets out four priorities for action across five outcome areas where targeted action is needed. These broadly align with the domains identified in the NCCRA1.
Adaptation framework	Work is underway to develop an enduring and fair adaptation framework to help New Zealand prepare for the impacts of climate change and clarify both the Government's response to adaptation challenges and the roles of insurers, local government and other groups. The Government will consider whether new legislation is required.[269]

3.5.1.2 Regional and local adaptation strategies and policies

Local government is already working with communities and iwi/Māori to address the climate change impacts. Some councils are developing plans and long-term adaptive pathways to proactively manage future risks. However, the level of climate preparedness varies from region to region. The *Adaptation preparedness 2024 information request* showed that:

- 46 per cent of councils (32 of 70 councils that responded) have some sort of plan or strategy to increase resilience to climate impacts[270]
- 49 per cent of councils (34 out of 70) have a plan in development
- 5 per cent (4 out of 70) do not have a plan or are unsure.

Out of New Zealand's 15 regional and unitary councils surveyed, 7 have some sort of climate adaptation strategy in place and 8 have a plan in development.

3.5.1.3 Sector adaptation strategies and policies

Several sectors are already:

- developing or implementing their own adaptation strategies and plans (eg, the Department of Conservation's *Climate Change Adaptation Action Plan* and Aotearoa Circle's *Tourism Adaptation Roadmap*)
- investing in climate change or adaptation programmes (eg, *Sustainable Land Management and Climate Change Adaptation Programme*)
- considering climate risks in their wider strategies and policies (eg, the Ministry of Civil Defence and Emergency Management's *National Disaster Resilience Strategy*).[271]

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268 Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan: Table of actions*.

269 Ministry for the Environment. 2024. *Adaptation framework.*

270 Ministry for the Environment. 2024. *Adaptation preparedness: 2024 update*.

271 For more examples of sector adaptation strategies and policies, see the NAP1 and Aotearoa Circle's Reports & Resources.

3.5.2 Best available knowledge, science and indigenous knowledge integrated into adaptation

3.5.2.1 Science and local knowledge

NAP1 incorporates the use of science through actions that deliver scientific information to people, along with actions that use and develop science and knowledge to deliver adaptation. For example, the plan details the research needed to close the adaptation knowledge gaps noted in NCCRA1, over the short and long term, as identified in section 3.4.2.2. Up to 2025, research priorities identified in NAP1 are to:

- consolidate existing data and make them open access
- complete priority datasets
- start national networks of long-term monitoring of natural environments
- start and complete vulnerability studies.

To support these research priorities, some actions in NAP1 develop and fund science and knowledge programmes to support innovative adaptation. Examples of these actions include the following.

- **Sustainable Land Management and Climate Change (SLMACC) Programme.** The aim of this programme is to help the agriculture and forestry sectors to address challenges arising from climate change. Within the SLMACC Programme, the SLMACC Adaptation Programme focuses on social impacts, policy research and the science around adaptation. No further funding rounds are currently proposed for the SLMACC Programme. Funding continues for those projects already approved from previous rounds. The Ministry for Primary Industries is continuing to fund research through other funds, such as the Sustainable Food and Fibre Futures Fund.
- **Climate Data Infrastructure initiative.** The aim of this initiative is to collate and integrate New Zealand's climate change data so that it is easier to find, access and use. It will help standardise modelling and reporting systems, build an evidence base for policy development, and centralise and improve core climate change data sets. Tailored tools will be developed to make the data and insights easier to understand and use.[272]

3.5.2.2 Nature-based solutions

Nature-based solutions involve using sustainable management and natural features and processes to tackle socio-environmental challenges such as climate change.

The Government prioritises nature-based solutions for addressing climate change through restoring biodiversity, while investigating new ways of harnessing nature to remove emissions from the atmosphere.

3.5.2.3 Mātauranga Māori

Mātauranga Māori is the modern term for traditional Māori knowledge. It provides a valuable lens for identifying current and future climate impacts on natural and human systems, as

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272 An example of an existing tool is based on the updated national climate projections for New Zealand, which are freely accessible. A geospatial tool to display the climate projections data on a map was released in July 2024. See section 3.3.1.2 for more information.

well as for planning and developing solutions. Changes in the usual seasonal patterns affect mātauranga Māori and many important Māori practices, including the transfer of mātauranga Māori across generations. Climate change and biodiversity loss may make already vulnerable people more so and reinforce inequities, meaning that harm falls disproportionately on minorities and indigenous peoples.

Climate change endangers the existence of culturally significant land and taonga species.[273] Māori treasure these species because they are significant historically, culturally, spiritually and ecologically. The particular species that are taonga vary among whānau, hapū and iwi, which can be due to whakapapa (genealogy) connection, identified kaitiaki (guardian) responsibilities and geographical distribution. Many taonga species have been gathered over generations and are connected to traditional Māori practices, such as mahinga kai (places to obtain traditional food or resources) and rongoā (healing). They are central to the intergenerational transmission of knowledge, including knowledge on the sustainable use and protection of these taonga species and their associated ecosystems.[274, 275, 276] Particular taonga species can also be symbols of status or associated with death, serve as tohu (environmental indicators) or to predict the weather, and feature in metaphors and stories.[277]

Māori adaptation plans form the basis of Māori resilience and have potential as a significant way of supporting Māori-led action on climate change.[278] Some iwi have developed their own adaptation strategies or plans: these iwi include Ngāi Tahu,[279, 280] Te Arawa[281] and Nā Ngā Iwi Ō Maketu (Te Rūnanga o Ngāti Whakaue ki Maketū, Whakaue Marae Trustees and Ngāti Pikiao Noho Ki Tai).[282]

In addition, the Government has already been collaborating with iwi on adaptation initiatives informed by mātauranga Māori. For example, *Navigating our freshwater environment* is a storymap about the significance of tuna (longfin eels) to the people of New Zealand.[283] Tuna are a taonga species of cultural significance to Māori. Climate change could alter ocean currents, in turn affecting how many tuna make it to New Zealand to continue the lifecycle of this species.

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273 Taonga is a word in te reo Māori (the Māori language) that broadly translates to: treasure, anything prized – applied to anything considered to be of value, including socially or culturally valuable objects, resources, phenomena, ideas and techniques.

274 Awatere S, King DN, Reid J, Williams L, Masters-Awatere B, Harris P, Tassell-Matamua N, Jones R, Eastwood K, Pirker J, Jackson A-M. 2021. He huringa āhuarangi, he huringa ao: A changing climate, a changing world. *Te Arotahi* (7).

275 Harmsworth G, Awatere S. 2013. Indigenous Māori knowledge and perspectives of ecosystems. In: JR Dymond (ed.), *Ecosystem Services in New Zealand: Conditions and Trends*. Lincoln: Manaaki Whenua Press. pp 274–286.

276 Smith T. 2011. *Traditional Māori Growing Practices: A Literature Review*. Te Atawhai o te Ao.

277 Keane-Tuala K. 2015. Ngā manu – birds. Te Ara – the Encyclopedia of New Zealand. Retrieved 15 October 2024.

278 Awatere et al. 2021. *He huringa āhuarangi, he huringa ao*.

279 Te Rūnanga o Ngāi Tahu. 2022. *Te Kounga Paparangi Climate Action Plan*. Te Rūnanga o Ngāi Tahu.

280 Te Rūnanga o Ngāi Tahu. 2018. *Te Tāhū o te Whāriki (Anchoring the Foundations) Climate Change Strategy*. Te Rūnanga o Ngāi Tahu.

281 Te Arawa Lakes Trust. 2021. *Te Ara Ki Kōpū Te Arawa Climate Strategy*. Te Arawa Lakes Trust.

282 Nā Ngā Iwi Ō Maketu. 2022. *He Toka Tū Moana Mō Maketu: Maketu Climate Change Adaptation Plan*. Nā Ngā Iwi Ō Maketu.

283 For more information, see: Ministry for the Environment. 2023. Navigating our freshwater environment.

Another example of an existing collaboration is *The Ngaa Rauru Kiitahi Climate Change Strategy* produced in a partnership involving representatives of Te Kaahui Ngaa Rauru and the Ministry for the Environment.[284] It is grounded in the framework of Te Kawa Ora | the Sacred Tree of Creation and in cultural understandings of balance, whakapapa (genealogy), relativity, interconnectedness and collectivism.

3.6 Progress on implementation of adaptation

3.6.1 Progress on implementing adaptation policies and strategies

New Zealand is two years into the implementation of its first NAP.

The Climate Change Chief Executives Board (the Board) monitors implementation progress of NAP1. The Board provided its first progress report on NAP1 implementation to ministers in August 2023, covering the implementation period January to June 2023.

The Board's progress reports on NAP1 actions are informed by baseline data collected from implementation agencies. Monitoring data from agencies include: an action status; a Red, Amber or Green rating for progress over the reporting period; key milestones for the next six months; and a Red, Amber or Green rating for confidence in delivery.

The Board's most recent publicly available report (covering the period July to December 2023) was published in March 2024.[285] In this report, the Board noted that:

- 95 NAP1 actions are actively being implemented, 9 are completed, 4 have been discontinued, 15 have not started and 4 are on hold
- agencies rated 66 per cent of active actions as Green[286] and on track for delivery in the short term
- a range of reasons account for why an action is not active. For example, it may be because of ministerial decisions pending or taken, internal funding and/or resourcing constraints, or external Budget constraints, or because the action is due to start later in the NAP1 implementation period.[287]

The Commission's first report on the implementation and effectiveness of NAP1 provides further review on the progress on implementation of adaptation policies and strategies. See section 3.7, for more information.

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284 Te Kaahui o Rauru and Ministry for the Environment. 2021. *Ka Mate Kaainga Tahi, Ka Ora Kaainga Rua – The Ngaa Rauru Kiitahi Climate Change Strategy.* Te Kaahui o Rauru and Ministry for the Environment.

285 For more information, see: Climate Change Chief Executives Board. 2024. *Quarterly Progress Report to Climate Priorities Ministerial Group, March 2024*. Climate Change Chief Executives Board.

286 For a Green rating, confidence in the delivery of the action is high, with no outstanding risks or issues at this stage to threaten that delivery.

287 Climate Change Chief Executives Board. 2024. *Quarterly Progress Report*.

3.6.2 Implementing the adaptation component of the Nationally Determined Contribution

Adaptation is not included as a component of New Zealand's Nationally Determined Contribution.

3.6.3 Coordinating adaptation policies and strategies

New Zealand is taking an all-of-government approach to its climate change response. The Ministry for the Environment is responsible for coordinating central government adaptation policies and strategies as set out in the NAP.

For a description of the institutional arrangements for adaptation policies and strategies, see section 3.2.2.

3.7 Monitoring and evaluation of adaptation actions and processes

3.7.1 Effectiveness and sustainability of adaptation actions

In August 2024, the Commission provided its first report on the implementation and effectiveness of NAP1.[288] In this report, the Commission focused on assessing the quality of NAP1, including gaps and opportunities. In future reports, the Commission will assess the overall effectiveness of the NAP, but such an assessment has not been possible this early in the six-year delivery cycle.

The following box sets out the recommendations and challenges that the report identifies. The Government will provide a response to this report.

Climate Change Commission recommendations on the implementation and effectiveness of the first national adaptation plan (NAP1)

Rec 1: Enable effective local adaptation planning and action.

Rec 2: Provide clarity on how adaptation costs will be shared and met.

Rec 3: Ensure iwi/Māori can plan for and carry out adaptation action.

Rec 4: Improve the science and research system to support good adaptation outcomes.

Rec 5: Consider and address the distributional costs and impacts of climate change so that they do not fall unfairly on particular communities and groups.

Rec 6: Prepare a strategy and plan to develop the climate adaptation workforce.

Rec 7: Facilitate access, availability and sharing of resources, expertise and information.

Rec 8: Make the direction, scale and pace of change required clear.

Rec 9: Make improvements to support monitoring, and continual learning and improvement within a dynamic environment.

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288 Climate Change Commission. 2024. *Progress report: National Adaptation Plan.*

3.7.2 Process for updating adaptation policies and strategies

Of the nine recommendations in the Commission's report, seven were for an additional policy, one was on the structure of the next NAP and one was on monitoring, specifically in establishing a transparent process and updating the table of actions from NAP1.

The next progress report from the Commission is due in 2026 alongside the second NCCRA. This next NCCRA will review the most significant climate risks New Zealand will face from 2026 to 2032. The second NAP will be published within two years to set out how the Government plans to address those risks. These next stages demonstrate the cycle in New Zealand's adaptation process, as discussed in section 3.2.3 and shown in figure 3.1.

3.8 Cooperation, good practices, experience and lessons learned

3.8.1 Efforts to share information, good practices, experience and lessons learned

3.8.1.1 Integrating adaptation actions into planning at different levels

Several local government case studies focus on coastal hazards as many coastal communities across New Zealand are already experiencing the effects of climate change through sea-level rise, flooding, erosion and rising groundwater (table 3.7). Local government case studies are being shared across councils and other authorities as lessons learned and options for adapting to climate change.

Table 3.7: Strategies, policies or programmes within local government

Strategy, policy or programme	Council	Description
Clifton to Tangoio Coastal Hazards Strategy 2120 [289]	Hawke's Bay Regional Council, Hastings District Council and Napier City Council	The Hawke's Bay Regional Council, Hastings District Council and Napier City Council have worked with local iwi and coastal community representatives to take a proactive, locally led approach to identifying and responding to coastal hazards over the next 100 years. The Joint Committee has adopted the strategy and agreed that the regional council is the responsible entity for implementation. Decisions are yet to be made on timing and the rating model (funding) for implementation.
The Head of Lake Wakatipu Natural Hazards Adaptation programme [290]	Otago Regional Council	The Otago Regional Council is using 'adaptation pathways' to develop long-term solutions to natural hazards. The Ministry for the Environment developed this approach to support community-centred projects. The pathways

289 HB Coast. *Clifton to Tangoio Coastal Hazards Strategy 2120*. Retrieved 22 July 2024.

290 Otago Regional Council. *Head of Lake Whakatipu – Whakatipu-wai-Māori*. Retrieved 20 September 2024.

Strategy, policy or programme	Council	Description
		approach is relatively new and has mostly been used for coastal hazards rather than in an alpine area or place with many hazards. Based on this approach, the Otago Regional Council is working with the Queenstown Lakes District Council, the local community, iwi and stakeholders on the Head of Lake Wakatipu Natural Hazards Adaptation Strategy.
South Dunedin Future [291]	Dunedin City Council and Otago Regional Council	Dunedin City Council and Otago Regional Council have a joint programme to find ways to respond to climate change and flooding problems in the area. The vision is for improved community wellbeing and resilience through sustainable urban regeneration. The councils intend to develop an adaptation strategy for South Dunedin by the end of 2026.
Thames-Coromandel District Council Coastal Management Strategy [292]	Thames-Coromandel District Council	Thames-Coromandel District Council has a Coastal Management Strategy that sets out a range of initiatives to better manage coastal assets and understand the risk of erosion and coastal inundation. In 2022, the council adopted the project outputs from the Shoreline Management Pathways, including 138 adaptation pathways for each stretch of shoreline specific to each community.[293] The council has worked with public and private organisations such as the Waikato Regional Council, New Zealand Transport Agency, the Department of Conservation, iwi and community groups with an interest in coastal protection.
Awatarariki Managed Retreat Programme [294]	Whakatāne District Council and Bay of Plenty Regional Council	Whakatāne District Council, Bay of Plenty Regional Council and the New Zealand Government have funded the Awatarariki Managed Retreat Programme to mitigate the risk to life and property from any future debris flow events and to build disaster resilience for the Matatā community. Whakatāne District Council offered property owners the opportunity to sell their property at market value with contributions towards legal expenses, relocation costs and mortgage break fees. It also introduced provisions in its district plan to prevent future residential development in the Awatarariki fanhead in areas of high natural hazard risk.[295]

291 Dunedin City Council. *South Dunedin Future*. Retrieved 22 July 2024.

292 Thames-Coromandel District Council. *Coastal Activity and Coastal Management Strategy*. Retrieved 22 July 2024.

293 Thames-Coromandel District Council. *Shoreline Management Pathways Project*. Retrieved 12 September 2024.

294 Whakatāne District Council. *Awatarariki Managed Retreat Programme*. Retrieved 22 July 2024.

295 For more information, see Whakatāne District Council. Plan Change 1 (Awatarariki Fanhead, Matatā). Retrieved 10 October 2024.

Iwi across the country are developing their own climate change strategies and adaptation plans (table 3.8). Iwi case studies focus on indigenous, community-led, proactive and collective approaches to adapting to climate change and are developing or sharing those approaches at all levels, from whānau (family) to the rest of New Zealand.

Table 3.8: Strategies, policies and programmes from iwi and hapū

Strategy, policy or programme	Iwi or hapū	Description
Ka Mate Kaainga Tahi, Ka Ora Kaainga Rua – Ngaa Rauru Kiitahi Climate Change Strategy[296]	Ngaa Rauru Kiitahi	Te Kaahui o Rauru representatives from Ngaa Rauru Kiitahi, a small iwi in south Taranaki, and the Ministry for the Environment co-developed the Ngaa Rauru Kiitahi Climate Change Strategy as a case study in understanding the complexities of climate change for small post-settlement governance entities. The strategy outlines how the iwi will work with others in the community to better adapt to the impacts of climate change and reduce emissions.
Te Tāhū o te Whāriki (Anchoring the Foundations) Climate Change Strategy[297] **Te Kounga Paparangi – Ngāi Tahu Climate Change Action Plan**[298]	Ngāi Tahu	Te Rūnanga o Ngāi Tahu released a climate change strategy, *Te Tāhū o te Whāriki*, in 2018. It was one of the first iwi to release such a strategy. Development of the strategy included a NIWA report on projected climate change impacts, whānau surveys, hui, wānanga and a rangatahi symposium. The strategy is supported by a climate change action plan, *Te Kounga Paparangi*.
Te Ara ki Kōpū – Te Arawa Climate Change Strategy[299]	Te Arawa	Te Urunga o Kea: Te Arawa Climate Change Working Group, Te Arawa Lakes Trust and Scion released *Te Ara ki Kōpū – Te Arawa Climate Change Strategy*. The strategy will help guide decision-making, and support adaptation and mitigation planning for whānau, hapū and iwi.
He Toka Tū Moana Mō Maketu: Maketu Climate Change Adaptation Plan[300]	Nā Ngā Iwi Ō Maketu (Te Rūnanga o Ngāti Whakaue ki Maketū, Whakaue Marae Trustees and Ngāti Pikiao Noho Ki Tai)	The Maketu community developed *He Toka Tū Moana Mō Maketu: Maketu Climate Change Adaptation Plan*. This was in response to more frequent coastal flooding. The community will use the plan to proactively work together to take practical actions and modify ways to reduce the impacts of climate change on their people, environment and special places.

[296] Te Kaahui o Rauru and Ministry for the Environment. 2021. *Ka Mate Kaainga Tahi, Ka Ora Kaainga Rua – Ngaa Rauru Kiitahi Climate Change Strategy*.

[297] Te Rūnanga o Ngāi Tahu. 2018. *Te Tāhū o te Whāriki (Anchoring the Foundations) Climate Change Strategy*.

[298] Te Rūnanga o Ngāi Tahu. 2022. *Te Kounga Paparangi – Ngāi Tahu Climate Change Action Plan*.

[299] Te Arawa. 2021. *Te Ara ki Kōpū – Te Arawa Climate Change Strategy*.

[300] Nā Ngā Iwi Ō Maketu. 2022. *He Toka Tū Moana Mō Maketu: Maketu Climate Change Adaptation Plan*.

The private sector is working with government, Māori and scientists to plan for the future and build long-term resilience (table 3.9).

Table 3.9: Strategies, policies or programmes within private sectors

Strategy, policy or programme	Sector	Description
Climate change scenarios and roadmaps[301] *The Aotearoa Circle*	Agriculture, energy, marine, seafood, transport, tourism	Tapping into the expertise of the industry, growers, government, iwi Māori and scientists, The Aotearoa Circle has worked collectively to develop climate change scenarios and roadmaps of actions to create sectors that are proactively planning for the future and building long-term resilience.
Sector-level scenario analysis[302] *External Reporting Board*	Banking, fund managers, KiwiSaver providers, health and life insurance, general insurance[303] Agriculture, energy, health, tertiary education, marine, media, retail, property and construction, telecommunications, tourism, transport[304]	The External Reporting Board has developed guidance on scenario analysis at entity level (ie, financial institutions) and sector level (ie, corporate sector). Aotearoa New Zealand Climate Standard 1 (NZ CS 1) requires entities to disclose details of how they have undertaken climate-related scenario analysis. The purpose of sector-level scenario analysis is to support high-quality, consistent and comparable entity- and sector-level scenario analysis. Sectors may choose to collectively develop sectoral climate-related disclosures that can support entity-level disclosure. The Aotearoa Circle hosts many of these sector-level scenarios.
Risk-based pricing[305]	Insurance	Insurance premiums are increasingly reflecting detailed assessments of a property's flood and earthquake risk as climate change has increased the underlying risks of flood, storm and other weather events in many areas of the country.

3.8.1.2 Improving effectiveness of adaptation actions

Central government agencies, councils, iwi and communities are looking at ways to better adapt to the changing climate and build more resilience. The following are some examples.

- **Adapting to flood risk in Westport.** The Westport community is facing significant challenges in adapting to the effects of flooding and climate change. Severe floods in July 2021 and February 2022 caused widespread damage to homes and infrastructure, and the Buller District Council required central government funding to help with the recovery. A number of risk reduction initiatives are underway locally. Central government is partnering with

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301 Aotearoa Circle. 2024. *Reports & Resources*.

302 External Reporting Board. *Sector-level scenario analysis*. Retrieved 16 September 2024.

303 Most of the entity-level analyses are completed for financial institutions General insurance has been completed, but is not published.

304 Most of the sector-level analyses are completed for the corporate sector. Those not yet completed are media (no active process underway) and telecommunications (in development, not yet published).

305 For more information, see Reserve Bank of New Zealand. 2024. *Financial Stability Report – May 2024*. Wellington: Reserve Bank of New Zealand.

local councils and iwi to explore new funding and financing models for co-investing in flood risk reduction and climate adaptation for Westport.

- **Upgrading flood protection through the RiverLink project in Lower Hutt**. The project is a partnership between Waka Kotahi NZ Transport Agency, Greater Wellington Regional Council, Hutt City Council and Ngāti Toa Rangatira and Taranaki Whānui ki Te Upoko o Te Ika. The flood protection upgrades will allow more water to pass down the river during floods, as well as enabling more fish to be established.
- **Wellington's digital twin**. Wellington City Council has developed a digital twin that functions as an interactive, virtual model of the capital city. The council is using this digital twin to communicate the complexities of climate impacts and adaptation planning in an accessible way. The approach encourages participation and empowers communities, businesses and organisations to adapt together.

Chapter 4 provides an overview of the capacity building supported through the New Zealand International Development Cooperation Programme. This includes New Zealand's capacity-building support in the context of adaptation provided to one or more recipient countries.

3.8.2 Strengthening scientific research and knowledge

New Zealand has a strong network of Crown research institutes, which are Crown-owned companies that carry out scientific research for the benefit of New Zealand. The Crown research institutes with research portfolios most closely related to climate are NIWA, AgResearch, Manaaki Whenua Landcare Research, Plant & Food Research, the Institute of Geological and Nuclear Sciences and the New Zealand Forest Research Institute.

A significant 10-year research programme, the National Science Challenges, has just been completed in June 2024. The aim of these challenges was to tackle the biggest science-based issues and opportunities facing New Zealand. The challenges brought together the country's top scientists to work collaboratively across disciplines, institutions and regional borders to achieve their objectives. Some of the challenges related to climate research included The Deep South, Resilience to Nature's Challenges, Our Land and Water, and Building Better Homes, Towns and Cities. For the final report on each Challenge, visit the Ministry of Business, Innovation and Employment website.[306] The Natural Hazards and Resilience Platform is a new collaborative natural hazards resilience research programme, with NZ$70 million in funding over seven years from 2024 to 2030. The platform is funded by the Ministry of Business, Innovation and Employment through the Strategic Science Investment Fund and will be hosted by GNS Science.[307]

The New Zealand Government has continued to support and promote collaboration in research and systematic observations on climate change, as required by Articles 4 and 5 of the United Nations Framework Convention on Climate Change. Complementing the central government's contribution, the private sector is providing substantial expenditure, which matches government funding in some research consortia, and local government is also supporting research, particularly in relation to climate impacts.

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306 Ministry of Business, Innovation and Employment. *National Science Challenges*. Retrieved 10 October 2024.

307 Natural Hazards and Resilience Platform - GNS Science | Te Pū Ao

New Zealand continues to collaborate internationally on scientific research. It contributes personnel and funding to support the work of the IPCC. This support includes participating in the production of IPCC's reports and in updating methodologies for estimating emissions and removals of greenhouse gases and other climate forcers. New Zealand researchers participate in international research and observation programmes of the World Meteorological Organization; the World Climate Research Programme; the Global Climate Observing System (GCOS) and its Pacific component (PI-GCOS); the Integrated Marine Observing System; the Southern Ocean Observing System; the Scientific Committee on Antarctic Research; Future Earth; and the Asia–Pacific Network for Global Change Research.

Chapter 4

Financial, technological and capacity-building support

Key messages

New Zealand has contributed NZ$235.69 million in climate-specific support for developing countries during 2021 and 2022.

In 2018, New Zealand committed NZ$300 million in climate finance for 2019–22. In 2021, New Zealand made a NZ$1.3 billion commitment for 2022–25. The 2021 and 2022 climate finance figures in the first Biennial Transparency Report do not yet reflect the significant scale-up of New Zealand's international climate finance commitment. We expect this to be reflected in the second Biennial Transparency Report.

New Zealand delivers its international climate finance through activities in its international development cooperation programme, focusing on agriculture, food security, disaster prevention and preparedness, ecosystem strengthening, renewable energy, infrastructure and water security.

New Zealand continues to support various multilateral financial institutions, including regional development banks, contributing NZ$11.77 million in 2021–22.

New Zealand has also undertaken dedicated capacity-building and technology transfer activities. These aim to strengthen the capability and capacity of Pacific Island countries to respond to the impacts of climate change.

4.1 Introduction

New Zealand is committed to delivering on its climate finance obligations and contributing to the global goal of jointly mobilising US$100 billion per year from various sources through to 2025. This is in the context of developing countries taking meaningful mitigation actions and transparency on implementation.

This chapter reports on the financial, capacity building and technological support New Zealand has provided to developing countries for climate change action for 2021 and 2022. This is in line with the modalities, procedures and guidelines agreed in the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA) decision 18/CMA.1 for the Enhanced Transparency Framework referred to in Article 13 of the Paris Agreement. The chapter covers support provided through multilateral, regional and bilateral channels for mitigation and adaptation.

This reporting covers two climate finance commitment periods. In 2018, New Zealand committed NZ$300 million for 2019–22 and, in 2021, made a NZ$1.3 billion commitment for 2022–25. These commitments demonstrate the importance New Zealand places on supporting developing countries to reduce emissions and adapt to the impacts of climate change.

Delivery of the 2022–25 commitment is guided by the *Aotearoa New Zealand International Climate Finance Strategy – Tuia te Waka a Kiwa*.[308] The strategy aims to ensure New Zealand's climate finance supports developing countries and communities to build resilience in a world on a pathway to keeping global warming within 1.5 degrees Celsius. To do this, the strategy is working towards four main goals:

308 Ministry of Foreign Affairs and Trade. No date. *Aotearoa New Zealand International Climate Finance Strategy – Tuia te Waka a Kiwa*. Wellington: Ministry of Foreign Affairs and Trade.

1. enhance resilience and adaptation
2. promote quicker action on mitigation
3. improve information to allow evidence-based decisions
4. leverage our investments to make a greater impact.

During the reporting period, New Zealand contributed NZ$235.69 million in climate-specific support for climate change outcomes including across:[309]

- various specialised United Nations bodies: total funding of NZ$14.25 million
- various multilateral financial institutions including regional development banks: total funding of NZ$11.77 million
- other multilateral organisations: total funding of NZ$6.43 million
- bilateral, regional and other channels: total funding of NZ$203.25 million.

As of December 2024, New Zealand's increased climate finance is almost fully programmed, this includes funds being held for activities still in development, and the focus is on implementation. New Zealand looks forward to further reporting on this significant increase in its climate finance as part of its second Biennial Transparency Report in December 2026.

Over the 2021–22 reporting period, New Zealand's climate-related support focused on the following areas:

- strengthening capacity for effective low-emissions, climate-resilient planning
- supporting low-carbon economic growth, including through a significant contribution to improving access to renewable energy
- supporting Pacific countries to access the climate-related support they need from regional and multilateral agencies
- ensuring decision-makers have access to the science and information they need and use it to make informed decisions
- supporting greater global action to reduce greenhouse gas emissions
- strengthening disaster prevention and preparedness
- improving Pacific resilience through on-the-ground adaptation activities, including in areas such as agriculture, ecosystem strengthening, infrastructure and water security
- supporting low-emissions agricultural development, through support for, and participation in, the Global Research Alliance on Agricultural Greenhouse Gases (GRA), which was founded in late 2009.

309 For the 2021–22 reporting period, no payments were made to multilateral climate change funds, such as the Global Environment Facility, the Green Climate Fund and the Adaptation Fund, because payments had already been made to these funds for a multi-year period.

4.2 National circumstances and institutional arrangements

4.2.1 Description of the systems and processes used to identify, track and report on support provided and mobilised through public interventions

New Zealand is committed to regular and transparent reporting of its climate-related support and improving the tracking of its climate-related financial flows. Tracking and monitoring of climate finance allows both donor and recipient countries to direct support to areas or sectors that offer the greatest mitigation and adaptation potential. This achieves the most effective outcomes and facilitates further climate finance and investment flows.

The climate-related support provided by New Zealand is delivered mainly through New Zealand's International Development Cooperation (IDC) Programme, managed by the Ministry of Foreign Affairs and Trade (MFAT). New Zealand's IDC Programme pursues impactful development outcomes through four principles when providing climate-related support. These are as outlined in *New Zealand's International Cooperation for Effective Sustainable Development (ICESD)*:[310]

- **effective development** is values driven, partnership focused, adaptive, outcomes focused and evidence based
- **inclusive development** addresses exclusions and inequality created across all dimensions of social identity while promoting human rights and equitable participation in the benefits of development
- **resilient development** strengthens the environment, economy and societies to withstand shocks and manage crises while protecting future wellbeing
- **sustained development** enables lasting progress and is locally owned to uphold results in the long term.

New Zealand aims, where appropriate, to integrate environment and climate change objectives as cross-cutting issues in all activities managed by its IDC Programme. This is in keeping with international best practice and reduces the reporting burden for partner countries. Designing development assistance with environment and climate change co-benefits in mind ensures the development initiatives funded by the IDC Programme support sustainable management of natural assets and address climate change.

To identify, track and report on this support, New Zealand uses the Rio Markers of the Organisation for Economic Co-operation and Development's (OECD's) Development Assistance Committee (DAC). Staff who are managing the provision of support use the DAC Rio Markers to capture the thematic objectives of each activity, including climate change mitigation and adaptation. New Zealand then uses a system to quantify the climate-related support for each activity tagged with the climate-related DAC Rio Markers. This system is described in section 4.3.12 in relation to underlying assumptions, definitions and methodologies.

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310 Ministry of Foreign Affairs and Trade. No date. *Policy Statement: New Zealand's International Cooperation for Effective Sustainable Development (ICESD)*. Wellington: Ministry of Foreign Affairs and Trade.

4.2.2 Description of challenges and limitations

4.2.2.1 Challenges

Climate change and development interventions are becoming increasingly interwoven. Most official development assistance- (ODA-) eligible activities can contribute to climate resilience in some form, but accurately accounting for the specific 'climate finance' contribution can be challenging. Accurate monitoring frameworks that incorporate specific climate indicators are one way to improve the accuracy of this assessment.

We are working to improve these monitoring frameworks. We are doing this as we increase the proportion of activities funded through the IDC Programme that seek to build partner resilience to the impacts of climate change and/or reduce emissions.

Another challenge has been accurately reporting activities that support technology transfer to developing countries. New Zealand's internal systems do not yet have the ability to specifically tag activities as supporting climate-related technology transfer. This report has therefore required a separate analysis of individual activities to ascertain whether they contribute to technology transfer.

4.2.2.2 Limitations

New Zealand does not have systems in place to track mobilised private finance, nor other official flows. As such, these are not reported on in this report. However, New Zealand is developing a portfolio of activities that specifically focus on mobilising private finance and looks forward to being able to report on this in future Biennial Transparency Reports (BTRs).

4.2.3 Information on experience and good practices in relation to public policy and regulatory frameworks to incentivise further private climate financing and investment

New Zealand has not reported or specifically focused on mobilising further private climate finance in this reporting period. We expect to report on this in the second Biennial Transparency Report.

4.2.4 Efforts taken to enhance comparability and accuracy of information reported on financial support provided and mobilised through public interventions

New Zealand's use of the DAC Rio Markers, which are widely used by other Parties, intends to enhance the comparability of the information it reports on financial support provided and mobilised through public interventions. Similarly, New Zealand bases its definition of technology transfer and capacity building on the United Nations Framework Convention on Climate Change definition, to ensure comparability and accuracy of the information provided.

Each activity identified as contributing to mitigation and adaptation outcomes is reviewed against the DAC Rio Markers and MFAT's internal guidance, to ensure the accuracy of the information provided in New Zealand's reporting.

4.3 Underlying assumptions, definitions and methodologies

To enhance transparency of reporting, the following underlying assumptions, methodologies and definitions, as applicable, are used to identify and/or report, in line with CMA decision 18/CMA.1.

4.3.1 Chosen reporting year (calendar year, fiscal year)

This report covers calendar years 2021 and 2022.

4.3.2 Conversion between domestic currency and United States dollars

New Zealand's reporting period includes two calendar years, 2021 and 2022. Funds are reported in New Zealand dollars (NZ$). The methodology used for calculating currency exchange is the annual average exchange rates, as used by the OECD. The rates used are:

- 2021: US$ 1 = NZ$1.4140
- 2022: US$ 1 = NZ$1.5771.

4.3.3 Status (committed, disbursed)

New Zealand only reports on the climate finance that has been disbursed. For this report, 'provided' means funds that have been transferred from the New Zealand Government to a recipient, including multilateral or regional organisations.

4.3.4 Channel (bilateral, regional, multi-bilateral, multilateral)

New Zealand provides and reports on support delivered through bilateral, regional, multi-bilateral and multilateral channels. Bilateral support refers to the disbursement of climate finance to a specific country. Regional support refers to the disbursement of climate finance to programmes that target specific region(s) but that is not tagged to a particular country or group of countries. This is often delivered through a regional agency. Multilateral support refers to the disbursement of climate finance through an international organisation. Multi-bilateral support refers to support provided to more than one country through a single activity.

4.3.5 Funding source (official development assistance, other official flows, other)

All of the financial support reported in this Biennial Transparency Report comes from New Zealand's IDC Programme. Most of this is ODA, based on the OECD DAC definitions. That is, it is support that has as its main purpose the economic development and welfare of developing countries and is provided on concessional terms that can be counted. However, New Zealand's IDC appropriation and total climate finance are more expansive than ODA. They include the Cook Islands, which despite being a high-income country, is still highly vulnerable to the impacts of climate change, and has unique constitutional arrangements with the New Zealand Government. These transactions are recorded as 'other' because they do not meet official development assistance criteria.

4.3.6 Financial instrument (eg, grant, concessional loan, non-concessional loan, equity, guarantee, insurance, other (specify))

All of the financial support provided by New Zealand is in the form of grants. New Zealand does not provide climate finance through loans, equities or guarantees although provides funding to organisations that do so.

4.3.7 Information on instruments and funding sources reported, including how a Party has determined finance to be concessional and/or ODA

This report includes any climate-related support provided over the reporting period that meets agreed ODA definitions (ie, with a strong concessional element and with economic development and the welfare of developing countries as its main objective). All of New Zealand's climate-related support is delivered through its IDC Programme as grant funding.

4.3.8 Type of support (eg, adaptation, mitigation, cross-cutting)

Activities reported as 'adaptation' are those tagged with the climate change adaptation DAC Rio Marker but not the mitigation marker. Activities reported as 'mitigation' are those tagged with the climate change mitigation DAC Rio Marker but not the adaptation marker. Activities reported as 'cross-cutting' are those tagged with both a climate change adaptation and mitigation DAC Rio Marker.

4.3.9 Sector

New Zealand codes sectors for activities using the DAC's statistical sector creditor reporting system purpose codes and their standard methodology and agreed definitions. These purpose codes are closely aligned with the sectors in the relevant Biennial Transparency Report tables and adjusted to the corresponding sector for this report.

4.3.10 Subsector

New Zealand only reports on the primary sector for its climate finance activities.

4.3.11 Capacity building and technology transfer

4.3.11.1 Capacity building

In 2018, MFAT added a marker for capacity building to its internal reporting systems. This marker provides a binary indication of whether projects support climate change capacity building. New Zealand does not track financial support provided to capacity building.

Activities are tagged as including capacity-building elements, if financing contributes to one or more of the following:

- enhancing coherence and coordination of capacity building
- addressing capacity-building gaps and needs
- awareness-raising, knowledge and information sharing and stakeholder engagement.

4.3.11.2 Technology development and transfer

New Zealand uses the United Nations Framework Convention on Climate Change definition of 'technology transfer'. Activities are tagged as including 'technology transfers' when they can demonstrate that a new 'tangible technological component' has been introduced (defined as 'hard technology') or if an activity includes information, knowledge sharing, training or research (defined as 'soft technology').

Much of New Zealand's support is a combination of endogenous and non-endogenous technology transfers. This helps ensure that technology transfer is implemented in country-specific ways, building on existing knowledge and practices, and using local governance structures. In recognition of this dual approach, this Biennial Transparency Report does not differentiate between endogenous and non-endogenous technology transfer.

4.3.12 Support as being climate-specific

New Zealand is committed to regular and transparent reporting of its climate-related support and to improving the tracking of its climate-related financial flows. Tracking and monitoring climate finance enables both donor and recipient countries to direct support to areas or sectors that offer the greatest mitigation and adaptation potential. This achieves the most effective outcomes and facilitates further climate finance and investment flows.

MFAT uses the DAC Rio Markers for tracking development assistance with climate change adaptation and mitigation outcomes. While the DAC Rio Markers capture the thematic objectives of each activity, they do not quantify expenditure towards these objectives. New Zealand has built on the DAC Rio Markers to create a system to quantify the climate-related support provided by the IDC Programme. This involves applying a nationally determined co-efficient and weighting for the proportion of the total cost that is considered climate-specific (see table 4.1).

To qualify for scoring against a DAC Rio Marker as a '*principal objective*', the objective (climate change mitigation, climate change adaptation) must be explicitly stated as fundamental in the design of, or motivation for, the action. Promoting the objective will thus be stated in the activity documentation to be one of the principal reasons for undertaking the action. In other words, the activity would not have been funded (or designed that way) but for that objective. Climate 'principal' activities have 100 per cent of their activity value reported as climate specific.

To qualify for scoring against a DAC Rio Marker as a *'significant objective'*, the objective must also be explicitly stated but is not the fundamental driver or motivation for undertaking and designing the activity. The activity has other prime objectives but has been formulated or adjusted to help meet the relevant environmental concerns. Climate 'significant' activities generally have 30 per cent of the activity value reported as climate specific. Disaster risk reduction and management activities also coded as adaptation 'significant' are reported with 50 per cent of the activity value as climate-specific due to their particularly strong climate adaptation connection.

Table 4.1: Classifications and coefficients for quantifying and recording climate-related expenditure

Classification	Where addressing climate change is…	Financial information recorded in the climate change inventory
Principal	…one of the main outcomes of the activity Addressing climate change risks or opportunities is fundamental to the design of the activity. The activity includes climate change as an important outcome. Climate change is explicitly addressed through specific outputs	100% of the activity value for the financial year
Significant	…one of the outcomes of the activity Addressing climate change risks or opportunities is an important but not the principal reason for undertaking the activity. Climate change is explicitly addressed as part of the outputs in the activity design, these do more than simply avoid a potential negative impact	30% of the activity value for the financial year unless either: 1. a more accurate figure is known, or 2. a different default figure is specified for the particular activity type. This is applicable for activities that contribute to disaster risk reduction and management, to which 50% of the activity value is attributed
Not targeted	…not an outcome of the activity Climate change opportunities and risks have been assessed but will not be significantly addressed through any of the outputs in the Results Framework	0% of the activity value for the financial year

Along with the criteria in table 4.1, specific types of activities supported by the IDC Programme have specific weightings.

4.3.13 Information on the efforts taken to avoid double counting

New Zealand endeavours to ensure no double counting occurs of the financial support it provides. By only reporting the resources disbursed through the IDC Programme, we ensure we are not double-counting resources of other Parties, including when multiple Parties are providing support for the same activity.

For support provided to activities involving multiple recipient countries, New Zealand reports this at a regional or multi-country level, as appropriate, to avoid double-counting risks associated with reporting at a country-by-country level.

We have not reported any mobilisation of private finance or resources used under Article 6 of the Paris Agreement. As such, no risk of double counting exists in this regard.

4.3.14 Definition of public and private finance, in particular where entities or funds are mixed

New Zealand is only reporting public grant-based finance during this reporting period. This is defined as financial resources provided by the Government of New Zealand.

4.3.15 How private finance was assessed as mobilised through public interventions

New Zealand has not tracked, and is not reporting, the quantum of private finance mobilised by its public interventions in this reporting period. However, New Zealand's IDC Programme supports the private sector to transition to a green economy by strengthening the enabling policy environment, catalysing investment and providing technical assistance across industry sectors.

For the 2022–25 commitment period, New Zealand is taking deliberate steps to mobilise private climate finance through several activities. We expect to start reporting on these efforts in the second BTR.

4.3.16 How New Zealand seeks to ensure that support provided and mobilised through public interventions effectively addresses the needs and priorities of developing country Parties for the implementation of the Paris Agreement

New Zealand delivered its climate-related support as part of activities designed to achieve sustainable, inclusive and resilient development outcomes that meet the aspirations and needs that partner countries identified, consistent with international best practice.

At the heart of this approach are country partnerships. New Zealand develops bilateral statements of partnership, and four-year plans are based on partner countries' national plans and self-identified needs and priorities. These then guide the provision of support to partner countries. New Zealand also conducts regular monitoring of its climate-related support to assess each activity's effectiveness in addressing the needs and priorities of developing country Parties.

New Zealand has also heard the calls from partners, including in the Pacific, for more flexible financing arrangements that allow them to take ownership of their climate response. In response, New Zealand has initiated a flexible finance programme that provides untagged climate finance to selected countries in the Pacific to enable them to deliver on their climate priorities. We expect to report further on this initiative in the second Biennial Transparency Report.

Further information is given below on how New Zealand's support during the reporting period addressed the specific needs and priorities of developing countries in relation to adaptation, climate mobility, and loss and damage.

4.3.16.1 Adaptation

New Zealand recognises adaptation as one of the pressing needs and priorities of developing countries vulnerable to the impacts of climate change, particularly small island developing states and least developed countries. New Zealand spent NZ$124,881,101 on climate adaptation, and an additional NZ$94,661,193 on cross-cutting activities, over the 2021 and 2022 reporting period. New Zealand works with partner countries, regional agencies and multilateral funds to shape and deliver activities that reduce the vulnerability of human or natural systems to the impacts of climate change and increase community resilience and adaptive capacity. Activities are designed in response to the priorities of individual countries, within the context of their national and regional plans, strategies and frameworks.

Significant initiatives supported for climate change adaptation, disaster risk management and resilience building during 2021–22 included:

- reducing the risk of water scarcity in atoll countries by enabling water-scarce communities to actively manage resources to improve resilience
- mainstreaming risk-based analysis of government planning by incorporating climate change into governance systems for planning, budgeting and programme management purposes. Interventions are targeted at national and subnational levels in several Pacific Island countries
- improving ecosystem resilience, through contributions to the Pacific Regional 'Kiwa Initiative: Nature-based Solutions for Climate Resilience'. This initiative aims to strengthen Pacific Island ecosystems, economies and communities to become more resilient to the impacts of climate change.

In supporting the needs and priorities of developing countries, New Zealand recognises how adaptation and disaster risk reduction are closely related processes because both aim to reduce vulnerability to short-term acute hazards and longer-term chronic hazards. For example, New Zealand supports the Pacific's approach, as stated in the Framework for Resilient Development in the Pacific, of integrating disaster risk reduction and climate adaptation.[311]

4.3.16.2 Loss and damage

New Zealand also recognises that the continuum of needs of developing countries extends beyond adaptation and to responding to loss and damage. This is evident in the Pacific, where the island countries are some of the most exposed in the world to the impacts of climate change. The indications are that some locations have exceeded their adaptation limits already and economic and non-economic losses and damages are becoming increasingly apparent.

Most of New Zealand's adaptation work supports the Pacific to build the resilience of its communities, livelihoods and ecosystems and helps to minimise the loss and damage associated with climate change. It also supports work on early warning systems to prepare for hazards, and financial preparedness and resilience, such as in the following examples.

- The Averting Water-related Emergencies activity, which creates effective early warning systems by supporting Pacific Island countries to anticipate and prepare for water-related emergencies through understanding their vulnerability.
- Support to the Pacific Community (SPC) to establish the Pacific Community Centre for Ocean Science. The centre brings together scientific data and expertise and makes them more readily available to decision-makers in the region. This provides a platform to coordinate and integrate ocean science activities with international and regional partners to understand and respond to loss and damage occurring in marine environments, such as the migration of fish stocks and sea-level rise.
- Support to the Pacific Insurance and Climate Adaptation Programme, which improves the financial preparedness and resilience of Pacific peoples to respond to economic loss and damage resulting from climate change and natural hazards.

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311 Pacific Community (SPC). 2017. *Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP) 2017–2030*. Suva: Pacific Community. Retrieved from http://gsd.spc.int/frdp/ (30 September 2022).

New Zealand has also started designing and implementing activities specifically aimed at addressing loss and damage. This includes the commitment of NZ$20 million made at the 27th Conference of the Parties (COP27) in 2022. An internal system for tagging and tracking climate finance related to loss and damage is under development and we expect to begin reporting on support for responding to loss and damage more systematically in the second Biennial Transparency Report.

4.3.16.3 Climate mobility

Another specific need and priority expressed by developing countries that relates to both adaptation and loss and damage is climate mobility and displacement. This is already a pressing concern in the Pacific. In 2018, New Zealand developed a plan to take early and collaborative action on climate mobility. This plan recognises the importance of the perspectives of Pacific peoples, including their desire to live in their own country, where possible.

As part of that plan, New Zealand supported activities during 2021 and 2022 to avert and delay climate-related displacement and prepare people for climate migration where that may be necessary. This included:

- conducting a comprehensive scoping study to inform the procurement of research to better understand future climate migration trends and the social and economic impacts on New Zealand and Pacific Island countries
- supporting a peace-building, non-governmental organisation to help communities in Fiji to prevent and manage conflicts that may result from displacement and relocations related to climate change
- supporting the Government of Fiji to establish the Fiji Relocation Trust Fund to provide internal relocation assistance to Fijian communities
- funding a consortium of United Nations and international organisations, led by the International Organization for Migration, to strengthen the capacity and coordination of Pacific governments and non-government actors in their approach to climate mobility.

4.3.17 How New Zealand seeks to ensure support provided and mobilised through public interventions is in line with the long-term goals of the Paris Agreement

New Zealand's climate finance is carefully programmed to ensure it aligns with the three long-term goals of the Paris Agreement. This is done in several ways.

First, a country-partnership approach, including supporting programmes aligned to partners' Nationally Determined Contributions and national adaptation plans, helps ensure support flows to those countries' national efforts towards delivering on the Paris Agreement.

Second, efforts are made to ensure finance flows from New Zealand's IDC Programme are aligned with low greenhouse gas emissions and climate-resilient development, as per Article 2.1(c) of the Paris Agreement. An example of this was New Zealand's support for the Statement on International Public Support for the Clean Energy Transition at the 26th Conference of the Parties (COP26). This included a commitment to transition our international public support towards the clean energy transition and out of unabated fossil fuels. This includes ending direct public support for the international unabated fossil fuel energy sector.

New Zealand has implemented this commitment and does not support fossil fuel assets through its IDC Programme. In December 2022, the New Zealand Export Credit Office announced it would also no longer provide support for the fossil fuel energy sector, in line with the Clean Energy Transition statement.

The Clean Energy Transition statement provides for exceptions in limited and clearly defined circumstances that are consistent with a 1.5 degree Celsius warming limit and the goals of the Paris Agreement. For New Zealand, any IDC support for fossil fuels would be exclusively limited to diesel electricity generation in the Pacific and, where necessary, to:

- ensure electricity supply as part of a humanitarian or emergency response
- back-up or supplement renewable energy systems in rural or remote locations, and where there is no access to an established electricity grid
- maintain security and stability of supply on fragile electricity grids and enable increased renewable energy generation.

New Zealand's climate finance also supports developing countries to align finance flows with climate action in their own countries.

Third, New Zealand ensures the activities it supports with climate finance are genuinely supporting climate action that advances the goals of the Paris Agreement. The use of DAC Rio Markers as guidance for tagging climate change adaptation and mitigation activities, for example, requires activity managers to ensure activities are genuinely supporting climate action in these areas.

4.3.18 An indication of what new and additional financial resources have been provided, and how it has been determined that such resources are new and additional

New Zealand's approach to determining new and additional financial resources for 2021–22 has been to report all climate-related assistance provided during the reporting period. This is the most transparent and appropriate way of communicating new resources provided. Because climate change is a cross-cutting development issue, this support frequently has co-benefits across various development outcomes. This is reflected in the integrated approach to climate change and development in the Pacific region.[312]

New Zealand's 2019–22 climate finance commitment drew on new finance from an increased IDC budget for that period. For the 2022–25 commitment period, New Zealand's NZ$1.3 billion climate finance commitment draws from new finance provided from New Zealand's Climate Emergency Response Fund, established in 2021 with proceeds from the New Zealand Emissions Trading Scheme. Of this commitment, $800 million is 'new and additional' in the sense it is new money that is in addition to the $500 million of our IDC budget already targeted towards climate outcomes. The $800 million is appropriated from New Zealand's Climate Emergency Response Fund, and activities from this component must be tagged as 'principal' (DAC Rio Marker Two) for climate outcomes whereas those in the $500 million component can be 'principal' (DAC Rio Marker Two) or 'significant' (DAC Rio Marker One).

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312 Pacific Community (SPC). 2017. *Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP) 2017–2030*.

4.3.19 How the information provided reflects a progression from previous levels in the provision and mobilisation of finance under the Paris Agreement

The financial support provided and mobilised by New Zealand for 2020–21 is lower than for the Fifth Biennial Report. The total reported for 2021 and 2022 is NZ$235.69 million, compared with NZ$285.70 million for 2019–20 reported in New Zealand's Fifth Biennial Report. This is due to normal variabilities in programming and payment cycles. Further, the data do not yet reflect the significant increase in New Zealand's climate finance commitment for 2022–25 because it takes time for delivery to be scaled up. Growth in the provision of New Zealand's climate finance for the next Biennial Transparency Report period will be bolstered by:

- New Zealand's increased climate finance commitment of NZ$1.3 billion for 2022–25 (a quadrupling of its previous commitment)
- increased efforts to mobilise private finance
- continued efforts to mainstream climate change across New Zealand's IDC Programme.

4.3.20 Information on reporting on multilateral finance, including inflow/outflow reporting, climate specificity, core/general reporting and Party attribution

New Zealand's multilateral finance that is reported is mainly based on the Party's inflow contribution to the relevant multilateral institution. For some institutions, an imputed share relating to outflows is available from the OECD DAC, which we then apply as a co-efficient to adjust our inflows for climate specificity.

New Zealand does not monitor its core funding to regional and multilateral organisations to the level of specific climate change allocations and actions.

In this report, New Zealand only reports on the climate-specific amounts of support. This is done either through its use of DAC Rio Markers and nationally determined coefficients described in table 4.1, or OECD DAC imputed shares as described above.

The general contributions New Zealand makes to multilateral institutions are pooled with others and not directly attributed to specific expenditures by the institution. The reported multilateral finance is attributed to New Zealand based on its inflow contributions, mediated by the climate-specific amount based on a determination of the institution as being climate 'principal' or 'significant', or as imputed shares provided by the institution.

4.3.20.1 Global Research Alliance on Agricultural Greenhouse Gases

The Global Research Alliance on Agricultural Greenhouse Gases (GRA) is a multilateral institution established by New Zealand in late 2009 that seeks to increase global cooperation and investment to reduce the emissions intensity of agricultural production systems. The GRA encompasses the voluntary, collaborative efforts of its 68 member countries and 27 partner organisations spread across the globe. The GRA's work is conducted through its four research groups, which are focused on significant agricultural subsectors (livestock, croplands, paddy rice), and an integrative research group, which addresses cross-cutting issues, including soil carbon sequestration and greenhouse gas inventories.

New Zealand plays an active role in supporting the GRA through funding and delivery of education, training and public awareness, funding of mitigation research projects and funding of regional and international collaboration. This is in addition to co-chairing the GRA's Livestock Research Group and hosting the GRA Secretariat and Special Representative. Through the GRA, New Zealand provided significant technology transfer and capacity-building support to developing countries in 2021–22 (see table 4.2).

Table 4.2: Technology transfer and capacity-building support delivered through the Global Research Alliance on Agricultural Greenhouse Gases

Recipient country or region	Title of the project programme, activity or other	Status	Channel	Funding source	Type of support	Capacity building	Technology transfer
Uruguay	2020-LEARN-TECH	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	Yes
China	2017-LEARN-PhD	disbursed	bilateral	Ministry for Primary Industries	mitigation	Yes	No
Indonesia	2018-CH4 Measurement Indonesia	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	Yes
Global	2020-GHGMI Online Resource	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	No
Sri Lanka	2020-Sri Lanka Postharvest Losses	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	No
Latin America	2021-FONTAGRO-Soil Carbon Monitoring System	disbursed	regional	Ministry for Primary Industries	cross-cutting	Yes	Yes
Global	Greener Cattle Initiative	disbursed	regional	Ministry for Primary Industries	cross-cutting	Yes	Yes
Global	GGAA-sponsorship	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	No
Chile, Ethiopia and Indonesia	2022-EJPSOILS-Truesoil	disbursed	bilateral	Ministry for Primary Industries	mitigation	Yes	No
South Africa, China	2022-EJPSOILS-WISHROOTS	disbursed	bilateral	Ministry for Primary Industries	mitigation	Yes	No
South Africa	2021-ERANET-CircAgricGHG	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	No
Argentina, Uruguay and Peru	2021-ERANET-Integrity	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	No
Chile	2021-ERANET-ReLive	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	No
Brazil and Uruguay	2021-ERANET-Sense	disbursed	bilateral	Ministry for Primary Industries	cross-cutting	Yes	Yes

4.4 Information on financial support provided and mobilised under Article 9 of the Paris Agreement

See annex 1 for common tabular format (CTF) tables:

- CTF table III.1 for financial support provided and mobilised through bilateral, regional and other channels
- CTF table III.2 for financial support provided through multilateral channels.

4.5 Information on support for technology development and transfer provided under Article 10 of the Paris Agreement

The development and transfer of climate-friendly technologies are critical for reducing greenhouse gas emissions and adapting to the impacts of climate change. New Zealand is committed to promoting, facilitating and financing the transfer of, access to, and deployment of climate-friendly technologies for the benefit of developing countries.

Technology transfer helps both developed and developing countries reduce the cost of tackling climate change, while also stimulating opportunities for sustainable development. Practical assistance and cooperative action to accelerate technology development and transfer to help developing country Parties are, therefore, priorities for New Zealand. During the reporting period, New Zealand delivered on these commitments through the IDC Programme and the GRA. This section reports on these commitments.

One particular priority for the IDC Programme has been supporting energy initiatives to enable access to affordable, reliable and clean energy technologies, reducing carbon emissions, improving energy efficiency, and creating low-carbon development pathways. One example that provides endogenous technology transfers is the Renewable Energy Initiative in Nauru. This activity constructed a 1.15-megawatt solar photo-voltaic generation system in Nauru and built a connection to the existing power network. In addition, this activity also provides exogenous technology to Nauru through technical assistance and training to operate the new generation system.

The Association of Southeast Asian Nations (ASEAN) Climate Smart Agricultural Initiative is an example of New Zealand's commitment to the reduction of global agricultural greenhouse gas emissions. This activity enables ASEAN member states to increase engagement with the GRA to develop technologies to mitigate greenhouse gas emissions and build regional capability in agricultural emissions measurement.

Another priority for New Zealand's support of technology transfer has been to help communities better meet the challenges of more extreme weather events, the increasing risk of drought, sea-level rise and changes in fisheries resources. For example, the Activity Information for Decision Making, an activity financed by New Zealand, supports technology transfers used to enhance collaborative approaches to research and development to reduce vulnerability to climate change. It does this by bringing together datasets and systems from across the Pacific region that support a connected and usable platform of climate data, hazard and risk analysis.

See annex 1 for CTF table III.4, for information on support for technology development and transfer provided under Article 10 of the Paris Agreement.

4.6 Information on capacity-building support provided under Article 11 of the Paris Agreement

Capacity building is an integral part of many activities in the New Zealand IDC Programme. New Zealand introduced a climate change capacity-building marker into its reporting system in 2018. This is allowing us to better track the support we provide for climate change capacity building and will let us provide more detailed reporting in the future.

The following examples show the range of areas to which this support has contributed.

- **Renewable energy:** Alongside the many renewable energy activities aimed at technology transfer for climate mitigation, New Zealand aims to strengthen these with capacity-building support. This will ensure countries and communities have the ability to operate and maintain these technologies into the future, especially in the face of the impacts of climate change. The Indonesia Renewable Energy Programme provides expert advice to ensure New Zealand's renewable energy activities are targeted and relevant and continue to contribute to increased access to renewable energy across Indonesia.
- **Improving climate research, data and analysis to support better evidence-based decision-making:** New Zealand provided funding to establish a Pacific Community Centre for Ocean Science. The Japan International Cooperation Agency is funding the construction of the centre. New Zealand's support will focus on human resources and capacity development support.
- **Ocean acidification:** The New Zealand Pacific Partnership on Ocean Acidification activity supported communities in Fiji, Kiribati and Tokelau to better adapt to the impacts of ocean acidification through support for research and community-based adaptation and awareness-raising actions.
- **Drought resilience:** The Integrated Water Resource Management activity supports Tuvalu's climate change adaptation efforts through the implementation of drought management plans, water and sanitation policy development and drought modelling.

See annex 1 for CTF table III.5 for information on New Zealand's capacity-building support in the context of climate change during 2021–22, provided under Article 11 of the Paris Agreement.

Annexes

Annex I: Common tabular formats for electronic reporting

Common tabular formats for the electronic reporting of information necessary to track progress in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement

CTF table 1: Structured summary: Description of selected indicators

Indicator(s) selected to track progress [a]	Description
Annual net target accounting emissions	Annual net target accounting emissions between 2021 and 2030 in kt CO_2e
Information for the reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate	Target reference year: 2005 LULUCF activity start year: 1990 Total emissions in base year (2005): provisional estimate 86.6 (Mt CO_2e) Base year emissions are as reported in the most recently published national greenhouse gas inventory report. Common metric: AR5 GWP100
Updates in accordance with any recalculation of the GHG inventory, as appropriate [b]	Base year and indicator values are consistent with the most recently published national greenhouse gas inventory report and therefore include category-specific GHG inventory recalculations for all sectors.
Relation to NDC [c]	This indicator allows us to quantitatively assess how New Zealand is tracking towards reducing net greenhouse gas emissions to 50 per cent below gross 2005 levels by 2030.

Note: AR5 GWP100 = the 100-year time horizon global warming potential values from the IPCC Fifth Assessment Report (IPCC, 2013[313]); GHG = greenhouse gas; LULUCF = Land Use, Land-Use Change and Forestry; NDC = Nationally Determined Contribution.

a Each Party shall identify the indicator(s) that it has selected to track progress of its NDC (para. 65 of the MPGs).

b Each Party shall provide the information for each selected indicator for the reference point(s), level(s), baseline(s), base year(s) or starting point(s), and shall update the information in accordance with any recalculation of the GHG inventory, as appropriate (para. 67 of the MPGs).

c Each Party shall describe for each indicator identified how it is related to its NDC (para. 76(a) of the MPGs).

313 IPCC. 2013. Stocker TF, Qin D, Plattner G-K, Tignor M, Allen SK, Boschung J, Nauels A, Xia Y, Bex V, Midgley PM (eds). Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

CTF table 2: Structured summary: Definitions needed to understand the Nationally Determined Contribution

	Definitions [a]
Definition needed to understand each indicator:	
Annual net target accounting emissions in kt CO_2e	Annual net target accounting quantities comprise: • all gross emissions • emissions from the following LULUCF activities: *Afforestation and reforestation, Forest management* and *Deforestation*. A country-specific approach to account for emissions from *Afforestation and reforestation* is applied.
Any sector or category defined differently than in the national inventory report:	
Land Use, Land-Use Change and Forestry	New Zealand's accounting approach to the LULUCF sector is activity based and applies existing IPCC methodologies to distinguish areas subject to direct human-induced change that has occurred since 1990 from those under pre-existing management as at 1990, as follows. • Emissions and removals from *Afforestation and reforestation* activities are accounted for until the forests attain their long-term average carbon stock, taking into account all carbon pools. Thereafter, emissions and removals from these activities are tracked to ensure they are consistent with attaining the long-term average carbon stock over the long term under business-as-usual management. • Emissions and removals from *Deforestation* activities are fully accounted for. • Emissions and removals from *Forest management* activities are accounted for under a business-as-usual reference level, to address the dynamic effects of age structure resulting from activities and practices occurring before the start year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal, sustainable forest management in production forests. • Accounting provisions to address natural disturbances on managed lands, non-anthropogenic effects and additionality since the activity start year also apply, building on existing guidance. • Accounting for harvested wood products is based on the production approach.
Definition needed to understand mitigation co-benefits of adaptation actions and/or economic diversification plans:	
Adaptation actions	Not applicable.
Economic diversification plans	Not applicable.
Any other relevant definitions	

Note: IPCC = Intergovernmental Panel on Climate Change; LULUCF = Land Use, Land-Use Change and Forestry.

Notes: (1) Pursuant to para. 79 of the MPGs, each Party shall report the information referred to in paras. 65–78 of the MPGs in a narrative and common tabular format, as applicable. (2) A Party may amend the reporting format (e.g. Excel file) to remove specific rows in this table if the information to be provided in those rows is not applicable to the Party's NDC under Article 4 of the Paris Agreement, in accordance with the MPGs. (3) The Party could add rows for each additional sector, category, mitigation co-benefits of adaptation actions and/or economic diversification plans, indicator and any other relevant definitions.

[a] Each Party shall provide any definitions needed to understand its NDC under Article 4, including those related to each indicator identified in para. 65 of the MPGs, those related to any sectors or categories defined differently than in the national inventory report, or the mitigation co-benefits of adaptation actions and/or economic diversification plans (para. 73 of the MPGs).

CTF table 3: Structured summary: Methodologies and accounting approaches – consistency with Article 4, paragraphs 13 and 14, of the Paris Agreement and with decision 4/CMA.1

Reporting requirement	Description or reference to the relevant section of the BTR
For the first NDC under Article 4: [a]	
Accounting approach, including how it is consistent with Article 4, paras 13–14, of the Paris Agreement (para 71 of the MPGs)	New Zealand's accounting approach is described in section 2.3.4. New Zealand's accounting approach is a gross:net point-year target for 2030, managed as an emissions budget across the period from 2021 to 2030; economy-wide, all sectors, all gases; modified Kyoto Protocol accounting rules are applied to the LULUCF sector. Because the accounting approach is an absolute reduction in greenhouse gas emissions as reported annually in New Zealand's Greenhouse Gas Inventory, it is consistent with Article 4, paragraphs 13–14 of the Paris Agreement and paragraph 71 of the MPGs.
For the second and subsequent NDC under Article 4, and optionally for the first NDC under Article 4: [b]	
Information on how the accounting approach used is consistent with paragraphs 13–17 and annex II of decision 4/CMA.1 (para. 72 of the MPGs)	Not applicable.
Explain how the accounting for anthropogenic emissions and removals is in accordance with methodologies and common metrics assessed by the IPCC and in accordance with decision 18/CMA.1 (para. 1(a) of annex II to decision 4/CMA.1)	Not applicable.
Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1)	Not applicable.
Explain how overestimation or underestimation has been avoided for any projected emissions and removals used for accounting (para. 2(c) of annex II to decision 4/CMA.1)	Not applicable.
For each NDC under Article 4: [b]	
Accounting for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the IPCC and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (para. 12(a) of decision 4/CMA.1 and para 1 of its annex II):	
Each methodology and/or accounting approach used to assess the implementation and achievement of the target(s) as applicable (para 74(a) of the MPGs)	Net target accounting quantities are used to assess the implementation, progress and achievement of the target for NDC1. See section 2.3.4 for details.
Methodology and/or accounting approach used for the construction of any baseline to the extent possible (para 74(b) of the MPGs)	Base year emissions are 2005 total (gross) emissions as reported in New Zealand's Greenhouse Gas Inventory. A forest reference level is used to account for Forest management activities. See annex 2, including section A.2.4.1 for details.
If the methodology or accounting approach used for the indicator(s) in table 1 differ from those used to assess the implementation and achievement of the target, describe each methodology or	Not applicable.

Reporting requirement	Description or reference to the relevant section of the BTR
accounting approach used to generate the information generated for each indicator in table 4	
Assumptions relevant to the achievement of the NDC under Article 4, as applicable and available (para 75(i) of the MPGs) (para 74(c) of the MPGs)	Not applicable.
Key parameters, assumptions, definitions, data sources and models used, as applicable and available (para 75(a) of the MPGs)	Information on parameters, assumptions, data sources and models used to calculate New Zealand's target, forest reference level and indicator is provided in sections 2.3, 2.5, 2.6 and annex 2 of New Zealand's first Biennial Transparency Report.
IPCC Guidelines used, as applicable and available (para 75(b) of the MPGs)	2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines).[314] 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (2013 KP Supplement).[315]
Report the metrics used, as applicable and available (para 75(c) of the MPGs)	100-year time horizon global warming potential values used are those listed in table 8.A.1 of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,[316] excluding the value for fossil methane (AR5 GWP100).
For Parties whose NDC cannot be accounted for using methodologies covered by IPCC guidelines, provide information on their own methodology used, including for NDCs, pursuant to Article 4, paragraph 6, of the Paris Agreement, if applicable (para 1(b) of annex II to decision 4/CMA.1)	New Zealand is applying an activity-based accounting approach to the net emissions it accounts for from the LULUCF sector. The methods applied to estimate accounting quantities adhere to the 2006 IPCC Guidelines and the 2013 KP Supplement while taking a country-specific approach to account for emissions from Afforestation and reforestation activities. See annex 2, section A2.3.2 for a full description of the country-specific approach New Zealand applies to Afforestation and reforestation activities.
Provide information on methodologies used to track progress arising from the implementation of policies and measures, as appropriate (para 1(d) of annex II to decision 4/CMA.1)	Not applicable.
Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance, taking into account any relevant decision under the Convention, as applicable (para 75(d) of the MPGs):	
For Parties that address emissions and subsequent removals from natural disturbances on managed lands, provide detailed information on the	In the event of a significant non-anthropogenic event or circumstance, New Zealand retains the option to invoke the natural disturbance accounting provision. The

[314] IPCC. 2006. Eggleston HS, Buendia L, Miwa K, Ngara T, Tanabe K (eds). *2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 1. General Guidance and Reporting.* IPCC National Greenhouse Gas Inventories Programme. Japan: Institute for Global Environmental Strategies for IPCC.

[315] IPCC. 2014. Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Switzerland: IPCC.

[316] IPCC. 2013. Stocker TF, Qin D, Plattner G-K, Tignor M, Allen SK, Boschung J, Nauels A, Xia Y, Bex V, Midgley PM (eds). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Reporting requirement	Description or reference to the relevant section of the BTR
approach used and how it is consistent with relevant IPCC guidance, as appropriate, or indicate the relevant section of the national GHG inventory report containing that information (para 1(e) of annex II to decision 4/CMA.1, para 75(d)(i) of the MPGs)	following types of natural disturbances are captured: wildfires; invertebrate and vertebrate pests and diseases; extreme weather events; geological disturbances. For planted forests, salvage logging is considered to take place in all disturbed forests. In the case of pre-1990 natural forests, the ground plot measurement programme captures emissions from natural disturbances implicitly, and the emissions from natural disturbance events, apart from wildfires, cannot be separated from other disturbance events. New Zealand assumes a zero baseline for all types of natural disturbance except wildfires. The background level has been defined for wildfire emissions using the default methodology described in section 2.3.9.6 of the 2013 KP Supplement. This is described in annex 2, section A2.3.7.
For Parties that account for emissions and removals from harvested wood products, provide detailed information on which IPCC approach has been used to estimate emissions and removals (para 1(f) of annex II to decision 4/CMA.1, para 75(d)(ii) of the MPGs)	New Zealand accounts for the changes in the harvested wood products pool by using the production approach. Annex 2, section A2.3.5 further describes the methods used for accounting for emissions and removals from harvested wood products.
For Parties that address the effects of age-class structure in forests, provide detailed information on the approach used and how this is consistent with relevant IPCC guidance, as appropriate (para 1(g) of annex II to decision 4/CMA.1, para 75(d)(iii) of the MPGs)	Forests established before the activity start year (1990) are accounted for under a business-as-usual reference level. For planted forests, the reference level addresses the dynamic effects of age-class structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal forest management in production forests. See annex 2, sections A2.1.1 and A2.3.4. Forests established after the activity start year (1990) are accounted for up until they attain their long-term average (LTA) carbon stock. Once they reach their LTA carbon stock, taking into account all carbon pools and activities, no further carbon gains or losses are accounted for. This is done to address the effects of age-class structure, and to only account for the long-term additional carbon sequestered in forests. This is further described in annex 2, sections A2.1.1 and A2.3.2.
How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, as appropriate, if applicable (para 1(c) of annex II to decision 4/CMA.1)	New Zealand is applying an activity-based accounting approach to the net emissions it accounts for from the LULUCF sector. The methods applied to estimate accounting quantities adhere to the 2006 IPCC Guidelines[317] and the 2013 KP Supplement[318] while

[317] IPCC. 2006. Eggleston HS, Buendia L, Miwa K, Ngara T, Tanabe K (eds). *2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 1. General Guidance and Reporting.* IPCC National Greenhouse Gas Inventories Programme. Japan: Institute for Global Environmental Strategies for IPCC.

[318] IPCC. 2014. Hiraishi T, Krug T, Tanabe K, Srivastava N, Baasansuren J, Fukuda M, Troxler TG (eds). *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Switzerland: IPCC.

Reporting requirement	Description or reference to the relevant section of the BTR
	taking a country-specific approach to account for emissions from *Afforestation and reforestation* activities.
Any methodologies used to account for mitigation benefits of adaptation actions and/or economic diversification plans (para 75(e) of the MPGs)	Not applicable.
Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed related to Article 6 if relevant (para 76(d) of the MPGs)	New Zealand uses wall-to-wall land-use mapping, completed every five years; deforestation mapping completed every two years; and national statistics to estimate change areas in intervening years, to estimate afforested, reforested and deforested land areas. This spatially explicit approach ensures that no double counting of activity areas occurs.
Any other methodologies related to the NDC under Article 4 (para 75(h) of the MPGs)	Not applicable.
Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para 12(b) of the decision 4/CMA.1 and para 1 of its annex II)):	
Explain how consistency has been maintained in scope and coverage, definitions, data sources, metrics, assumptions and methodological approaches including on baselines, between the communication and implementation of NDCs (para 2(a) of annex II to decision 4/CMA.1)	New Zealand has implemented its NDC consistent with its NDC communication.
Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para 76(c) of the MPGs)	New Zealand has maintained consistency between its accounting quantities and the GHG data reported in its national GHG inventory by accounting for all gross emissions as reported in New Zealand's Greenhouse Gas Inventory 1990–2022 and, for LULUCF target accounting estimates, deriving the accounting quantities from the estimates reported in the latest GHG Inventory.[319]
For Parties that apply technical changes to update reference points, reference levels or projections, the changes should reflect either of the following (para 2(d) of annex II to decision 4/CMA.1):	
Technical changes related to improvements in accuracy that maintain methodological consistency (para 2(d)(ii) of annex II to decision 4/CMA.1)	Not applicable because this is New Zealand's first BTR.
Explain how any methodological changes and technical updates made during the implementation of their NDC were transparently reported (para 2(e) of annex II to decision 4/CMA.1)	Not applicable because this is New Zealand's first BTR.
Striving to include all categories of anthropogenic emissions or removals in the NDC and, once a source, sink or activity is included, continuing to include it (para 12 (c) of decision 4/CMA.1 and para 3 of annex II to decision 4/CMA.1):	
Explain how all categories of anthropogenic emissions and removals corresponding to their NDC were accounted for (para 3(a) of annex II to decision 4/CMA.1)	All categories of anthropogenic emissions and removals as communicated in New Zealand's NDC have been included in the accounting quantities reported for the 2021 and 2022 years.

319 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

Reporting requirement	Description or reference to the relevant section of the BTR
Explain how Party is striving to include all categories of anthropogenic emissions and removals in its NDC, and, once a source, sink or activity is included, continue to include it (para 3(b) of annex II to decision 4/CMA.1)	New Zealand is not yet able to include sufficiently robust emission and removals estimates from non-forest activities when accounting for its NDC. Improvements are being undertaken to develop a better understanding of the carbon fluxes occurring from non-forest activities.
Provide an explanation of why any categories of anthropogenic emissions or removals are excluded (para 12 (c) of decision 4/CMA.1 and para 4 of annex II to decision 4/CMA.1)	New Zealand has focused resources on improving its understanding of forest carbon fluxes because these provide a larger contribution to the LULUCF sector.
Each Party that participates in cooperative approaches that involve the use of ITMOs towards an NDC under Article 4, or authorizes the use of mitigation outcomes for international mitigation purposes other than achievement of its NDC	
Provide information on any methodologies associated with any cooperative approaches that involve the use of ITMOs towards an NDC under Article 4 (para. 75(f) of the MPGs)	Not applicable.
Provide information on how each cooperative approach promotes sustainable development, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	Not applicable.
Provide information on how each cooperative approach ensures environmental integrity consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	Not applicable.
Provide information on how each cooperative approach ensures transparency, including in governance, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	Not applicable.
Provide information on how each cooperative approach ensures transparency, including in governance, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	Not applicable.
Any other information consistent with decisions adopted by the CMA on reporting under Article 6 (para. 77(d)(iii) of the MPGs)	Not applicable.

Note: BTR = Biennial Transparency Report; GHG = greenhouse gas; IPCC = Intergovernmental Panel on Climate Change; KP = Kyoto Protocol; LULUCF = Land Use, Land-Use Change and Forestry; MPGs = modalities, procedures and guidelines; NDC = Nationally Determined Contribution; NDC1 = first Nationally Determined Contribution.

Notes: (1) Pursuant to para. 79 of the MPGs, each Party shall report the information referred to in paras. 65–78 of the MPGs in a narrative and common tabular format, as applicable. (2) A Party may amend the reporting format (eg, Excel file) to remove specific rows in this table if the information to be provided in those rows is not applicable to the Party’s NDC under Article 4 of the Paris Agreement, in accordance with the MPGs.

[a] For the first NDC under Article 4, each Party shall clearly indicate and report its accounting approach, including how it is consistent with Article 4, paras. 13–14, of the Paris Agreement (para. 71 of the MPGs)

[b] For the second and subsequent NDC under Article 4, each Party shall provide information referred to in chapter III.B and C of the MPGs consistent with decision 4/CMA.1. Each Party shall clearly indicate how its reporting is consistent with decision 4/CMA.1 (para. 72 of the MPGs). Each Party may choose to provide information on accounting of its first NDC consistent with decision 4/CMA.1 (para. 71 of the MPGs).

CTF table 4: Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement [a]

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate (paras 67 and 77(a)(i) of the MPGs)	Implementation period of the NDC covering information for previous reporting years, as applicable, and the most recent year, including the end year or end of period (paras 68 and 77(a)(ii–iii) of the MPGs)		Target level [b]	Target year or period	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras 69–70 of the MPGs)
		2005	2021	2022			
Indicator(s) selected to track progress of the NDC or portion of NDC under Article 4 of the Paris Agreement (paras 65 and 77(a) of the MPGs):							
Annual net target accounting emissions	kt CO_2 equivalent	86,615.38	75,741.67	73,115.79	43307.69	2030	In 2022, net target accounting emissions were 15.6 per cent below total gross emissions in the base year (2005). New Zealand's net target accounting emissions in 2021 and 2022 were 75,742 kt CO_2e and 73,116 kt CO_2e. This leaves an emissions budget of 430,143 kt CO_2e for the remaining budget period until 2030.
Where applicable, total GHG emissions and removals consistent with the coverage of the NDC (para 77(b) of the MPGs)	kt CO_2 equivalent		81,808.92	78,395.36			
Contribution from the LULUCF sector for each year of the target period or target year, if not included in the inventory time series of total net GHG emissions and removals, as applicable (para 77(c) of the MPGs)	kt CO_2 equivalent		–6,067.25	–5,279.57			

Each Party that participates in cooperative approaches that involve the use of ITMOs towards an NDC under Article 4 of the Paris Agreement, or authorizes the use of mitigation outcomes for international mitigation purposes other than achievement of the NDC, shall provide (para. 77(d) of the MPGs):			NA	NA			

Note: GHG = greenhouse gas; LULUCF = Land Use, Land-Use Change and Forestry; MPGs = modalities, procedures and guidelines; NDC = Nationally Determined Contribution.

(1) Pursuant to para. 79 of the MPGs, each Party shall report the information referred to in paras. 65–78 of the MPGs in a narrative and common tabular format, as applicable. (2) A Party may amend the reporting format (eg, Excel file) to remove specific rows in this table if the information to be provided in those rows is not applicable to the Party's NDC under Article 4 of the Paris Agreement, in accordance with the MPGs. (3) The Party could add rows for each additional selected indicator.

[a] This table could be used for each NDC target in case Party's NDC has multiple targets.

[b] Parties may provide information on conditional targets in a documentation box with references to the relevant page in their biennial transparency report.

CTF table 5: Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement [a, b]

Note: CCRA = Climate Change Response Act 2002; CH_4 = methane; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; GHGs = greenhouse gases; HFCs = hydrofluorocarbons; IPPU = Industrial Processes and Product Use; kt = kilotonnes; LULUCF = Land Use, Land-use Change and Forestry; N_2O = nitrous oxide; NE = not estimated; IE = included elsewhere; NZU = New Zealand Unit; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride;

Estimates are produced using sector-based emissions projections models. Methodologies used are described in Annex 3. A negative estimate of mitigation impact indicates additional GHG emissions resulting from this policy or measure for this particular year. Under LULUCF, only forests established as a direct result of the initiative are included. A negative value is reported in 2022. This is due to vegetation clearance and soil carbon emissions upon conversion to a forest exceeding removals in that year. The impact the NZ ETS has in reducing (avoided) deforestation is excluded from CTF table 5. LULUCF removal estimates are based on New Zealand's first Nationally Determined Contribution accounting methodology, rather than the full LULUCF sector as reported in New Zealand's Greenhouse Gas Inventory.

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Overarching policies											
Climate Strategy	The Climate Strategy sets out five pillars that guide New Zealand's approach for reducing emissions and managing the impacts of climate change.	Sets out the approach to how the Government will deliver on New Zealand's climate goals	Other	Implemented	Energy, Transport, IPPU, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2024	Ministry for the Environment	NE	NE	NE
New Zealand Emissions Trading	The NZ ETS requires upstream entities, such as fuel suppliers and	Reduce emissions by creating a market through which emitters	Regulatory, economic instrument	Implemented	Energy, Transport, IPPU, Agriculture,	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the	IE	IE	IE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Scheme (NZ ETS)	large emitters, to surrender emissions units (NZUs) to the Government for their activities that result in emissions. It also rewards entities that remove carbon dioxide from the atmosphere, which for New Zealand is predominantly through forestry sequestration. Estimate of GHG emissions reductions by sector are detailed in individual rows, below.	pay for emissions covered by the scheme.			LULUCF, Waste management			Environment, Ministry for Primary Industries			
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for	NE	NE	519

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Energy sector emissions								Primary Industries			
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on Transport sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	119	169	194
New Zealand Emissions Trading Scheme (NZ ETS) - Impact on Agriculture sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	304	485	1,125
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on IPPU sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	163	215	358

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
New Zealand Emissions Trading Scheme (NZ ETS) – Impact on Waste sector emissions	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for a description of this policy. The estimates of GHG emissions reductions for this policy also include those from the National Environmental Standard for Air Quality.	See row 'New Zealand Emissions Trading Scheme (NZ ETS)' for the objectives of this policy.	Regulatory, economic instrument	Implemented	Energy, Transport, Agriculture, IPPU, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2008	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	669	629	706
New Zealand Emissions Trading Scheme (NZ ETS) - LULUCF	The NZ ETS is an important tool for meeting domestic and international climate change targets. Owners of post-1989 eligible forest can earn NZUs for carbon sequestered. There are also liabilities for forest carbon loss, via harvesting or deforestation.	Promote afforestation and disincentivise planted forest deforestation.	Economic instrument	Implemented	LULUCF	CO_2	2008	Ministry for Primary Industries	299	–104	10,440

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
First emissions reduction plan	The policies and strategies in the first emissions reduction plan form a package with an aim to reduce emissions in key sectors of the economy, including sector-specific policies.	Sets out over 300 actions, policies and strategies for meeting New Zealand's first emissions budget.	Regulatory, economic instrument, other	Implemented	Energy, Transport, Agriculture, Waste, IPPU, LULUCF	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2022	Ministry for the Environment, Ministry for Primary Industries, Ministry of Transport, Ministry of Business, Innovation and Employment, The New Zealand Treasury, Ministry of Foreign Affairs and Trade, Ministry of Social Development, Ministry of Housing and Urban Development, Department of Conservation, Energy Efficiency and Conversation Authority, NZ Transport Agency, Kāinga Ora, Te Arawhiti,	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
								Te Puni Kōkiri, the New Zealand Infrastructure Commission, Department of Internal Affairs			
Funding and finance initiatives											
New Zealand's Sovereign Green Bond Programme	Green Bonds provide financing for government expenditure with positive climate and environmental outcomes. Design of the Green Bond Programme has been informed by international best practice and incorporates New Zealand-specific elements.	Finance or refinance specific government projects with positive climate and environmental government impacts.	Economic instrument	Implemented	Energy, Transport, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2022	The New Zealand Treasury	NE	NE	NE
New Zealand Green Investment Finance Limited	This government-owned entity has the objective of accelerating emissions reduction in New Zealand by	Invest in climate-mitigating technologies.	Economic instrument	Implemented	Energy, Transport, IPPU, Agriculture, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2019	New Zealand Green Investment Finance Limited	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	investing in climate-mitigating technologies.										
Climate-related disclosures	Climate reporting entities are required to publish disclosures from financial years starting on or after 1 January 2023, in accordance with climate standards published by the External Reporting Board.	Ensure that the effects of climate change are routinely considered in business, investment, lending and insurance decisions.	Regulatory	Implemented	Energy, Transport, IPPU, Agriculture, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2023	Ministry for the Environment, Ministry of Business, Innovation and Employment	NE	NE	NE
State Sector Decarbonisation Fund	The NZ$219.437 million State Sector Decarbonisation Fund provides co-funding to state sector agencies to replace coal boilers with low-emissions alternatives and for other energy efficiency or renewable energy projects, including efficient lighting and electric	Government agencies demonstrate the action required to decarbonise.	Economic instrument	Implemented	Energy, Transport	CO_2	2020	Energy Efficiency and Conservation Authority, Ministry of Business, Innovation and Employment, The New Zealand Treasury	NE	NE	96

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	vehicles. Three-quarters of the funding is targeted for hospitals, schools and universities, which are the biggest emitters.										
Energy: Strategies											
Electrify NZ	The Government is committed to doubling renewable energy by 2050. Electrify NZ includes a range of initiatives designed to support achievement of this goal.	Enable investment by removing barriers and resolving market failures that prevent or slow investment in infrastructure for electrification.	Regulatory	Adopted	Energy	CO_2	2025	Ministry of Business, Innovation and Employment	0	0	42
Hydrogen Action Plan	Development of a Hydrogen Action Plan	Support private investment in hydrogen	Regulatory, other	Planned	Energy, Transport, IPPU	CO_2	2024	Ministry of Business, Innovation and Employment	NE	NE	NE
Carbon capture, utilisation and storage	The Government has agreed to create an enabling regime for carbon	Allow New Zealand's industries to access carbon capture,	Regulatory	Adopted	Energy	CO_2	2025	Ministry of Business, Innovation and Employment	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	capture, utilisation and storage.	utilisation and storage technology on a level playing field with other emissions reduction and removal tools.									
Energy: energy efficiency											
Equipment Energy Efficiency programme	The joint Equipment Energy Efficiency Programme has been developed with Australia. Energy efficiency measures, including energy rating labelling for a range of residential, commercial and industrial products, along with mandatory performance standards, allow both countries to set consistent standards and	Help households and businesses to purchase and use products that use less energy and save money.	Regulatory, other	Implemented	Energy	CO_2	2002	Energy Efficiency and Conservation Authority	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	measures for energy efficiency.										
Publicly Available Specifications	The Energy Efficiency and Conservation Authority has worked with Standards New Zealand since 2020 to develop five Publicly Available Specifications. This includes guidance for biomass boilers, high-temperature heat pumps, and residential and commercial electric vehicle chargers.	Provide best-practice specifications for non-regulated products.	Other	Implemented	Energy	CO_2	2020	Energy Efficiency and Conservation Authority	NE	NE	NE
Gen Less	The Gen Less website, social media channels and direct mailing lists provide information about climate change and how to reduce energy-related emissions at household,	Educate people and businesses about their energy choices.	Other	Implemented	Energy	CO_2	2019	Energy Efficiency and Conservation Authority	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	business and national levels.										
Support for Energy Education in Communities Programme	The Support for Energy Education in Communities Programme funds New Zealand organisations to deliver personalised, specialist advice and education to struggling households in their communities. Organisations can also supply low-cost, energy-saving items, such as LED light bulbs, low-flow showerheads, heaters and devices to monitor temperature and humidity.	Lift people out of energy hardship.	Economic instrument	Implemented	Energy	CO_2	2020	Ministry of Business, Innovation and Employment	NE	NE	NE
Energy: Business decarbonisation											
Business decarbonisation programmes	The Government's business decarbonisation	Support businesses to	Other	Implemented	Energy	CO_2	2013	Energy Efficiency and Conservation Authority	277	332	646

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	programmes help businesses reduce emissions and improve energy productivity. Support is provided through the programmes included below, as well as via energy audits and feasibility studies. It includes the Energy Transition Accelerator programme, Regional Energy Transition Accelerator programme, Technology Demonstration programme and the Sector Decarbonisation Programme.	decarbonise process heat.									
Energy Transition Accelerator Programme	The Energy Efficiency and Conservation Authority works	Develop long-term plans for businesses to transition to	Economic instrument, other	Implemented	Energy	CO_2	2019	Energy Efficiency and Conservation Authority	IE	IE	IE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	with large energy users to help them develop tailored and practical low-carbon transition pathways. The goal is to facilitate long-term thinking by drafting a practical map for transition, showing what the technically and economically feasible opportunities are, including innovative technologies, energy efficiency and fuel switching. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.	lowering emissions as much as possible.									

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Regional Energy Transition Accelerator programme	The Regional Energy Transition Accelerator programme's focus is on understanding localised opportunities and barriers faced by medium and large energy users when seeking to reduce emissions from process heat. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.	Develop and share a well-informed and coordinated approach for regional decarbonisation.	Other	Implemented	Energy	CO_2	2022	Energy Efficiency and Conservation Authority	IE	IE	IE
Technology Demonstration Fund	The Technology Demonstration Fund co-funds and reduces risks for underused energy-saving technology for wider market	Promote technology that is commercially proven but underused in New Zealand.	Other	Implemented	Energy	CO_2	2013	Energy Efficiency and Conservation Authority	IE	IE	IE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	deployment. Since 2018/19, the programme has included a specific investment focus to demonstrate innovative electric heat pump technologies. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.										
Sector Decarbonisation Programme	The Sector Decarbonisation Programme provides easy-to-follow pathways for businesses across a range of sectors to understand how to use existing equipment and processes as efficiently as	Energy efficiency pathways for businesses.	Other	Implemented	Energy	CO_2	2019	Energy Efficiency and Conservation Authority	IE	IE	IE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	possible. It provides businesses with resources and tools to reduce reliance on fossil fuels. The estimates of GHG emissions reductions from this policy are included within Business decarbonisation programmes.										
Government Investment in Decarbonising Industry Fund	The Government Investment in Decarbonising Industry Fund provided co-funding for private sector businesses to help with energy efficiency initiatives and the decarbonisation of process heat. The original fund was expanded in 2022 with a significant increase in funding.	Decarbonise businesses through several workstreams, including industrial process heat, commercial space and water heating, and efficient industrial equipment replacements.	Economic instrument	Implemented	Energy	CO_2	2020	Energy Efficiency and Conservation Authority	NE	NE	1,549

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	This included funding to help large energy users with decarbonising, to provide energy-efficient equipment subsidies and develop enabling infrastructure.										
Energy: Other energy policies											
Māori and Public Housing Renewable Energy Fund	This fund trials community-scale renewable technologies for Māori and public housing. These include technologies such as modern geothermal, solar panels and batteries. The final round made funding available for larger, more complex, renewable energy projects, such as small-scale hydro	Support renewable and affordable energy in communities.	Economic instrument	Implemented	Energy	CO_2	2020	Ministry of Business, Innovation and Employment	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	and solar photovoltaic projects integrating remote distribution and retail solutions. The $28 million Community Renewable Energy Fund builds on and expands this.										
Community Renewable Energy Fund	The fund supports renewable energy projects that help communities access secure, renewable and more affordable energy. Funded projects are providing valuable insight into the operational, economic, environmental and wellbeing effects of introducing renewable energy	Support renewable and affordable energy in communities.	Economic instrument	Implemented	Energy	CO_2	2022	Ministry of Business, Innovation and Employment	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	systems. This information will help inform future projects on a larger scale, as well as the overall future of the New Zealand energy system.										
National Direction for Greenhouse Gas Emissions from Industrial Process Heat	Industries using process heat are required to consider greenhouse gas emissions for their operations when applying to local councils for a discharge to air consent. Guidance has been published to help local councils and industry understand the requirements.	Requires local councils to consider greenhouse gas emissions for resource consent applications.	Regulation, other	Implemented	Energy	CO_2	2023	Ministry for the Environment, Ministry of Business, Innovation and Employment, Energy Efficiency and Conservation Authority	0	0	579
Energy: Building and construction											
Improvements to the energy efficiency	The Ministry of Business, Innovation and	Improve the energy efficiency of new buildings.	Regulatory	Implemented	Energy	CO_2	2023	Ministry of Business,	0	0	154

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
requirements in the New Zealand Building Code	Employment increased the minimum energy efficiency standards for new buildings through changes to the compliance requirements in Clause H1 of the New Zealand Building Code.							Innovation and Employment			
Technical methodologies to measure embodied carbon and operational carbon	The Ministry of Business, Innovation and Employment has developed two technical methodologies to enable the building and construction sector to measure embodied and operational carbon from new buildings in a consistent and credible way.	Reduce embodied and operational emissions from new buildings.	Other	Implemented	Energy	CO_2	2022	Ministry of Business, Innovation and Employment	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Energy performance ratings: National Australian Built Environment Rating System – New Zealand (NABERSNZ™)	NABERSNZ™ is a system for rating the energy efficiency of existing office buildings and identifies opportunities for implementing building energy performance improvements. Other work includes financial grants and loans for energy audits; energy plans; monitoring and verification systems; systems optimisation; and new and emerging technologies.	Improve the energy performance of new and existing commercial buildings.	Other	Implemented	Energy	CO_2	2013	Energy Efficiency and Conservation Authority	NE	NE	NE
Insulation and heating grants: Warmer Kiwi Homes Programme	Warmer Kiwi Homes offers insulation and heating grants to low-income households to make their homes	Provide warmer, drier homes through improved thermal performance.	Economic instrument	Implemented	Energy	CO_2	2018	Energy Efficiency and Conservation Authority	0	1	4

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	warmer, drier and more energy efficient.										
Transport											
Electric vehicle charging infrastructure	The Government is taking steps to enable the delivery of a network of 10,000 public electric vehicle charging points by 2030. It will support the transition to and use of low-emissions transport by giving users the confidence that they can charge their vehicle on the public network when and where they need to.	Provide a long-term strategic direction as New Zealand's electric vehicle infrastructure expands.	Other	Planned	Transport	CO_2	2024	Ministry of Transport, Ministry of Business, Innovation and Employment, Energy Efficiency and Conservation Authority	NE	NE	NE
Clean Vehicle Standard and Clean Vehicle Discount Scheme	The Clean Vehicle Standard requires vehicle importers to achieve annually stricter carbon dioxide targets	Address both the supply of and the demand for low-emissions vehicles in New Zealand.	Regulatory, economic instrument	Implemented	Transport	CO_2	2021	Ministry of Transport, NZ Transport Agency	6	30	364

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	from 2023 or otherwise face financial charges. The Clean Vehicle Discount encouraged buyer demand for low-emission vehicles by providing rebates for zero- and low-emission light vehicles, and requiring a fee be paid for high-emission vehicles registered in New Zealand for the first time.										
Road user charges exemptions for electric vehicles	A road user charges exemption on light electric vehicles started in 2009 and ran until 1 April 2024. A road user charges exemption for heavy electric vehicles was introduced in 2017	Encourage electric vehicle uptake in both the light and heavy fleets.	Economic instrument	Implemented	Transport	CO_2	2009	Ministry of Transport, NZ Transport Agency	2	5	6

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	and will run until 1 January 2026.										
Freight and Supply Chain Strategy	The Government released the Freight and Supply Chain Strategy in August 2023, informed by extensive stakeholder engagement.	Reduce emissions from heavy road freight.	Other	Implemented	Transport	CO_2	2023	Ministry of Transport	NE	NE	NE
Public transport bus decarbonisation	The Government will require only zero-emission public transport buses to be purchased by 1 July 2025 and is targeting full decarbonisation of the bus fleet by 2035. The Government is providing $44.7 million over four years to support bus decarbonisation initiatives.	Accelerate decarbonisation of the public transport bus fleet.	Regulatory, economic instrument	Implemented	Transport	CO_2	2023	Ministry of Transport, NZ Transport Agency, Energy Efficiency and Conservation Authority	1	3	37

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Zero-emissions trucks and buses	The Government has committed $30 million for a grant scheme to reduce the upfront capital cost of low-emissions heavy vehicles.	Reduce emissions from heavy vehicles.	Economic instrument	Planned	Transport	CO_2	2024	Energy Efficiency and Conservation Authority	NE	NE	NE
Low Emissions Transport Fund	The Government increased the funding contribution from $6 million–$7 million per year to $25 million per year by 2023/24.	Support the demonstration and adoption of low-emissions transport technology, innovation and infrastructure to accelerate the decarbonisation of New Zealand's transport sector.	Economic instrument	Implemented	Transport	CO_2	2021	Energy Efficiency and Conservation Authority	NE	NE	NE
Vehicle Fuel Economy Labelling	This compulsory programme requires vehicle traders and online vendors to display information relating to fuel economy.	Allow consumers to make more informed vehicle purchase choices, and to place an appropriate value on fuel economy.	Regulatory, other	Implemented	Transport	CO_2	2008	Energy Efficiency and Conservation Authority	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Industrial Processes and Product Use											
Synthetic greenhouse gas levy	A levy is applied to imported goods containing certain HFCs and PFCs, based on the global warming potential and quantity of HFCs or PFCs they contain.	Encourage the use of lower global warming potential gases.	Regulatory	Implemented	IPPU	HFCs, PFCs	2013	Environmental Protection Authority	NE	NE	NE
Permitting scheme for imports and exports of bulk HFCs	Staged phase-down on consumption (production, importation and exportation) of bulk HFCs.	Phase-down of consumption of HFC gases.	Regulatory	Implemented	IPPU	HFCs	2020	Ministry for the Environment	0	0	102
Voluntary product stewardship scheme for refrigerants	A government-accredited organisation facilitates the collection and export of refrigerant gases for destruction overseas.	Export for destruction of refrigerant gases.	Other	Implemented	IPPU	HFCs, PFCs, SF6	2010	Ministry for the Environment	0	0	51

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Agriculture											
A fair and sustainable pricing system for on-farm agricultural emissions	The Government has committed to a fair and sustainable pricing system for agricultural emissions no later than 2030, with on-farm emissions measurement by 2025.	Encourage reduction in agricultural emissions.	Regulatory, economic instrument	Planned	Agriculture	CH_4, N_2O, CO_2	2030	Ministry for Primary Industries	NE	NE	NE
Centre for Climate Action on Agricultural Emissions	The Centre for Climate Action on Agricultural Emissions accelerates the commercialisation of new mitigation technologies. The Centre has two components: AgriZero[NZ], a catalyst and investment industry–Crown joint venture company, and the New Zealand Agricultural	Accelerate the development of greenhouse gas mitigations.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2022	Ministry for Primary Industries	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	Greenhouse Gas Research Centre.										
New Zealand Agricultural Greenhouse Gas Research Centre	Brings together nine primary sector research organisations.	Focus on ways to reduce on-farm CH_4 and N_2O emissions and enhance soil carbon.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2009	Ministry for Primary Industries	NE	NE	NE
Global Research Alliance on Agricultural Greenhouse Gases (GRA)	New Zealand plays an active role in supporting the GRA through funding and delivery of education, training and public awareness, funding of mitigation research projects and funding of regional and international collaboration in addition to co-chairing the GRA's Livestock Research Group and hosting the GRA Secretariat and Special Representative.	Increase international collaboration on and investment in research on increasing agricultural and food production, without increasing greenhouse gas emissions.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2009	Secretariat support and co-Chair of the Livestock Research Group provided by New Zealand Ministry for Primary Industries	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Sustainable Food and Fibre Futures	Provides co-funding for programmes driving sustainable impact for the food and fibre sectors.	Co-invest in innovative projects to grow New Zealand's food and fibre industries sustainably.	Other	Implemented	Agriculture	CH_4, N_2O, CO_2	2018	Ministry for Primary Industries	NE	NE	NE
Sustainable Land Management and Climate Change Research Programme	Initiatives and programmes in the agriculture and forestry sectors that focus on adaptation to climate change.	Research programmes in agriculture and forestry sectors.	Other	Implemented	Agriculture, LULUCF	CH_4, N_2O, CO_2	2007	Ministry for Primary Industries	NE	NE	NE
Synthetic nitrogen fertiliser cap	From 1 July 2021, a cap on the use of synthetic nitrogen fertiliser applies on any contiguous parcel of pastoral land. The cap has been set at 190 kilograms per hectare per year.	Limit the impacts of synthetic nitrogen fertiliser on freshwater ecosystems following application to land. Has a co-benefit of reducing synthetic nitrogen fertiliser applied to land.	Regulatory	Implemented	Agriculture	N_2O	2021	Ministry for the Environment, regional and local councils	0	0	50
Regulations to manage	The National Policy Statement for	Improve the quality of	Regulatory	Implemented	Agriculture	CH_4, N_2O	2020	Regional and local councils	0	0	200

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
freshwater introduced under the Essential Freshwater package	Freshwater Management provides national policy direction to regional councils on freshwater management (excluding the impact of the nitrogen fertiliser cap). These measures will impact emissions from agriculture through their influence on animal numbers.	freshwater in New Zealand. Has co-benefits of more streamside planting (to reduce rural runoff), retention of more natural wetlands, and potentially less intensive stocking.									
Land Use, Land-use Change and Forestry											
Afforestation Grant Scheme	Under the Afforestation Grant Scheme, land owners who have received a grant have ongoing obligations to maintain their grant forests for a	Promote the establishment of production and permanent forests on previously unforested land. Reduce erosion by encouraging tree planting on	Economic instrument	Implemented	LULUCF	CO_2	2008	Ministry for Primary Industries	447	502	698

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	minimum 10-year period.	erosion-prone land. Enhance the sequestration of carbon in forest sinks. Increase the area of new forests that meet the afforestation and reforestation definition under the Kyoto Protocol in New Zealand.									
One Billion Trees	This $176.8 million fund ran for three years from August 2018 until its closure on 30 June 2021. Existing funding agreements extend into the future and will receive continued support and relationship management as these projects progress to completion.	Increase tree planting across New Zealand to contribute to the wider programme's goal of reaching 1 billion trees planted by 2028.	Economic instrument	Implemented	LULUCF	CO_2	2018	Ministry for Primary Industries	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Sustainable Land Management Hill Country Erosion Programme	The programme currently provides up to NZ$6.3 million of targeted funding support annually to regional and unitary councils. The purpose of the programme is to speed up the rate of treatment of erosion-prone land.	Protect New Zealand's estimated 1.4 million hectares of pastoral hill country that is classified as erosion prone.	Economic instrument	Implemented	LULUCF	CO_2	2007	Ministry for Primary Industries	180	211	871
Erosion Control Funding Programme	Land owner grants can be used to control erosion on erosion-prone land in the Tairāwhiti district, by providing effective tree cover through planting or encouraging natural reversion to native bush.	Provide funding to land owners to prevent and control erosion.	Economic instrument	Implemented	LULUCF	CO_2	1993	Ministry for Primary Industries	1,200	1,152	1,065
Permanent Forest Sink Initiative	Enable land owners to receive New Zealand Units for permanent forest sinks. It closed in	Incentivise land owners for the creation of permanent forests.	Economic instrument	Implemented	LULUCF	CO_2	2008	Ministry for Primary Industries	229	223	156

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	2023 and was replaced by 'permanent forestry' in the ETS.										
Afforestation on Crown-owned land	The Government is exploring opportunities to partner with the private sector to plant trees on Crown-owned land (excluding national parks) that is of low conservation value and low farming value.	Secure additional net emissions reductions that contribute towards our climate change targets, boost forestry and wood processing, and provide other environmental benefits.	Economic instrument	Planned	LULUCF	CO_2	2025	Ministry for Primary Industries	NE	NE	NE
Woody biomass for bioenergy	Investment in commercial planting to increase the supply of biomass, research into alternative biomass crops and effective forest waste recovery for biomass.	Directly increase biomass supply and stimulate private sector investment to create further supply.	Economic instrument	Implemented	LULUCF	CO_2	2023	Ministry for Primary Industries	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
Maximising forest carbon programme	Maximise carbon stored in new and existing forests. Expand NZ ETS look-up tables to more accurately reflect carbon stock changes and explore the feasibility of measuring carbon with remote-sensing tools.	Support the increased sequestration of forest carbon.	Economic instrument	Planned	LULUCF	CO_2	2022	Ministry for Primary Industries	NE	NE	NE
National Environmental Standards for Commercial Forestry	These regulations under the Resource Management Act 1991 are the main forestry management rules for commercial forestry activities in New Zealand, including afforestation and harvesting. Changes to the National Environmental Standards for Commercial	Ensure the environmental effects of commercial forestry are managed.	Regulatory	Implemented	LULUCF	CO_2	2023	Ministry for the Environment, Ministry for Primary Industries	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	Forestry were completed in November 2023.										
Waste											
Food waste reduction (behaviour change)	Encourage behaviour to prevent waste at home.	Enable households and businesses to reduce organic waste.	Regulatory, economic instrument	Implemented	Waste management	CH_4	2023	Ministry for the Environment, regional and local councils	0	0	8
Limits on organic waste disposal	Banning organic materials from a range of landfill types to incentivise businesses and households to look for ways to reduce, recycle or compost their organic waste.	Explore bans or limits to divert more organic waste from landfill.	Regulatory, economic instrument	Planned	Waste management	CH_4	2030	Ministry for the Environment, regional and local councils	NE	NE	NE
Kerbside expansion	Provide services and infrastructure for kerbside organic collections to make it easier for households and businesses to manage their organic waste.	Enable households and businesses to reduce food and garden waste.	Regulatory, economic instrument	Planned	Waste management	CH_4	2030	Ministry for the Environment, regional and local councils	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e)		
									2021 Achieved	2022 Achieved	2030 Expected
Paper waste diversion (business)	Investigate whether to require paper and cardboard to be collected separately from other recyclables.	Require the separation of paper and cardboard.	Regulatory, economic instrument	Planned	Waste management	CH_4	2026	Ministry for the Environment, regional and local councils	NE	NE	NE
Wood waste reduction and diversion	Invest in organic waste processing and resource recovery infrastructure and support the building and construction sector to minimise waste through research and improved capability.	Increase the amount of organic waste diverted from landfill.	Regulatory, economic instrument	Implemented	Waste management	CH_4	2023	Ministry for the Environment, regional and local councils	0	0	1
Landfill gas capture expansion	Regulations will require landfill gas capture at municipal landfills. Feasibility studies will determine the need for additional landfill gas capture requirements. This could include	Increase the capture of gas from landfills.	Regulatory, economic instrument	Planned	Waste management	CH_4	2026	Ministry for the Environment, regional and local councils	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	expanding landfill gas capture systems to smaller class 1 (municipal waste) facilities, for example, facilities that receive over 10,000 Tonnes of waste per year.										
Waste disposal levy under the Waste Minimisation Act 2008	The waste disposal levy rate for landfills has progressively increased and expanded. From $10 per tonne for landfills that receive household waste, set in 2009, to $60 per tonne as of July 2024, further increasing to $75 in 2027 as a result of additional changes to the Waste Minimisation Act 2008 in July 2024. The levy was also expanded from July	Achieve a range of waste and environmental objectives, including encouraging waste minimisation and decreasing waste disposal to protect the environment from harm and provide environmental, social, economic and cultural benefits.	Regulatory	Implemented	Waste management	CO_2, CH_4, N_2O	2010	Ministry for the Environment	13	15	97

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	2021 to cover additional landfill types.										
Waste Minimisation Fund	A levy is imposed on waste disposed to landfill and generates funds for waste minimisation activities. These funds are distributed to territorial authorities and waste minimisation projects (via the Waste Minimisation Fund). Additional funding from the Climate Emergency Response Fund is available for infrastructure projects to reduce emissions from waste over 2022 to 2024.	Increase resource efficiency, increase reuse, recovery and recycling, and decrease waste to landfill.	Economic instrument	Adopted	Waste management	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	2010	Ministry for the Environment	NE	NE	NE
Product stewardship	Co-designing product stewardship for six	Implement regulations to increase circular	Regulatory	Adopted	IPPU, Waste management	CO_2, CH_4, HFCs, SF_6	2020	Ministry for the Environment	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	priority products. The first regulatory framework to be implemented addresses end-of-life tyres and has been designed by industry-led working groups. The other priority product schemes and proposed regulations are in various stages of development.	economy and place responsibilities for managing end-of-life products on producers, importers and retailers rather than on communities, councils, neighbours and nature.									
National Environmental Standard for Air Quality	Amendments proposed under the first emissions reduction plan will require all municipal landfills to capture gas, including sites with less than 1 million tonnes capacity. The estimates of GHG emissions reductions from this policy are	Effectively manage discharges to air of greenhouse gases (mainly CH_4) generated from large landfills.	Regulatory	Implemented	Waste management	CH_4	2004	Ministry for the Environment, regional and local councils	IE	IE	IE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	included within NZ ETS – Impact on Waste sector emissions.										
Public sector policies											
Carbon Neutral Government Programme	Support public sector organisations to measure, report and reduce their emissions to achieve a 20% reduction by 2025 and 42% by 2030. Agencies should offset remaining emissions to achieve a future neutrality date.	Understand and accelerate the reduction of emissions within the public sector.	Other	Implemented	Energy, Transport, IPPU, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	2022	Ministry for the Environment, Ministry of Business, Innovation and Employment, Energy Efficiency and Conservation Authority	NE	NE	NE
Sustainable Government Procurement	The Government Procurement Rules were updated in 2019 to include a focus on the achievement of wider social, economic, cultural and environmental outcomes that go	Make sustainable procurement part of government procurement practice.	Other	Implemented	Energy	CO_2	2019	Ministry of Business, Innovation and Employment	NE	NE	NE

Name [c]	Description [d, e, f]	Objectives	Type of instrument [g]	Status [h]	Sector(s) affected [i]	Gases affected	Start year of implementation	Implementing entity or entities	Estimate of GHG emissions reductions (kt CO_2e) 2021 Achieved	2022 Achieved	2030 Expected
	beyond the immediate purchase of goods and services. A new Government Procurement Rule was introduced. Rule 20: Transitioning to a net zero emissions economy and designing waste out of the system.										
Climate implications of policy assessment	Government agencies must do a greenhouse gas emissions analysis on certain policy proposals that go to Cabinet, so that Cabinet can make decisions informed of the impact on greenhouse gas emissions.	Measure, monitor and report on policy decisions that will impact New Zealand's greenhouse gas emissions.	Regulatory	Implemented	Energy, Transport, IPPU, Agriculture, LULUCF, Waste management	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6	2019	Ministry for the Environment	NE	NE	NE

[a] Each Party shall provide information on actions, policies and measures that support the implementation and achievement of its NDC under Article 4 of the Paris Agreement, focusing on those that have the most significant impact on GHG emissions or removals and those impacting key categories in the national GHG inventory. This information shall be presented in narrative and tabular format (para. 80 of the MPGs).

[b] For each Party with an NDC under Article 4 of the Paris Agreement that consists of mitigation co-benefits resulting from Parties' adaptation actions and/or economic diversification plans consistent with Article 4, para. 7, information to be reported under paras. 80, 82 and 83 of the MPGs includes relevant information on policies and measures contributing to mitigation co-benefits resulting from adaptation actions or economic

diversification plans (para. 84 of the MPGs).

[c] Parties may indicate whether a measure is included in the 'with measures' projections.

[d] Additional information may also be provided on the cost of the mitigation actions, non-GHG mitigation benefits, and how the mitigation action interacts with other mitigation actions, as appropriate (para. 83(a–c) of the MPGs).

[e] Parties should identify actions, policies and measures that influence GHG emissions from international transport (para. 88 of the MPGs).

[f] Parties should, to the extent possible, provide information about how actions, policies and measures are modifying longer-term trends in GHG emissions and removals (para. 89 of the MPGs).

[g] Parties shall, to the extent possible, provide information on the types of instrument: regulatory, economic instrument or other (para. 82(d) of the MPGs).

[h] Parties shall, to the extent possible, use the following descriptive terms to report on status of implementation: planned, adopted or implemented (para. 82(e) of the MPGs).

[i] Parties shall, to the extent possible, provide information on sector(s) affected: energy, transport, industrial processes and product use, agriculture, LULUCF, waste management or other (paras. 81 and 82(f) of the MPGs).

[j] Each Party shall provide, to the extent possible, estimates of expected and achieved GHG emission reductions for its actions, policies and measures in the tabular format; those developing country Parties that need flexibility in the light of their capacities with respect to this provision are instead encouraged to report this information (para. 85 of the MPGs).

[k] To the extent available, each Party shall describe the methodologies and assumptions used to estimate the GHG emission reductions or removals due to each action, policy and measure. This information may be presented in an annex to the Biennial Transparency Report (para. 86 of the MPGs).

CTF table 6: Summary of greenhouse gas emissions and removals in accordance with the common reporting table 10 emission trends – summary

Greenhouse gas emissions and removals	Reference year/period for NDC (1)	Base year (2)	1990	1991	1992	1993	1994	1995	1996	1997
					CO₂ equivalents (kt) (3)					
CO_2 emissions without net CO_2 from LULUCF			25,497.22	26,175.92	28,162.45	27,754.74	27,895.36	28,000.62	29,300.68	31,274.49
CO_2 emissions with net CO_2 from LULUCF			804.19	-378.37	2,344.33	1,506.96	2,319.73	3,848.13	5,894.08	7,205.78
CH_4 emissions without CH_4 from LULUCF			37,519.68	37,735.48	37,360.14	37,650.75	38,697.95	38,979.68	39,989.01	40,608.17
CH_4 emissions with CH_4 from LULUCF			37,596.24	37,789.26	37,423.91	37,732.91	38,787.37	39,065.37	40,087.29	40,704.24
N_2O emissions without N_2O from LULUCF			5,102.69	5,173.25	5,202.26	5,399.72	5,601.74	5,814.81	5,917.67	5,945.81
N_2O emissions with N_2O from LULUCF			5,394.53	5,459.63	5,496.69	5,705.68	5,929.19	6,151.56	6,269.83	6,308.33
HFCs			NA, NO	NA, NO	0.26	0.39	11.82	29.47	66.80	113.37
PFCs			818.01	812.47	415.35	188.99	167.42	138.60	227.00	195.36
Unspecified mix of HFCs and PFCs			NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
SF_6			20.59	21.50	22.58	23.39	24.15	25.17	25.40	26.37
NF_3			NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)			**68,958.18**	**69,918.61**	**71,163.04**	**71,017.98**	**72,398.45**	**72,988.35**	**75,526.57**	**78,163.57**
Total (with LULUCF)			**44,633.56**	**43,704.49**	**45,703.11**	**45,158.32**	**47,239.69**	**49,258.30**	**52,570.42**	**54,553.45**
Total (without LULUCF, with indirect)			**68,958.18**	**69,918.61**	**71,163.04**	**71,017.98**	**72,398.45**	**72,988.35**	**75,526.57**	**78,163.57**
Total (with LULUCF, with indirect)			**44,633.56**	**43,704.49**	**45,703.11**	**45,158.32**	**47,239.69**	**49,258.30**	**52,570.42**	**54,553.45**

Greenhouse gas source and sink categories	Reference year/period for NDC (1)	Base year (2)	1990	1991	1992	1993	1994	1995	1996	1997
	CO₂ equivalents (kt) (3)									
1. Energy			23,998.31	24,458.23	26,297.47	25,823.09	26,139.62	25,898.65	27,502.26	29,513.99
2. Industrial Processes and Product Use			3,478.23	3,632.81	3,322.77	3,188.68	3,066.20	3,166.18	3,331.17	3,253.57
3. Agriculture			37,121.53	37,346.78	36,948.73	37,294.86	38,607.77	39,235.02	39,907.26	40,542.01
4. Land Use, Land-Use Change and Forestry (4)			-24,324.62	-26,214.13	-25,459.93	-25,859.66	-25,158.76	-23,730.05	-22,956.16	-23,610.12
5. Waste			4,356.74	4,477.30	4,590.62	4,707.94	4,581.49	4,685.17	4,782.58	4,850.60
6. Other			3.37	3.50	3.45	3.41	3.37	3.33	3.30	3.40
Total (with LULUCF) (8)			**44,633.56**	**43,704.49**	**45,703.11**	**45,158.32**	**47,239.69**	**49,258.30**	**52,570.42**	**54,553.45**

Greenhouse gas emissions and removals	1998	1999	2000	2001	2002	2003	2004	2005	2006
	CO_2 equivalents (kt) (3)								
CO_2 emissions without net CO_2 from LULUCF	29,853.02	31,460.67	32,241.04	34,378.75	34,541.83	36,243.23	35,836.71	37,425.18	37,329.75
CO_2 emissions with net CO_2 from LULUCF	5,145.84	4,345.40	4,446.75	6,316.32	8,036.25	8,983.14	8,808.71	12,700.36	14,712.28
CH_4 emissions without CH_4 from LULUCF	39,933.54	39,842.56	40,791.21	41,185.22	40,806.80	41,048.47	41,296.65	41,526.76	41,812.50
CH_4 emissions with CH_4 from LULUCF	40,068.53	39,930.89	40,868.13	41,266.94	40,891.54	41,139.32	41,379.36	41,647.47	41,935.31
N_2O emissions without N_2O from LULUCF	5,904.82	5,908.56	6,163.87	6,481.80	6,546.35	6,791.13	6,905.91	6,925.98	6,717.65
N_2O emissions with N_2O from LULUCF	6,269.50	6,267.93	6,527.37	6,843.10	6,904.14	7,146.12	7,257.38	7,279.16	7,067.47
HFCs	140.28	185.49	230.57	311.88	365.92	435.83	531.92	648.87	748.18
PFCs	110.58	85.48	84.53	63.50	77.02	115.77	90.07	62.39	97.09
Unspecified mix of HFCs and PFCs	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
SF_6	25.62	25.32	20.16	20.65	24.03	25.96	29.80	26.19	21.69
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	**75,967.87**	**77,508.08**	**79,531.38**	**82,441.80**	**82,361.96**	**84,660.38**	**84,691.06**	**86,615.38**	**86,726.86**
Total (with LULUCF)	**51,760.36**	**50,840.50**	**52,177.52**	**54,822.38**	**56,298.90**	**57,846.13**	**58,097.24**	**62,364.44**	**64,582.02**
Total (without LULUCF, with indirect)	**75,967.87**	**77,508.08**	**79,531.38**	**82,441.80**	**82,361.96**	**84,660.38**	**84,691.06**	**86,615.38**	**86,726.86**
Total (with LULUCF, with indirect)	**51,760.36**	**50,840.50**	**52,177.52**	**54,822.38**	**56,298.90**	**57,846.13**	**58,097.24**	**62,364.44**	**64,582.02**

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006
	CO_2 equivalents (kt) (3)								
1. Energy	27,928.77	29,267.01	29,973.78	31,985.09	31,918.98	33,363.86	33,015.86	34,629.21	35,055.13
2. Industrial Processes and Product Use	3,244.59	3,430.80	3,467.51	3,572.03	3,647.88	3,839.15	3,896.33	4,007.74	4,109.97
3. Agriculture	39,945.73	39,933.23	41,181.52	41,951.28	41,844.58	42,612.38	42,913.99	43,125.88	42,930.88
4. Land Use, Land-Use Change and Forestry (4)	-24,207.51	-26,667.58	-27,353.85	-27,619.41	-26,063.06	-26,814.25	-26,593.82	-24,250.93	-22,144.84
5. Waste	4,845.27	4,873.43	4,904.84	4,929.58	4,946.70	4,841.18	4,860.62	4,847.84	4,626.19
6. Other	3.51	3.61	3.72	3.82	3.82	3.82	4.26	4.71	4.69
Total (with LULUCF) (8)	**51,760.36**	**50,840.50**	**52,177.52**	**54,822.38**	**56,298.90**	**57,846.13**	**58,097.24**	**62,364.44**	**64,582.02**

Greenhouse gas emissions and removals	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalents (kt) (3)								
CO_2 emissions without net CO_2 from LULUCF	36,408.52	37,506.35	34,617.45	34,807.76	34,262.13	35,941.32	35,237.91	35,435.07	35,802.20
CO_2 emissions with net CO_2 from LULUCF	15,839.39	8,310.40	6,556.82	5,820.69	5,147.17	10,049.85	9,314.13	9,575.15	9,865.63
CH_4 emissions without CH_4 from LULUCF	40,426.41	39,190.31	39,181.00	39,520.64	39,558.37	40,050.89	39,889.93	40,245.15	39,715.18
CH_4 emissions with CH_4 from LULUCF	40,589.84	39,275.91	39,289.74	39,622.84	39,630.09	40,134.95	39,972.70	40,322.29	39,801.79
N_2O emissions without N_2O from LULUCF	6,539.59	6,600.34	6,560.54	6,692.21	6,794.01	6,905.95	6,921.50	7,167.77	7,109.09
N_2O emissions with N_2O from LULUCF	6,899.83	6,919.20	6,877.59	7,003.98	7,102.51	7,212.82	7,216.92	7,441.31	7,371.97
HFCs	822.25	910.20	983.07	1,010.60	1,058.16	1,103.29	1,136.72	1,176.10	1,198.51
PFCs	43.68	41.21	48.61	42.77	31.61	42.68	43.28	66.02	52.68
Unspecified mix of HFCs and PFCs	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
SF_6	20.48	19.94	23.23	23.54	19.52	21.54	18.74	17.32	16.97
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	**84,260.94**	**84,268.35**	**81,413.89**	**82,097.53**	**81,723.81**	**84,065.67**	**83,248.07**	**84,107.42**	**83,894.63**
Total (with LULUCF)	**64,215.48**	**55,476.86**	**53,779.06**	**53,524.42**	**52,989.07**	**58,565.12**	**57,702.48**	**58,598.19**	**58,307.56**
Total (without LULUCF, with indirect)	**84,260.94**	**84,268.35**	**81,413.89**	**82,097.53**	**81,723.81**	**84,065.67**	**83,248.07**	**84,107.42**	**83,894.63**
Total (with LULUCF, with indirect)	**64,215.48**	**55,476.86**	**53,779.06**	**53,524.42**	**52,989.07**	**58,565.12**	**57,702.48**	**58,598.19**	**58,307.56**

Greenhouse gas source and sink categories	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalents (kt) (3)								
1. Energy	33,600.80	34,713.33	32,072.88	32,268.69	31,579.11	32,915.05	32,020.70	32,075.29	32,311.15
2. Industrial processes and product use	4,330.37	4,213.79	4,177.31	4,496.66	4,504.61	4,541.66	4,661.10	4,849.17	4,943.45
3. Agriculture	41,739.43	40,845.14	40,814.28	41,045.48	41,520.86	42,602.94	42,616.69	43,281.95	42,781.20
4. Land Use, Land-Use Change and Forestry (4)	-20,045.46	-28,791.49	-27,634.83	-28,573.11	-28,734.74	-25,500.54	-25,545.59	-25,509.23	-25,587.07
5. Waste	4,585.65	4,491.39	4,344.71	4,281.98	4,114.49	4,001.55	3,945.90	3,897.36	3,855.25
6. Other	4.69	4.70	4.71	4.72	4.74	4.45	3.70	3.65	3.58
Total (with LULUCF) (8)	**64,215.48**	**55,476.86**	**53,779.06**	**53,524.42**	**52,989.07**	**58,565.12**	**57,702.48**	**58,598.19**	**58,307.56**

Greenhouse gas emissions and removals	2016	2017	2018	2019	2020	2021	2022	Change from 1990 to latest reported year
	CO_2 equivalents (kt) [3]							(%)
CO_2 emissions without net CO_2 from LULUCF	34,145.53	35,684.56	35,702.51	36,731.82	34,022.76	34,322.61	31,610.09	23.97
CO_2 emissions with net CO_2 from LULUCF	8,832.93	11,889.49	12,973.51	14,806.00	12,618.07	13,551.36	12,019.14	1,394.56
CH_4 emissions without CH_4 from LULUCF	39,116.71	38,915.49	39,079.73	39,147.54	39,030.73	38,618.24	38,339.31	2.18
CH_4 emissions with CH_4 from LULUCF	39,239.22	39,024.19	39,161.08	39,239.79	39,128.37	38,654.80	38,421.60	2.20
N_2O emissions without N_2O from LULUCF	7,114.91	7,151.00	7,272.57	7,295.44	7,389.14	7,221.25	6,877.13	34.77
N_2O emissions with N_2O from LULUCF	7,361.94	7,380.31	7,494.85	7,534.59	7,635.63	7,450.37	7,146.99	32.49
HFCs	1,217.35	1,252.42	1,299.52	1,314.81	1,343.16	1,585.20	1,498.48	–
PFCs	43.79	54.37	65.10	80.15	79.06	45.58	50.93	–93.77
Unspecified mix of HFCs and PFCs	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	–
SF_6	17.90	15.24	15.16	16.48	17.01	16.03	19.42	–5.65
NF_3	NO	NO	NO	NO	NO	NO	NO	–
Total (without LULUCF)	**81,656.18**	**83,073.08**	**83,434.60**	**84,586.24**	**81,881.85**	**81,808.92**	**78,395.36**	**13.69**
Total (with LULUCF)	**56,713.13**	**59,616.02**	**61,009.23**	**62,991.82**	**60,821.29**	**61,303.36**	**59,156.57**	**32.54**
Total (without LULUCF, with indirect)	**81,656.18**	**83,073.08**	**83,434.60**	**84,586.24**	**81,881.85**	**81,808.92**	**78,395.36**	**13.69**
Total (with LULUCF, with indirect)	**56,713.13**	**59,616.02**	**61,009.23**	**62,991.82**	**60,821.29**	**61,303.36**	**59,156.57**	**32.54**

Greenhouse gas source and sink categories	2016	2017	2018	2019	2020	2021	2022	Change from 1990 to latest reported year
	CO_2 equivalents (kt) [3]							(%)
1. Energy	30,901.97	32,323.79	32,413.25	33,378.64	30,925.12	31,231.73	28,716.11	19.66
2. Industrial processes and product use	4,681.30	4,715.89	4,641.73	4,690.16	4,479.95	4,708.40	4,469.16	28.49
3. Agriculture	42,246.61	42,249.44	42,670.28	42,858.81	42,869.26	42,320.55	41,712.69	12.37
4. Land Use, Land-Use Change and Forestry [4]	–24,943.06	–23,457.07	–22,425.38	–21,594.41	–21,060.56	–20,505.56	–19,238.79	–20.91
5. Waste	3,822.70	3,780.27	3,705.56	3,654.18	3,603.19	3,544.31	3,492.72	–19.83
6. Other	3.60	3.69	3.79	4.45	4.33	3.93	4.69	38.94
Total (with LULUCF) [8]	**56,713.13**	**59,616.02**	**61,009.23**	**62,991.82**	**60,821.29**	**61,303.36**	**59,156.57**	**32.54**

[1] In accordance with decision 18/CMA.1, annex, para. 57, Parties shall report a consistent annual time series starting from 1990; those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead report data covering, at a minimum, the reference year/period for its NDC under Article 4 of the Paris Agreement and, in addition, a consistent annual time series from at least 2020 onwards.

[2] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the COP. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[3] As per decision 18/CMA.1, annex, para. 37, Parties shall use the 100-year time-horizon GWP values from the IPCC Fifth Assessment Report, or 100-year time-horizon GWP values from a subsequent IPCC assessment report as agreed upon by the CMA, to report aggregate emissions and removals of GHGs, expressed in CO_2 eq. Parties may also use other metrics (e.g. global temperature potential) to report supplemental information on aggregate emissions and removals of GHGs, expressed in CO_2 eq. In such cases, Parties shall provide in the NID information on the values of the metrics used and the IPCC assessment report they were sourced from.

[4] Fill in net emissions/removals as reported in table Summary 1. For the purposes of reporting, the signs for removals are always negative (–) and for emissions positive (+).

[5] Parties are asked to report emissions from international aviation and international navigation and multilateral operations, as well as CO_2 emissions from biomass and CO_2 captured, under memo items. These emissions should not be included in the national total emissions from the energy sector. The Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO_2 emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO_2 emissions are accounted for as a loss of biomass stocks in the LULUCF sector.

[6] In accordance with the MPGs (chapter II), for Parties that decide to report indirect CO_2 emissions, the national totals shall be provided with and without indirect CO_2.

[7] In accordance with the MPGs (chapter II), HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs. Note that the unit used for this row is kt CO_2 eq. and that appropriate notation keys should be entered in the cells for the individual chemicals.

[8] Includes net CO_2, CH_4 and N_2O from LULUCF.

Note: Minimum level of aggregation is needed to protect confidential business and military information, where it would identify particular entity's/entities' confidential data.

CFT table 7: Information on projections of greenhouse gas emissions and removals under a ‘with measures’ scenario [a, b]

	Most recent year in the Party’s national inventory report ($kt\ CO_2\ eq$) [c]	Projections of GHG emissions and removals ($kt\ CO_2\ eq$)					
	2022	2025	2030	2035	2040	2045	2050
Sector [d]							
Energy	15,031.68	14,910.37	12,427.87	10,970.97	10,486.34	10,680.91	10,746.68
Transport	13,684.43	14,321.88	13,716.23	12,576.88	10,811.19	8,927.79	7,446.42
Industrial processes and product use	4,469.16	4,229.75	3,112.61	3,032.42	2,908.26	2,917.18	2,828.60
Agriculture	41,712.69	39,605.62	39,148.87	38,847.03	38,719.71	38,752.29	38,764.31
Forestry/LULUCF	–19,238.79	–12,160.48	–16,992.94	–27,424.07	–20,411.17	–27,903.90	–28,877.35
Waste management/waste	3,492.72	3,403.35	3,266.15	3,205.17	3,163.40	3,137.25	3,123.68
Tokelau	4.69	4.74	4.78	3.89	3.95	4.02	4.10
Gas							
CO_2 emissions including net CO_2 from LULUCF	12,019.14	19,420.82	10,830.12	–2,167.49	2,451.36	–6,708.53	–9,081.49
CO_2 emissions excluding net CO_2 from LULUCF	31,610.09	31,896.93	28,146.54	25,579.05	23,185.06	21,517.90	20,118.38
CH_4 emissions including net CH_4 from LULUCF	38,421.60	36,327.86	35,477.32	35,164.88	35,155.69	35,152.15	35,147.20
CH_4 emissions excluding net CH_4 from LULUCF	38,339.31	36,260.50	35,404.17	35,092.25	35,083.05	35,079.51	35,074.56
N_2O emissions including net N_2O from LULUCF	7,146.99	7,369.65	7,267.89	7,186.81	7,170.78	7,159.30	7,146.92
N_2O emissions excluding net N_2O from LULUCF	6,877.13	7,121.39	7,017.56	6,936.97	6,920.89	6,909.41	6,897.03
HFCs	1,498.48	1,129.45	1,038.59	958.43	834.20	842.95	754.11
PFCs	50.93	47.43	47.43	47.43	47.43	47.43	47.43
SF_6	19.42	20.02	22.23	22.22	22.23	22.24	22.27
Total with LULUCF	**59,156.57**	**64,315.23**	**54,683.58**	**41,212.28**	**45,681.68**	**36,515.55**	**34,036.44**
Total without LULUCF	**78,395.36**	**76,475.71**	**71,676.52**	**68,636.35**	**66,092.85**	**64,419.44**	**62,913.79**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; LULUCF = Land Use, Land-Use Change and Forestry; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride.

[a] Each Party shall report projections pursuant to paras. 93–101 of the MPGs; those developing country Parties that need flexibility in the light of their capacities are instead encouraged to report such projections (para. 92 of the MPGs).

[b] Those developing country Parties that need flexibility in the light of their capacities with respect paras. 93–101 of the MPGs can instead report using a less detailed methodology or coverage (para. 102 of the MPGs).

[c] Projections shall begin from the most recent year in the Party's national report and extend at least 15 years beyond the next year ending in zero or five; those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead extend their projections at least to the end point of their NDC under Article 4 of the Paris Agreement (para. 95 of the MPGs).

[d] In accordance with para. 82(f) of the MPGs.

CTF table 9: Information on projections of greenhouse gas emissions and removals under a 'without measures' scenario [a, b]

	Most recent year in the Party's national inventory report (kt CO_2 eq) [c]	Projections of GHG emissions and removals (kt CO_2 eq)					
	2022	2025	2030	2035	2040	2045	2050
Sector [d]							
Energy	15,031.68	15,518.98	14,199.16	13,710.96	11,745.53	11,364.43	11,150.27
Transport	14,024.43	14,620.71	14,283.89	13,274.27	11,423.73	9,333.44	7,690.04
Industrial processes and product use	4,698.51	4,918.63	4,699.18	4,503.56	4,317.20	4,290.91	4,225.61
Agriculture	42,423.53	40,789.75	40,750.94	40,955.29	41,289.32	41,520.28	41,788.60
Forestry/LULUCF	–12,860.23	–5,391.88	–2,316.28	–7,187.20	636.56	–566.79	–10,639.27
Waste management/waste	4,137.86	4,111.84	4,109.92	4,116.22	4,129.71	4,146.36	4,164.84
Tokelau	4.69	4.74	4.78	3.89	3.95	4.02	4.10
Gas							
CO_2 emissions including net CO_2 from LULUCF	19,089.10	27,903.58	29,366.24	23,003.67	26,991.53	23,333.71	11,411.14
CO_2 emissions excluding net CO_2 from LULUCF	31,949.33	33,295.47	31,682.52	30,190.87	26,354.97	23,900.50	22,050.41
CH_4 emissions including net CH_4 from LULUCF	39,627.74	37,984.75	37,728.02	37,900.83	38,242.78	38,466.09	38,732.97
CH_4 emissions excluding net CH_4 from LULUCF	39,627.74	37,984.75	37,728.02	37,900.83	38,242.78	38,466.09	38,732.97
N_2O emissions including net N_2O from LULUCF	6,945.56	6,978.84	7,071.84	7,102.66	7,128.25	7,135.74	7,148.30
N_2O emissions excluding net N_2O from LULUCF	6,945.56	6,978.84	7,071.84	7,102.66	7,128.25	7,135.74	7,148.30
HFCs	1,727.72	1,638.20	1,498.11	1,302.45	1,116.05	1,089.73	1,024.40
PFCs	50.93	50.93	50.93	50.93	50.93	50.93	50.93
SF_6	19.41	16.45	16.45	16.45	16.45	16.45	16.45
Total with LULUCF	**67,460.47**	**74,572.76**	**75,731.60**	**69,377.00**	**73,546.00**	**70,092.65**	**58,384.19**
Total without LULUCF	**80,320.70**	**79,964.64**	**78,047.87**	**76,564.19**	**72,909.44**	**70,659.44**	**69,023.46**

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; LULUCF = Land Use, Land-Use Change and Forestry; N_2O = nitrous oxide; PFCs = perfluorocarbons; SF_6 = sulphur hexafluoride. Estimates for LULUCF for the WOM scenario only include CO_2.

[a] Each Party shall report projections pursuant to paras. 93–101 of the MPGs; those developing country Parties that need flexibility in the light of their capacities are instead encouraged to report such projections (para. 92 of the MPGs).

[b] Those developing country Parties that need flexibility in the light of their capacities with respect paras. 93–101 of the MPGs can instead report using a less detailed methodology or coverage (para. 102 of the MPGs).

[c] Projections shall begin from the most recent year in the Party's national report and extend at least 15 years beyond the next year ending in zero or five; those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead extend their projections at least to the end point of their NDC under Article 4 of the Paris Agreement (para. 95 of the MPGs).

[d] In accordance with para. 82(f) of the MPGs.

CTF table 10: Projections of key indicators [a, b]

Key indicator(s) [c]	Unit, as applicable	Most recent year in the Party's national inventory report, or the most recent year for which data are available	Projections of key indicators [d]					
		2022	2025	2030	2035	2040	2045	2050
Annual net target accounting emissions	kt CO_2 equivalent	73,115.79	69,104.29	56,703.32	51,208.85	43,174.17	39,737.70	41,160.81

Notes: The Party could add rows for each additional key indicator.

[a] Each Party shall report projections pursuant to paras. 93–101 of the MPGs; those developing country Parties that need flexibility in the light of their capacities are instead encouraged to report such projections (para. 92 of the MPGs).

[b] Those developing country Parties that need flexibility in the light of their capacities with respect paras. 93–101 of the MPGs can instead report using a less detailed methodology or coverage (para. 102 of the MPGs).

[c] Each Party shall also provide projections of key indicators to determine progress towards its NDC under Article 4 of the Paris Agreement (para. 97 of the MPGs).

[d] Future years extended to at least 15 years beyond the next year ending in zero or five; those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead extend their projections at least to the end point of their NDC under Article 4 of the Paris Agreement (para. 95 of the MPGs).

CTF table 11: Key underlying assumptions and parameters used for projections [a, b]

Key underlying assumptions and parameters [c]	Unit, as applicable	Most recent year in the Party's national inventory report, or the most recent year for which data are available	Projections of underlying assumption/parameters [d]					
		2022	2025	2030	2035	2040	2045	2050
GDP	billion (real 2009/20 NZ$)	275,851.00	293,431.00	331,959.90	359,764.60	384,984.00	409,255.00	431,441.40
Population	Millions	5,116,000.00	5,217,280.00	5,441,000.00	5,642,140.00	5,823,270.00	5,987,770.00	6,132,460.00
Effective carbon price	NZ$ tonne CO_2e		67.80	67.86	50.00	50.00	50.00	50.00
Light passenger vehicle travel	Million KM	33,364.00	35,507.00	37,296.00	38,929.00	40,626.00	41,936.00	43,863.00
Light commercial vehicle travel	Million KM	10,072.00	10,890.00	11,612.00	12,252.00	12,768.00	13,271.00	13,729.00
Heavy truck travel	Million KM	3,200.00	3,370.00	3,488.00	3,548.00	3,560.00	3,579.00	3,607.00
Heavy bus travel	Million KM	259.00	301.00	320.00	338.00	358.00	379.00	402.00
Motorcycle travel	Million KM	412.00	402.00	408.00	412.00	418.00	426.00	437.00
Exchange rate	(NZ$/US$)	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Dairy area	Thousand hectares	1,659,430.00	1,639,569.94	1,607,626.38	1,587,840.42	1,576,337.09	1,570,306.86	1,564,276.62
Sheep beef deer area	Thousand hectares	7,482,359.30	7,290,808.88	7,094,820.47	6,862,454.99	6,672,407.31	6,501,464.74	6,342,785.12
Horticulture area	Thousand hectares	103,223.10	106,505.08	108,317.70	111,317.70	114,317.70	117,317.70	120,317.70
Arable land	Thousand hectares	148,960.60	150,995.00	150,995.00	150,995.00	150,995.00	150,995.00	150,995.00
Exotic forest	Thousand hectares	1,954,648.83	2,116,012.55	2,244,522.47	2,372,182.47	2,504,352.38	2,637,649.77	2,770,947.15
Afforestation	Hectares	76,810.00	29,699.00	27,648.00	27,354.00	27,354.00	27,354.00	27,354.00
Deforestation	Hectares	3,669.00	1,822.00	1,822.00	1,822.00	695.00	695.00	695.00
Managed waste tonnage	Kilotonnes	3,589.76	3,316.29	3,324.89	3,378.90	3,361.80	3,413.63	3,456.48

Key underlying assumptions and parameters [c]	Unit, as applicable	Most recent year in the Party's national inventory report, or the most recent year for which data are available	Projections of underlying assumption/parameters [d]					
Non-MSW landfills waste	Kilotonnes	5,092.90	5,092.90	5,092.90	5,092.90	5,092.90	5,092.90	5,092.90
Farm fills waste	Kilotonnes	518.30	508.10	499.40	490.00	482.20	475.10	468.90
Composted waste tonnage	Kilotonnes	437.38	495.48	531.70	552.70	565.85	579.88	594.19
AD waste tonnage	Kilotonnes	20.00	80.00	100.00	120.00	200.00	200.00	200.00

Note: The Party could add rows for each additional key underlying assumptions and parameters.

[a] Each Party shall report projections pursuant to paras. 93–101 of the MPGs; those developing country Parties that need flexibility in the light of their capacities are instead encouraged to report such projections (para. 92 of the MPGs).

[b] Those developing country Parties that need flexibility in the light of their capacities with respect to paragraphs 93–101 of the MPGs can instead report using a less detailed methodology or coverage (para. 102 of the MPGs).

[c] Information provided by each Party in describing the methodology used to develop the projections should include key underlying assumptions and parameters used for projections (e.g. gross domestic product growth rate/level, population growth rate/level) (para. 96(a) of the MPGs).

[d] Future years extended to at least 15 years beyond the next year ending in zero or five; those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead extend their projections at least to the end point of their NDC under Article 4 of the Paris Agreement (para. 95 of the MPGs).

Common tabular formats for the electronic reporting of information on financial, technology development and transfer and capacity-building support provided and mobilised under Articles 9-11 of the Paris Agreement

CTF table III.1 (2021): Information on financial support provided under Article 9 of the Paris Agreement in year 2021: bilateral, regional and other channels

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Myanmar	Myanmar Renewable Energy Programme	**82,940**	**117,276**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	No	Yes
Solomon Islands	Forest Conservation Solomon Islands	**151,917**	**214,811**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Ethiopia	Supporting Value Chain for Farmers	**41,876**	**59,213**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes
Pacific Regional / Multi-Country	Climate and Oceans Support Program in the Pacific	**1,768,034**	**2,500,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
America Central Regional/Multi-Country	Caribbean Agriculture and Tourism Support	**161,661**	**228,588**	Disbursed	Regional	ODA	Grant	Adaptation	Agriculture	No	Yes
Tonga	Tonga Parliament Buildings Project	**140,106**	**198,110**	Disbursed	Bilateral	ODA	Grant	Adaptation	Government and Civil Society	No	No
Pacific Regional/Multi-Country	Pacific Seeds for Life	**192,185**	**271,750**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Tuvalu	Vaitupu Water Security	**78,458**	**110,940**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	No	Yes
Pacific Regional/ Multi-Country	Pacific Partnership 2019 - 2024	**742,574**	**1,050,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Fiji	Social Housing	**204,526**	**289,200**	Disbursed	Bilateral	ODA	Grant	Adaptation	Other Social Infrastructure and Services	No	No
Tokelau	Coastal Risk Mitigation	**136,009**	**192,317**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Fiji	Disaster Risk Management in Fiji	**252,641**	**357,234**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Vanuatu	Vanuatu Inter-island Shipping Project Additional Support - South Paray	**92,820**	**131,247**	Disbursed	Bilateral	ODA	Grant	Adaptation	Transport and Storage	No	No
Pacific Regional/Multi-Country	Pacific Community (SPC) Core Funding 2020-2024	**4,037**	**5,709**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/ Multi-Country	Improving Ecosystem Resilience: Kiwa Initiative	**1,414,427**	**2,000,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Support to the Pacific Climate Change Centre	**393,918**	**557,001**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Pacific Regional/Multi-Country	InvestPacific	**2,820**	**3,988**	Disbursed	Regional	ODA	Grant	Cross-cutting	Banking and Financial Services	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Niue	Niue Strengthen Governance: Infrastructure	**657.85**	**930**	Disbursed	Bilateral	ODA	Grant	Adaptation	Government and Civil Society	No	No
Cambodia	Cambodia Climate Smart Commercial Horticulture	**294,588**	**416,547**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes
Pacific Regional/Multi-Country	Pacific Public Sector Strengthening	**571,495**	**808,094**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Government and Civil Society	Yes	No
Nauru	Energy Efficiency	**475,266**	**672,026**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	No	Yes
Kiribati	Energy and Public Utility Reform	**1,272,472**	**1,799,276**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	Yes	Yes
Pacific Regional/Multi-Country	Improve Ocean decision making.	**1,461,920**	**2,067,155**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/ Multi-Country	Pacific Regional NDC Hub	**424,328**	**600,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Pacific Regional/Multi-Country	Pacific Response to Coconut Rhinoceros Beetle CRB	**1,088,305**	**1,538,863**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes
Solomon Islands	Solomon Islands Fisheries New Phase 2020-2024	**192,039**	**271,543**	Disbursed	Bilateral	ODA	Grant	Adaptation	Fishing	No	No
Pacific Regional/Multi-Country	Pacific Infrastructure Technical Assistance Fund	**452,909**	**640,413**	Disbursed	Regional	ODA	Grant	Cross-cutting	Construction	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Pacific Regional/Multi-Country	Design and Delivery	**757,793**	**1,071,520**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Pacific Voice	**1,022,625**	**1,445,992**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Climate Mobility	**918,220**	**1,298,363**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Regional	Disaster Risk Finance	**3,902,406**	**5,518,002**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Invasive Species Management	**1,772,557**	**2,506,395**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Tuvalu	Integrated Water Resources Management - Tuvalu	**707,214**	**1,000,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Ecosystems Resilience	**1,498,540**	**2,118,935**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Pacific Regional/Multi-Country	Mainstreaming Climate Change in Governance	**622,348**	**880,000**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Government and Civil Society	Yes	No
Africa Regional/Multi-Country	African Climate Smart Agriculture Initiative	**990,099**	**1,400,000**	Disbursed	Multi-Bilateral	ODA	Grant	Mitigation	Agriculture	Yes	Yes

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Pacific Regional/Multi-Country	Information for decision-making	**2,072,941**	**2,931,139**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Africa Regional/Multi-Country	East Africa: Farm to Market Alliance	**297,030**	**420,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	Yes	No
Viet Nam	Viet Nam Climate-Smart Fruit Value Chain	**39,109**	**55,300**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Myanmar	Myanmar Livelihoods and Food Security Fund	**827,440**	**1,170,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Pacific Regional/ Multi-Country	Enhanced Pacific Biosecurity Programme	**209,312**	**295,967**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	Yes	Yes
Pacific Regional/Multi-Country	Reduce risk of water scarcity	**3,141,028**	**4,441,413**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	Yes
Pacific Regional/Multi-Country	Averting water-related emergencies	**401,976**	**568,394**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Humanitarian Aid	Yes	Yes
Pacific Regional/Multi-Country	Building resilient water management systems	**348,123**	**492,246**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Tokelau	Establishing Air Services to Tokelau	**45,699**	**64,619**	Disbursed	Bilateral	ODA	Grant	Adaptation	Transport and Storage	No	No
Pacific Regional/Multi-Country	Secretariat of the Pacific Regional Environment Programme 2020-2025	**1,525,527**	**2,157,095**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Pacific Regional/Multi-Country	Access to Finance	**876,756**	**1,239,733**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Banking and Financial Services	No	No
Pacific Regional/Multi-Country	Low Emission, Climate Resilient Planning	**1,957,309**	**2,767,635**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Tuvalu	Fisheries Support Programme: 2020-2025	**128,253**	**181,350**	Disbursed	Bilateral	ODA	Grant	Adaptation	Fishing	No	No
Pacific Regional/Multi-Country	Strategic Evaluation: Infrastructure	**424**	**600**	Disbursed	Regional	ODA	Grant	Adaptation	Transport and Storage	No	No
Pacific Regional/Multi-Country	Food Security and Ecosystem Resilience funds	**2,121,641**	**3,000,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Timor-Leste	Crop Diversification in Timor-Leste	**1,023,050**	**1,446,592**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Worldwide/Multi-Regional	Save the Children New Zealand (SCNZ) - Implementation	**420,085**	**594,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Fiji	Rural Water Sanitation and Hygiene Programme, Fiji	**114,745**	**162,250**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Polynesian Climate and Community Resilience	**14,144**	**20,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Fiji	Sustainable Fisheries Management in Fiji	**136,846**	**193,500**	Disbursed	Bilateral	ODA	Grant	Adaptation	Fishing	Yes	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Vanuatu	Delivering the Water Promise 2030, Vanuatu	**99,010**	**140,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	Yes
Pacific Regional/Multi-Country	Climate Change and Tuna Fisheries	**1,331,296**	**1,882,452**	Disbursed	Regional	ODA	Grant	Adaptation	Fishing	No	No
Pacific Regional/Multi-Country	Forum Fisheries Agency 2021-26 core funding	**763,791**	**1,080,000**	Disbursed	Regional	ODA	Grant	Adaptation	Fishing	No	No
Indonesia	Indonesia Renewable Energy Programme Resourcing	**15,753**	**22,275**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Education	No	No
Pacific Regional/Multi-Country	Oxfam Implementation	**582,619**	**823,823**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Pacific Regional/Multi-Country	Habitat for Humanity NZ Implementation	**534,368**	**755,597**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Other Social Infrastructure and Services	No	No
Worldwide/Multi-Regional	Caritas New Zealand Implementation	**342,672**	**484,538**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	UNICEF NZ Implementation	**323,976**	**458,102**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Worldwide/Multi-Regional	The Adventist Development and Relief Agency Implementation	**430,959**	**609,377**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Worldwide/Multi-Regional	TearFund New Zealand Implementation	**337,886**	**477,771**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Timor-Leste	Enhancing Climate Resilience in Timor-Leste	**14,144**	**20,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Fishing	Yes	No
Kiribati	Kiribati Water	**10,067**	**14,235**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Water and Sanitation	Yes	No
Viet Nam	Viet Nam Dam Safety Project	**9,429**	**13,332**	Disbursed	Bilateral	ODA	Grant	Adaptation	Humanitarian Aid	No	No
Indonesia	Indonesia: Accelerating Geothermal Development	**343,010**	**485,016**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	No	Yes
Indonesia	Indonesia: Improving Energy Access in Maluku	**736,122**	**1,040,876**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	No	Yes
Africa Regional/Multi-Country	Africa Geothermal Assistance Facility	**1,236,705**	**1,748,701**	Disbursed	Regional	ODA	Grant	Cross-cutting	Energy	Yes	Yes
Indonesia	Indonesia: Supporting Geothermal Sector Training	**149,740**	**211,733**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	No	Yes
Indonesia	Indonesia: Better Warehousing	**530,478**	**750,097**	Disbursed	Bilateral	ODA	Grant	Adaptation	Humanitarian Aid	No	No
Asia Regional/Multi-Country	ASEAN: Lao and Cambodia Renewable Energy Facility	**758,674**	**1,072,766**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Energy	Yes	Yes
Myanmar	Myanmar Better Warehousing and Logistics	**198,691**	**280,950**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Myanmar	Myanmar Resilient Horticulture	**97,417**	**137,748**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes
Vanuatu	Water Sector Partnership 2017-2021	**789,353**	**1,116,146**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	Yes

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Nauru	Renewable Energy Initiative	**13,978**	**19,766**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	Yes	Yes
Pacific Regional/Multi-Country	Improving Pacific Access to Climate Finance	**106,082**	**150,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Worldwide/Multi-Regional	Volunteer Service Abroad 2018 - 2023	**1,222,835**	**1,729,089**	Disbursed	Regional	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Worldwide/Multi-Regional	New Zealand Red Cross Partnership 2018-2024	**142,383**	**201,329**	Disbursed	Regional	ODA	Grant	Cross-cutting	Humanitarian Aid	No	No
Asia Regional/Multi-Country	ASEAN Climate Smart Agriculture Initiative	**212,164**	**300,000**	Disbursed	Regional	ODA	Grant	Mitigation	Water and Sanitation	Yes	Yes
Pacific Regional/Multi-Country	Pacific Islands Emergency Management Alliance	**190,842**	**269,850**	Disbursed	Regional	ODA	Grant	Adaptation	Humanitarian Aid	No	No
Republic of Marshall Islands	Republic of Marshall Islands- Energy initiative	**82,940**	**117,276**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	No	No
American Central Regional/Multi-Country	Caribbean Geothermal Technical Assistance Phase II	**304,485**	**430,542**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	No	No
Solomon Islands	Forest Conservation Solomon Islands	**151,917**	**214,811**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	University of the South Pacific 2019-2022	**1,654,880**	**2,340,000**	Disbursed	Regional	ODA	Grant	Adaptation	Education	No	No
Samoa	Incentivising economic Reform	**1,768,034**	**2,500,000**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Commodity aid and	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
									General Programme Assistance		
Tuvalu	Tuvalu Trust Fund Contributions	**34,231**	**48,403**	Disbursed	Bilateral	ODA	Grant	Adaptation	Government and Civil Society	No	No
Republic of Marshall Islands	RMI Transport Strategy	**64,788**	**91,610**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Transport and Storage	No	No
Kiribati	Climate Change Resilience	**30,731**	**43,453**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Vanuatu	Santo Water Sanitation and Hygiene Project	**66,339**	**93,803**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	No	No
Pacific Regional/Multi-Country	Strategic Evaluation: Energy	**35,522**	**50,228**	Disbursed	Regional	ODA	Grant	Cross-cutting	Energy	No	No
Tonga	Improve Climate Resilience: Water and Sanitation	**12,265**	**17,342**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	No	No
Pacific Regional/Multi-Country	Pacific Islands Forum Secretariat 2021-2023	**925,035**	**1,308,000**	Disbursed	Regional	ODA	Grant	Mitigation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Tearfund New Zealand Design	**17,512**	**24,762**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Evaluation: Formative Evaluation of the Climate Change Programme Delivery Team	**19,679**	**27,826**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate-specific USD)	Amount (climate-specific NZD)	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity building	Technology transfer
Tonga	Improve Niuafo'ou Water Security Activity	**353,607**	**500,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	No	No
Cambodia	Security, Resilience and ED	**34,383**	**48,618**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes
Zambia	Zambia Dairy Transformation Programme	**311,514**	**440,481**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Asia Regional/Multi-sector	ASEAN Climate Smart Agriculture Initiative	**1,449,788**	**2,050,000**	Disbursed	Regional	ODA	Grant	Mitigation	Agriculture	Yes	Yes
Myanmar	Matupi Sustainable Rural Economic Development Myanmar	**52,542**	**74,294**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Energy: North West Pacific Design	**10,138**	**14,336**	Disbursed	Multi-Bilateral	ODA	Grant	Mitigation	Energy	No	No
Fiji	Tuna longline fisheries in Fiji	**63,214**	**89,384**	Disbursed	Bilateral	ODA	Grant	Mitigation	Fishing	No	No
Pacific Regional/Multi-Country	Local Government Technical Assistance Facility	**171,004**	**241,800**	Disbursed	Regional	ODA	Grant	Adaptation	Government and Civil Society	No	Yes
Worldwide/Multi-regional	High Commission Embassy Funding Adaptation	**59,595**	**84,268**	Disbursed	Regional	ODA	Grant	Adaptation	Multisector /cross-cutting	No	No
Worldwide Multi-regional	High Commission Embassy Funding Cross-cutting	**99,315**	**140,432**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector /cross-cutting	No	No
Worldwide Multi-regional	High Commission Embassy Funding Mitigation	**7,779**	**11,000**	Disbursed	Regional	ODA	Grant	Mitigation	Multisector / Cross-cutting	No	No
	Totals	**59,293,850**	**83,841,509**								

CTF table III.1 (2022): Information on financial support provided under Article 9 of the Paris Agreement in year 2022: bilateral, regional and other channels

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Solomon Islands	Forest Conservation Solomon Islands	**84,593**	**133,472**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector/Cross-cutting	No	No
Ethiopia	Supporting Value Chain for Farmers	**18,653**	**29,430**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes
Indonesia	Indonesia: Livelihood Support in Eastern Indonesia	**47,535**	**75,000**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Agriculture	No	No
Pacific Regional/Multi-Country	Climate and Oceans Support Program in the Pacific	**155,913**	**246,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector/ Cross-cutting	Yes	Yes
America Central Regional/Multi-Country	Caribbean Agriculture and Tourism Support	**110,037**	**173,616**	Disbursed	Regional	ODA	Grant	Adaptation	Agriculture	No	Yes
Solomon Islands	Provincial Airfield Upgrades	**3,170,401**	**5,002,258**	Disbursed	Bilateral	ODA	Grant	Adaptation	Tourism	No	No
Tonga	Tonga Parliament Buildings Project	**196,036**	**309,305**	Disbursed	Bilateral	ODA	Grant	Adaptation	Government and Civil Society	No	No
Solomon Islands	Building Ecotourism in the Arnavons	**103,938**	**163,994**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector/Cross-cutting	No	No
Pacific Regional/Multi-Country	Pacific Seeds for Life	**164,628**	**259,750**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Fiji	Social Housing	**124,573**	**196,552**	Disbursed	Bilateral	ODA	Grant	Adaptation	Other Social Infrastructure and Services	No	No
Tokelau	Coastal Risk Mitigation	**133,892**	**211,255**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector/Cross-cutting	No	No
Fiji	Disaster Risk Management in Fiji	**192,017**	**302,964**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Pacific Regional/Multi-Country	Papua New Guinea and Pacific Islands Umbrella Fund	**3,042,211**	**4,800,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Pacific Community (SPC) Core Funding 2020-2024	**3,405,499**	**5,373,196**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Improving Ecosystem Resilience: Kiwa Initiative	**1,267,588**	**2,000,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Support to the Pacific Climate Change Centre	**842,250**	**1,328,902**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Pacific Regional/Multi-Country	InvestPacific	**22,855**	**36,060**	Disbursed	Regional	ODA	Grant	Cross-cutting	Banking and Financial Services	No	No
Botswana	Botswana Beef Phase II	**21,968**	**34,661**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Niue	Niue Strengthen Governance: Infrastructure	**356**	**561**	Disbursed	Bilateral	ODA	Grant	Adaptation	Government and Civil Society	No	No
Cambodia	Cambodia Climate Smart Commercial Horticulture	**275,388**	**434,507**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Nauru	Energy Efficiency	**358,633**	**565,852**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	No	Yes
Kiribati	Energy and Public Utility Reform	**699,146**	**1,103,112**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	Yes	Yes
Pacific Regional/Multi-Country	Pacific Regional NDC Hub	**570,415**	**900,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Fiji	Revitalising Informal Settlements and their Environment - Upgrades for Informal Settlements in Fiji	**316,897**	**500,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Pacific Response to Coconut Rhinoceros Beetle CRB	**657,502**	**1,037,407**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	No	Yes

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Solomon Islands	Solomon Islands Fisheries New Phase 2020-2024	**382,344**	**603,262**	Disbursed	Bilateral	ODA	Grant	Adaptation	Fishing	No	No
Pacific Regional/Multi-Country	Pacific Infrastructure Technical Assistance Fund	**110,115**	**173,739**	Disbursed	Regional	ODA	Grant	Cross-cutting	Construction	No	No
Pacific Regional/Multi-Country	Design and Delivery	**59,074**	**93,207**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Pacific Voice	**1,158,429**	**1,827,770**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Climate Mobility	**669,179**	**1,055,830**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Palau	Support to Our Ocean 2020 in Palau	**140,075**	**221,011**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Marshall Islands	RMI Electricity Roadmap Programme Manager	**12,492**	**19,710**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	Yes	No
Vanuatu	Vanuatu Water Sector Partnership - Phase II	**19,367**	**30,558**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Invasive Species Management	**2,300,454**	**3,629,656**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Tuvalu	Integrated Water Resources Management - Tuvalu	**682,938**	**1,077,539**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Ecosystems Resilience	**1,888,514**	**2,979,697**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Pacific Regional/Multi-Country	Mainstreaming Climate Change in Governance	**697,173**	**1,100,000**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Government and Civil Society	Yes	No
Africa Regional/Multi-Country	African Climate Smart Agriculture Initiative	**823,932**	**1,300,000**	Disbursed	Regional	ODA	Grant	Mitigation	Agriculture	Yes	Yes
Pacific Regional/Multi-Country	Information for decision-making	**2,764,385**	**4,361,646**	Disbursed	Multi-Bilateral	Other	Grant	Adaptation	Multisector / Cross-cutting	Yes	Yes

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Cook Islands	Infrastructure: Trust fund	**7,605,527**	**12,000,000**	Disbursed	Bilateral	Other	Grant	Adaptation	Multisector / Cross-cutting	No	No
Africa Regional/Multi-Country	East Africa: Farm to Market Alliance	**266,193**	**420,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	Yes	No
Viet Nam	Viet Nam Climate-Smart Fruit Value Chain	**107,736**	**169,986**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Pacific Regional/Multi-Country	Enhanced Pacific Biosecurity Programme	**509,664**	**804,147.59**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Agriculture	Yes	Yes
Fiji	Fiji Climate Action Programme	**11,450**	**18,066**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Reduce risk of water scarcity	**4,385,003**	**6,918,658**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Averting water-related emergencies	**250,190**	**394,750**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Humanitarian Aid	Yes	Yes
Pacific Regional/Multi-Country	Building resilient water management systems	**4,048,682**	**6,388,011**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Secretariat of the Pacific Regional Environment Programme 2020-2025	**1,316,379**	**2,076,982**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No
Fiji	Fiji Relocation Trust Fund	**212,067**	**334,599**	Disbursed	Bilateral	ODA	Grant	Adaptation	Other Social Infrastructure and Services	No	No
Pacific Regional/Multi-Country	Access to finance	**1,213,781**	**1,915,104**	Disbursed	Regional	ODA	Grant	Cross-cutting	Banking and Financial Services	No	No
Pacific Regional/Multi-Country	Low Emission, Climate Resilient Planning	**1,114,845**	**1,759,003**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Tuvalu	Fisheries Support Programme: 2020-2025	**279,844**	**441,538**	Disbursed	Bilateral	ODA	Grant	Adaptation	Fishing	No	No
Pacific Regional/Multi-Country	Pacific Islands Forum Secretariat 2021-2023	**829,002**	**1,308,000**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Timor-Leste	Crop Diversification in Timor-Leste	**1,828,838**	**2,885,529**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Worldwide/Multi-Region	Save the Children New Zealand - Implementation	**104,576**	**165,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Worldwide/Multi-Region	ChildFund New Zealand Implementation	**320,497**	**505,680**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Fiji	Rural Water Sanitation Hygiene Programme, Fiji	**79,224**	**125,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Polynesian Climate and Community Resilience	**330,101**	**520,833**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Vanuatu	Delivering the Water Promise 2030, Vanuatu	**63,379**	**100,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	Yes
Pacific Regional/Multi-Country	Business Link Pacific Phase II	**457,913**	**722,495**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Banking and Financial Services	No	No
Pacific Regional/Multi-Country	Forum Fisheries Agency 2021-26 core funding	**684,497**	**1,080,000**	Disbursed	Regional	ODA	Grant	Adaptation	Fishing	No	No
Indonesia	Indonesia Renewable Energy Programme Resourcing	**93,414**	**147,388**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	No	No
Worldwide/Multi-Region	Oxfam Implementation	**66,396**	**104,760**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Worldwide/Multi-Region	Caritas New Zealand Implementation	**256,687**	**405,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	UNICEF NZ Implementation	**630,596**	**994,954**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Worldwide/Multi-Region	The Adventist Development and Relief Agency Implementation	**480,594**	**758,282**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Worldwide/Multi-Region	TearFund New Zealand Implementation	**310,401**	**489,751**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Indonesia	Indonesia: Accelerate Renewable Energy Transition	**693,188**	**1,093,712**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	Yes	Yes
Samoa	Samoa Tourism Recovery and Resilience	**190,138**	**300,000**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Tourism	Yes	No
Timor-Leste	Enhancing Climate Resilience in Timor-Leste	**12,682**	**20,000**	Disbursed	Bilateral	ODA	Grant	Adaptation	Fishing	Yes	No
Pacific Regional/Multi-Country	Meterological Forecasting 2021-2025	**15,325**	**24,180**	Disbursed	Regional	ODA	Grant	Mitigation	Humanitarian Aid	No	Yes
Samoa	Supporting Economic Reform 2021 - 2024	**1,330,967**	**2,100,000**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Commodity aid and general programme assistance	No	No
Zambia	Zambia Dairy Transformation Programme Extension	**150,949**	**238,167**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Afghanistan	Afghanistan: Food and Agricultural Organisation Food Security	**565,972**	**892,990**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Pacific Regional/Multi-Country	Centre for Pacific Crops and Trees	**3,168,969**	**5,000,000**	Disbursed	Regional	ODA	Grant	Adaptation	Agriculture	Yes	Yes
Cambodia	Cambodia: Angkor Water Resilience Project	**47,156**	**74,403**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Climate Science for Ensuring Pacific Tuna Access	**3,990,515**	**6,296,234**	Disbursed	Regional	ODA	Grant	Adaptation	Fishing	Yes	Yes

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Asia Regional/ Multi-Country	Hybrid Food + Agribusiness Short Term Training ASEAN/Timor-Leste	**3,823**	**6,032**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Agriculture	Yes	No
Asia Regional/ Multi-Country	Energy Transition Mechanism	**85,529**	**134,947**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	No	No
Kiribati	2022 Drought Kiribati	**75,285**	**118,785**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	No	No
Palau	The development of a small-scale fishery	**14,260**	**22,500**	Disbursed	Bilateral	ODA	Grant	Adaptation	Fishing	No	No
Tuvalu	Tuvalu Drought Response	**31,662**	**49,956**	Disbursed	Bilateral	ODA	Grant	Mitigation	Water and Sanitation	No	No
Pacific Regional/Multi-Country	Climate Resilience, Fiji & Cook Islands	**12,676**	**20,000**	Disbursed	Multi-Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Kiribati	Improving water security in Kiribati	**139,492**	**219,994**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Health	Yes	Yes
Pacific Regional/Multi-Country	Country Flexible Finance - Support and Delivery	**73,846**	**116,515**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Commodity aid and general programme assistance	No	No
Laos	Lao PDR: Nature Based Solutions for Urban Adaptation	**138,479**	**218,493**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	Yes	No
Kiribati	Kiribati Water	**351,581**	**554,725**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	No
Pacific Regional/Multi-Country	Ocean Acidification Partnership	**55,303**	**87,257**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Viet Nam	Viet Nam Dam Safety Project	**173,737**	**274,122**	Disbursed	Bilateral	ODA	Grant	Adaptation	Humanitarian Aid	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
Indonesia	Indonesia: Accelerating Geothermal Development	**396,239**	**625,186**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	No	No
Indonesia	Indonesia: Improving Energy Access in Maluku	**763,939**	**1,205,343**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Energy	No	Yes
Africa Regional/Multi-Country	Africa Geothermal Assistance Facility	**963,625**	**1,520,407**	Disbursed	Regional	ODA	Grant	Cross-cutting	Energy	Yes	No
Indonesia	Indonesia: Supporting Geothermal Sector Training	**173,921**	**274,412**	Disbursed	Bilateral	ODA	Grant	Mitigation	Energy	No	No
Indonesia	Indonesia: Better Warehousing	**225,198**	**355,317**	Disbursed	Bilateral	ODA	Grant	Adaptation	Humanitarian Aid	No	No
Asia Regional/Multi-country	ASEAN: Lao and Cambodia Renewable Energy Facility	**1,172,448**	**1,849,068**	Disbursed	Multi-Bilateral	ODA	Grant	Cross-cutting	Energy	Yes	Yes
Myanmar	Myanmar Better Warehousing and Logistics	**140,659**	**221,931**	Disbursed	Bilateral	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	No
Myanmar	Myanmar Resilient Horticulture	**324,041**	**511,273**	Disbursed	Bilateral	ODA	Grant	Adaptation	Agriculture	No	No
Vanuatu	Water Sector Partnership 2017-2021	**290,362**	**458,133**	Disbursed	Bilateral	ODA	Grant	Adaptation	Water and Sanitation	Yes	Yes
Worldwide/Multi-Region	Volunteer Service Abroad 2018 - 2023	**1,295,663**	**2,044,298**	Disbursed	Regional	ODA	Grant	Adaptation	Multisector / Cross-cutting	No	Yes
Asia Regional/ Multi-Country	ASEAN Climate Smart Agriculture Initiative	**1,806,313**	**2,850,000**	Disbursed	Regional	ODA	Grant	Mitigation	Agriculture	Yes	Yes
Asia Regional/ Multi-Country	ASEAN: Support to the Mekong River Commission	**190,138**	**300,000**	Disbursed	Regional	ODA	Grant	Adaptation	Water and Sanitation	No	Yes
Pacific Regional/Multi-Country	Pacific Islands Emergency Management Alliance	**156,615**	**247,108**	Disbursed	Regional	ODA	Grant	Adaptation	Humanitarian Aid	No	No

Recipient Country or Region	Title of the project programme, activity or other	Amount (climate specific USD)	Amount (climate specific NZD)	Status	Channel	Funding Source	Financial Instrument	Type of support	Sector	Capacity Building	Technology transfer
America Central Regional/ Multi-Country	Caribbean Geothermal Technical Assistance Phase II	**381,561**	**602,026**	Disbursed	Regional	ODA	Grant	Mitigation	Energy	No	No
Republic of Marshall Islands	RMI Transport Strategy	**7,399**	**11,673**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Transport and Storage	No	No
Kiribati	Climate Change Resilience	**15,408**	**24,310**	Disbursed	Bilateral	ODA	Grant	Cross-cutting	Multisector/Cross-cutting	No	No
Pacific Regional/Multi-Country	Local Government Technical Assistance Facility	**115,794**	**182,700**	Disbursed	Regional	ODA	Grant	Adaptation	Government and Civil Society	No	No
Pacific Regional/ Multi-Country	Recognised Seasonal Employer Worker Training Scheme II	**102,726**	**162,009**	Disbursed	Regional	ODA	Grant	Adaptation	Education	Yes	No
Worldwide/ multi-regional	High Commission Embassy Funding Adaptation	**33,484**	**52,808**	Disbursed	Regional	ODA	Grant	Adaptation	Multisector/Cross-cutting	No	No
Worldwide/ multi-regional	High Commission Embassy Funding Cross-cutting	**246,781**	**389,198**	Disbursed	Regional	ODA	Grant	Cross-cutting	Multisector/Cross-cutting	No	No
Worldwide/ multi-regional	High Commission Embassy Funding Mitigation	**10,967**	**17,299**	Disbursed	Regional	ODA	Grant	Mitigation	Multisector/Cross-cutting	No	No
Totals		**75,683,686**	**119,412,507**								

CTF table III.2 (2021): Information on financial support provided under Article 9 of the Paris Agreement in year 2021: multilateral channels

Institution	Amount (climate-specific USD)	Amount (climate-specific NZD)	Recipient	Title of the project programme, activity or other	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity Building	Technology Transfer
Multilateral financial institutions, including regional development banks												
World Bank Group International Development Agency	2,657,843	3,758,190	Global	WBG IDA19	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Asian Development Bank	470,067.19	664,675	Global	ADB ADF13	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
Specialised United Nations Bodies												
United Nations Development Programme	1,060,820.37	1,500,000	Global	UNDP 2018/19 - 2020/21	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector / Cross-cutting	Yes	No
International Fund for Agricultural Development	318,246	555,000	Global	IFAD 11	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Agriculture	Yes	Yes
United Nations Environmental Programme	6,251.77	8,840	Global	UNEP MP MLF10	Disbursed	Multilateral	ODA	Grant	Mitigation	Multisector/ Cross-cutting	No	No
United Nations Food and Agriculture Organisation	109,210.04	154,423	Global	COVID-19 Food Security Support LAC	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Agriculture	No	No
United Nations Women	530,410.18	750,000	Global	UN Women 18/19-20/21	Disbursed	Multilateral	ODA	Grant	Adaptation	Government and Civil Society	No	No
United Nations World Food Programme	1,272,984.44	1,800,000	Global	WFP 2018/19-2020/21	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Humanitarian Aid	No	No

United Nations Peacebuilding Fund	636,492.22	900,000	Global	United Nations Peacebuilding Fund 2020–21	Disbursed	Multilateral	ODA	Grant	Adaptati on	Government and Civil Society	No	No
Other Multilateral												
Alliance of Small Island States	135,807.64	192,032	Global	AOSIS Grant for Assistance	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	No
Commonwealth Fund for Technical Cooperation	636,492.22	900,000	Global	Commonwealth Fund for Technical Cooperation 19-21	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	No
ChildFund New Zealand	357,623.76	505,680	Global	ChildFund New Zealand Implementation	Disbursed	Multilateral	ODA	Grant	Adaptati on	Multisector/ Cross-cutting	No	No
Totals	**8,192,249**	**11,688,840**										

CTF table III.2 (2022): Information on financial support provided under Article 9 of the Paris Agreement in year 2022: multilateral channels

Institution	Amount (climate-specific USD)	Amount (climate-specific NZD)	Recipient	Title of the project programme, activity or other	Status	Channel	Funding Source	Financial instrument	Type of Support	Sector	Capacity Building	Technology Transfer
Multilateral financial institutions, including regional development banks												
World Bank Group	3,368,031	6,199,760	Global	WBG IDA19	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	No
Asian Development Bank	727,965.89	1,148,075	Global	ADB ADF13	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	No
Specialised United Nations Bodies												
United Nations World Food Programme	1,141,335.36	1,800,000	Global	WFP 2018/19–2020/21	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Humanitarian Aid	No	No
United Nations Development Programme	570,667.68	900,000	Global	UNDP 2018/19 - 2020/21	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	No
UNICEF	1,141,335.36	1,800,000	Global	UNICEF 2021–24	Disbursed	Multilateral	ODA	Grant	Adaptation	Multisector/ Cross-cutting	No	No
United Nations Development Programme	1,521,105	2,400,000	Global	UNDP 2021/22 to 2023/24	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	No
United Nations Environment Programme	176,470.10	278,311	Global	UNEP MP MLF10	Disbursed	Multilateral	ODA	Grant	Mitigation	Multisector/ Cross-cutting	No	No

International Fund for Agricultural Development	304,356.10	480,000	Global	IFAD 12	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Agriculture	No	Yes
United Nations Peacebuilding Fund	570,667.68	900,000	Global	Peacebuilding Fund 2022–24	Disbursed	Multilateral	ODA	Grant	Adaptation	Government and Civil Society	No	No
Other Multilateral												
Alliance of Small Island States	138,043.88	217,709	Global	AOSIS Grant for Assistance	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	No
Consultative Group for International Agricultural Research	2,041,722.15	3,220,000	Global	CGIAR – 2021/22–2023/24	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Agriculture	Yes	Yes
Commonwealth Fund for Technical Cooperation	570,667.68	900,000	Global	Commonwealth Fund for Technical Cooperation 21–24	Disbursed	Multilateral	ODA	Grant	Cross-cutting	Multisector/ Cross-cutting	Yes	Yes
ChildFund New Zealand	320,639.15	505,680	Global	ChildFund New Zealand Implementation	Disbursed	Multilateral	ODA	Grant	Adaptation	Multisector/ Cross-cutting	No	No
Totals	**12,593,007**	**20,749,535**										

CTF table III.4: Information on support for technology development and transfer provided under Article 10 of the Paris Agreement

Title	Recipient Country	Description and Objectives	Type of Support	Sector	Subsector	Type of Technology	Status / measure of Activity	Activity undertaken by
Myanmar Renewable Energy Programme	Myanmar	Increase access to affordable and reliable energy through support to ethnic communities to undertake best practise development of renewable energy production and connectivity in rural areas.	Mitigation	Energy	Energy policy and administrative management	Development of renewable energy resources; increasing renewable energy production and connectivity in rural areas.	Ongoing	Public sector institutions
Pacific Seeds for Life (PS4L)	Pacific Regional/ multi-country	Strengthen seed resistance to improve climate resilience and food security.	Adaptation	Agriculture	Agricultural development	Research, regulations, training, and awareness raising; improve in country seed and planting material production; and identify and promote open pollinated and clonal crop varieties of seed production across the region and at country level.	Ongoing	Public-Private partnerships and networks
Vaitupu Water Security	Tuvalu	Construct a well-managed ground-water resource that enables self-sufficiency for potable water during periods of drought.	Adaptation	Water and sanitation	Basic drinking water supply and basic sanitation	Construction of ground-water resource to combat drought	Ongoing	Multilateral organisations
Cambodia Climate Smart Commercial Horticulture	Cambodia	Increase climate-change resilience, farm and food safety, profitability, and market system support for small-scale commercial and semi-commercial horticulture farmers.	Adaptation	Agriculture	Food crop production	Climate change resilience, farm and food safety, profitability, and market system support.	Ongoing	Non-Governmental Organisation and Civil Society
Pacific Response to Coconut Rhinoceros Beetle	Pacific Regional/ multi-country	Development and release of a biocontrol to suppress new strain of Coconut Rhinoceros Beetle, support to introduce biosecurity and pest management plans.	Adaptation	Agriculture	Plant and post-harvest protection and pest control	Scientific development and release of a biocontrol	Ongoing	Public-Private partnerships and networks

Title	Recipient Country	Description and Objectives	Type of Support	Sector	Subsector	Type of Technology	Status / measure of Activity	Activity undertaken by
African Climate Smart Agriculture Initiative	Africa Regional/multi-country	Enable countries to develop effective technologies/practices to mitigate GHG emissions, and to build regional capability in agricultural emissions measurement.	Mitigation	Agriculture	Agricultural research	Increase engagement with the Global Research Alliance to develop and implement effective technologies / practices to mitigate greenhouse gas emissions	Ongoing	Public sector institutions
Enhanced Pacific Biosecurity Programme	Pacific Regional/ multi-country	Improve biosecurity systems and capability in the Pacific by applying a system wide approach enabling greater responsiveness for export pathway requests.	Adaptation	Agriculture	Plant and post-harvest protection and pest control	Improve biosecurity systems and capability	Ongoing	Public sector institutions
Reduce risk of water scarcity	Pacific Regional/ multi-country	Provide at-risk communities improvements to their water infrastructure to effectively manage water demand and supply.	Adaptation	Water and Sanitation	Water resources conservation	Water infrastructure maintenance, training and tools	Ongoing	Non-Governmental Organisations and civil society
Averting water-related emergencies	Pacific Regional/ multi-country	Supports Pacific Island Countries to anticipate and prepare for water-related emergencies through understanding their vulnerability to water-related hazards.	Adaptation	Humanitarian aid	Multi-hazard response preparedness	Early Warning Systems	Ongoing	Non-Governmental Organisations and civil society
Delivering the Water Promise 2030, Vanuatu	Vanuatu	Increases new recruits' skills, including using a training tracking tool; a school outreach component including to develop engineering career modules and teachers able to run the modules.	Adaptation	Water and Sanitation	Education and training in water supply	Training tracking tool, development of engineering career modules and upskilling teachers	Ongoing	Non-Governmental Organisations and civil society
Indonesia: Accelerating	Indonesia	Provision of technical assistance and capacity building to three Indonesian Partner agencies	Mitigation	Energy	Geothermal Energy	Support geothermal energy development and access to energy in Indonesia	Ongoing	Public-Private partnerships and networks

Title	Recipient Country	Description and Objectives	Type of Support	Sector	Subsector	Type of Technology	Status / measure of Activity	Activity undertaken by
Geothermal Development		focused on geothermal development.						
Indonesia: Improving Energy Access in Maluku	Indonesia	Support the uptake of affordable, reliable, and renewable energy in off-grid and grid-connected areas.	Mitigation	Energy	Energy policy and administrative management	The uptake of affordable, reliable and renewable energy in off-grid and grid-connected regions of Indonesia	Ongoing	Public sector institutions
Africa Geothermal Assistance Facility	Africa Regional/ multi-country	Reduces reliance on fossil fuels and expand access to affordable, reliable and clean energy in East Africa through the provision of targeted technical assistance for geothermal energy development and distribution in East Africa.	Mitigation	Energy	Geothermal Energy	Expanding access to affordable, reliable and clean energy	Ongoing	Public-Private partnerships and networks
Indonesia: Supporting Geothermal Sector Training	Indonesia	Increase workforce skills and capability in geothermal energy through targeted support to cover all aspects of on-job and off-job training for geothermal trades, technicians and plant operators in Indonesia.	Mitigation	Energy	Energy education/training	On and off-job training for geothermal trades, technicians and plant operators	Ongoing	Public-Private partnerships and networks
ASEAN: Lao and Cambodia Renewable Energy Facility	Asia Regional/multi-country	Provides technical assistance with the overall goal of increasing the beneficial use of renewable energy resources to support economic and social development	Mitigation	Energy	Energy policy and administrative management	Technical assistance to increase beneficial use of renewable energy resources	Ongoing	Public-Private partnerships and networks
Myanmar Resilient Horticulture	Myanmar	Supports the capacity and capability of a not-for-profit Myanmar agriculture agency to deliver extension support and agricultural solutions.	Adaptation	Agriculture	Food crop production	Deliver extension support and agricultural solutions to farmer clients	Ongoing	Public-Private partnerships and networks

Title	Recipient Country	Description and Objectives	Type of Support	Sector	Subsector	Type of Technology	Status / measure of Activity	Activity undertaken by
Water Sector Partnership 2017-2021	Vanuatu	Identify, map and prioritise water safety and security needs as well as develop water supply improvements, procure expertise and mobilise and manage funding to finance them.	Adaptation	Water and Sanitation	Basic drinking water supply and basic sanitation	Identify, map and prioritise water safety and security needs as well as develop water supply improvements, procure expertise and mobilise and manage funding to finance them.	Ongoing	Public sector institutions
Renewable Energy Initiative	Nauru	Constructs a 1.15 Megawatt solar photo-voltaic (PV) generation system, builds a connection to the existing network and provides technical assistance and capability building fund.	Mitigation	Energy	Energy generation, renewable sources	Construct a solar-phot-voltaic generation system	Ongoing	Public sector institutions
ASEAN Climate Smart Agriculture Initiative	Asia Regional/multi-country	Enable countries in ASEAN to increase engagement with the Global Research Alliance to develop technologies to mitigate GHG gas emissions, and build regional capability in agricultural emissions measurement.	Mitigation	Agriculture	Agricultural research	Mitigation of global agricultural greenhouse gas emissions and build regional capacity in agricultural emissions measurement.	Ongoing	Public sector institutions
Supporting Value Chain for Farmers	Ethiopia	Improve economic resilience and market opportunities by transitioning SHGs to a commercial model, establishing market links, introducing climate smart production practises and identifying and enhancing primary and post-harvest techniques.	Adaptation	Agriculture	Agricultural development	Transition Self Help Groups to commercial models, establishing market links, introducing climate smart production practises, and identifying and enhancing primary and post-harvest techniques	Ongoing	Non-governmental organisation and civil society
Climate and Oceans Support Program in the Pacific	Pacific Regional/ multi-country	Delivers sea level and geodetic monitoring project, climate data for the environment and seasonal prediction project.	Adaptation	Multisector/cross-cutting	Disaster risk reduction	Delivering three project components: a Pacific Sea Level and Geodetic Monitoring Project; Climate	Ongoing	Public sector institutions

Title	Recipient Country	Description and Objectives	Type of Support	Sector	Subsector	Type of Technology	Status / measure of Activity	Activity undertaken by
						Data for the Environment and a seasonal prediction project		
Caribbean Agriculture and Tourism Support	America Central Regional/multi-country	Supports research into technologies and value chains for the marine biomass. This will consist of an investigation of potential uses for the Sargassum.	Adaptation	Agriculture	Agricultural research	Technology to mitigate associated environmental and economic impacts of the Sargassum seaweed influx	Ongoing	Public sector institutions
Energy Efficiency	Nauru	Increases Nauru's economic resilience by increasing energy efficiency and therefore reducing the amount of fossil fuel that needs to be imported.	Cross-cutting	Energy	Energy conservation and demand-side efficiency	Technology to increase Nauru's economic resilience by increasing energy efficiency	Ongoing	Public sector institutions
Energy and Public Utility Reform	Kiribati	Provides water, sanitation and electricity to South Tarawa. This activity provide supports to PUB to build institutional capability and capacity.	Mitigation	Energy	Energy policy and administrative management	Build institutional capacity and capability	Ongoing	Public sector institutions
Information for decision-making	Pacific Regional/ multi-country	Support the incorporation of climate change information into all forms of government decision-making and planning.	Adaptation	Multisector/cross-cutting	Disaster risk reduction	Development of activities support a connected and usable platform of climate data, hazard and risk analysis	Ongoing	Public sector institutions
Indonesia: Accelerate Renewable Energy Transition	Indonesia	Addresses existing policy barriers and gaps to renewable energy investments that create sustainable and inclusive economic growth with lasting benefits for communities.	Mitigation	Energy	Energy sector policy, planning and administration	Addressing existing policy barriers and gaps to renewable energy investments	Ongoing	Public sector institutions
Meteorological Forecasting 2021-2025	Pacific Regional/ multi-country	This activity provides expert meteorological advice (relating to the annual Pacific cyclone season).	Mitigation	Humanitarian Aid	Multi-hazard response preparedness	Provision of expert meteorological advice	Ongoing	Public sector institutions

Title	Recipient Country	Description and Objectives	Type of Support	Sector	Subsector	Type of Technology	Status / measure of Activity	Activity undertaken by
Centre for Pacific Crops and Trees	Pacific Regional/ multi-country	The activity aims to ensure that farmers have access to pest, disease, drought and salt tolerant seeds and other planting materials, particularly of crops that have been traditionally grown in the Pacific.	Adaptation	Agriculture	Agricultural inputs	Pest, disease, drought and salt tolerant seeds and other planting materials	Ongoing	Public sector institutions
Climate Science for Ensuring Pacific Tuna Access	Pacific Regional/ multi-country	Development of advanced warning system to forecast climate induced tuna migration in the Pacific.	Adaptation	Fishing	Fishery research	Advanced warning systems and support of scientific infrastructure	Ongoing	Multilateral Organisation
Improving water security in Kiribati	Kiribati	Recruit and train two i-Kiribati WASH (water, sanitation and hygiene) officers to implement Drinking Water Safety and Security Planning.	Adaptation	Health	Basic health infrastructure	Recruitment and training of two water, sanitation and hygiene officers to implement drinking water safely and security planning in communities and households	Ongoing	Non-governmental organisation and civil society
ASEAN: Support to the Mekong River Commission	Asia Regional/multi-country	Promotes Lower Mekong communities' livelihoods, energy and food security needs are met through sustainable access to water.	Adaptation	Water and Sanitation	Water sector policy and administrative management	Sustainable access to water to promote livelihoods, energy and food security	Ongoing	Multilateral Organisation
Consultative Group for International Agricultural Research	Global	The Consultative Group on International Agricultural Research’s work includes science-based innovation, targeted capacity development and provision of policy advice.	Cross-cutting	Agriculture	Agricultural research	Science-based innovation, targeted capacity development and provision of policy advice across three action areas: food, land and water system transformation; resilient agrifood systems; and genetic innovation.	Ongoing	Multilateral Organisation

CTF table III.5:Information on capacity-building support provided under Article 11 of the Paris Agreement

Title	Recipient Entity	Description and Objectives	Type of Support	Status or measure of activity
Climate and Oceans Support Program in the Pacific	Pacific Regional/ multi-country	Delivers a sea level and geodetic monitoring project, climate data and a seasonal prediction project.	Adaptation	Ongoing
Disaster Risk Management in Fiji	Fiji	Provides; (a) technical assistance to the National Disaster Management Office DMO; (b) upgrade of tsunami and flood protection systems; and (c) construction of warehouses and evacuation centres.	Adaptation	Ongoing
Support to the Pacific Climate Change Centre	Pacific Regional/ multi-country	Supports the Japan International Cooperation Agency (JICA), who are funding the construction of the PCCC, and will focus on human resources and capacity development support.	Cross-cutting	Ongoing
Pacific Public Sector Strengthening	Pacific Regional/ multi-country	Supports public sector reform initiatives, develop Pacific-specific solutions and support Pacific Public Service Commissions to share knowledge and experience across the region.	Adaptation	Ongoing
Energy and Public Utility Reform	Kiribati	Supports to Public Utilities Board in Kiribati to build institutional capability and capacity for the provision of water, sanitation and electricity.	Mitigation	Ongoing
Pacific Regional NDC Hub	Pacific Regional/ multi-country	Provides support to the Pacific Regional NDC Hub which has been established to help Pacific Island countries enhance and implement their Nationally Determined Contributions under the Paris Agreement.	Cross-cutting	Ongoing
Integrated Water Resources Management - Tuvalu	Tuvalu	Supports drought management plans, water and sanitation policy development and drought modelling.	Cross-cutting	Ongoing
Ecosystems Resilience	Pacific Regional/ multi-country	Supports the maintenance and restoration of ecosystem services for food security, coastal protection and disaster risk reduction, to enable climate change adaptation.	Cross-cutting	Ongoing
Mainstreaming Climate Change in Governance	Pacific Regional/ multi-country	Mainstreams climate change into existing governance systems for planning, budgeting and programme management purposes.	Cross-cutting	Ongoing

Title	Recipient Entity	Description and Objectives	Type of Support	Status or measure of activity
African Climate Smart Agriculture Initiative	Africa Regional/multi-country	Enables the development and implementation of effective technologies to mitigate global agricultural greenhouse gas emissions, and build capability in agricultural emissions measurement.	Mitigation	Ongoing
Information for decision-making	Pacific Regional/ multi-country	Supports a connected and usable platform of climate data, hazard and risk analysis to aid decision-making.	Adaptation	Ongoing
East Africa: Farm to Market Alliance (FtMA)	Africa Regional/multi-country	Sustainably improves farmer livelihoods whilst fostering commercial viability of value chain stakeholders.	Adaptation	Ongoing
Enhanced Pacific Biosecurity Programme	Pacific Regional/ multi-country	Improve biosecurity systems and capability in the Pacific by increasing responsiveness to Pacific requests for export pathways to New Zealand.	Adaptation	Ongoing
Reduce risk of water scarcity	Pacific Regional/ multi-country	Enables communities to effectively manage water resources, water demand and supply and to mitigate risks.	Adaptation	Ongoing
Averting water-related emergencies	Pacific Regional/ multi-country	Supports preparation for water-related emergencies through understanding their vulnerability to water-related hazards and informing vulnerable communities so they can anticipate and respond.	Adaptation	Ongoing
Building resilient water management systems	Pacific Regional/ multi-country	Improves integration of water resource management approaches and national and regional coordination to enhance investment in water sector.	Adaptation	Ongoing
Low Emission, Climate Resilient Planning	Pacific Regional/ multi-country	Supports Pacific Island countries to develop climate change related strategies, policies, and planning frameworks.	Cross-cutting	Ongoing
Food Security and Ecosystem Resilience funds	Pacific Regional/ multi-country	Enables greater resilience to the impacts of climate change and natural disasters, through improved food security.	Cross-cutting	Ongoing
Save the Children New Zealand (SCNZ)	Worldwide/multi-regional	Builds resilience to disasters and climate risk through safe schools and ensures that families can meet health, nutrition and educational needs.	Adaptation	Ongoing
Rural WASH Programme, Fiji	Fiji	Addresses low levels of rural sanitation provision in Fiji by building capacity and confidence of sanitation designers.	Adaptation	Ongoing
Polynesian Climate and Community Resilience	Pacific Regional/ multi-country	Increases understanding of marine ecosystems, climate change threats and mitigations, contributes to implementing ocean and climate policies.	Adaptation	Ongoing

Title	Recipient Entity	Description and Objectives	Type of Support	Status or measure of activity
Sustainable Fisheries Management in Fiji	Fiji	Improves in-shore sustainable fishery management knowledge to enhance livelihoods and promote sustainable fisheries.	Adaptation	Ongoing
Delivering the Water Promise 2030, Vanuatu	Vanuatu	Upskills new recruits, including using a training tracking tool; a school outreach component including to develop engineering career modules and teachers able to run the modules.	Adaptation	Ongoing
Oxfam (ONZ) Implementation	Pacific Regional/ multi-country	Ensures women (including those also in other groups facing marginalisation) are resilient, and have greater wellbeing and agency in the face of climate breakdown and disasters.	Adaptation	Ongoing
Enhancing Climate Resilience in Timor-Leste	Timor-Leste	Delivers improved marine protection and management, improved livelihoods and resilience of fishers, as well as climate-sensitive, shared fisheries management between Timor-Leste and Indonesia.	Adaptation	Ongoing
Kiribati Water	Kiribati	Improves access for communities to reliable, safe water in Kiribati through investing in infrastructure and capacity / management strengthening.	Adaptation	Ongoing
Africa Geothermal Assistance Facility	Africa Regional/multi-country	Provides targeted technical assistance for geothermal energy development and distribution in East Africa.	Mitigation	Ongoing
ASEAN: Lao and Cambodia Renewable Energy Facility	Asia Regional/multi-country	Provides technical assistance with the overall goal of increasing the beneficial use of renewable energy resources to support economic and social development in Lao PDR.	Cross-cutting	Ongoing
Water Sector Partnership 2017-2021	Vanuatu	Works with communities across Vanuatu to identify, map and prioritise water safety and security needs, and to develop water supply improvement projects.	Adaptation	Ongoing
Renewable Energy Initiative	Nauru	Constructs a 1.15 Megawatt solar-voltaic generation system and builds a connection to the existing transmission network. Also provides technical assistance and a capability building fund.	Mitigation	Ongoing
ASEAN Climate Smart Agriculture Initiative	Asia Regional/multi-country	Develops and implements effective technologies/practices to mitigate global agricultural greenhouse gas emissions, and to build regional capability in agricultural emissions measurement.	Mitigation	Ongoing

Title	Recipient Entity	Description and Objectives	Type of Support	Status or measure of activity
RMI Electricity Roadmap Programme Manager	Marshall Islands	Supports the roll out of the Electricity Roadmap including the technology pathway, the policy and regulatory needs, long-term human resource strategy, and a long-term financing strategy.	Cross-cutting	Ongoing
Vanuatu Water Sector Partnership - Phase II	Vanuatu	Increases sustainable and equitable access to improved, safe water.	Adaptation	Ongoing
Indonesia: Accelerate Renewable Energy Transition	Indonesia	Addresses existing policy barriers and gaps to renewable energy investments that create sustainable and inclusive economic growth with lasting benefits for communities.	Mitigation	Ongoing
Samoa Tourism Recovery and Resilience	Samoa	Supports product development, training, marketing, sustainability and resilience, and capacity building.	Cross-cutting	Ongoing
Centre for Pacific Crops and Trees	Pacific Regional/ multi-country	Ensures access to climate resilient varieties of seeds and plants, improving livelihoods by increasing yields and production.	Adaptation	Ongoing
Cambodia: Angkor Water Resilience Project	Cambodia	Strengthens water infrastructure and providing livelihood support to communities located in the north, west and south-east of Angkor Park, Cambodia.	Adaptation	Ongoing
Climate Science for Ensuring Pacific Tuna Access	Pacific Regional/ multi-country	Develops an advanced warning system to forecast climate-induced tuna migration, integrates Tokelau into the advanced warning system and support key regional scientific infrastructure.	Adaptation	Ongoing
Hybrid Food + Agribusiness STTS ASEAN/Timor-Leste	Asia Regional/multi-country	Equips scholars with the concepts, principles, and tools they need to leverage value chain approaches to enhance agri-food systems.	Cross-cutting	Ongoing
Climate Resilience, Fiji & Cook Islands	Pacific Regional/ multi-country	Enables the conditions (especially for youth) to sustainably manage their resources using customary approaches.	Adaptation	Ongoing
Improving water security in Kiribati	Kiribati	Supports the recruitment and training of two officers to implement drinking water safety and security, focused on the islands with highest drinking water vulnerability.	Adaptation	Ongoing
Lao PDR: NATURA	Laos	Promotes ecosystems resilience, raises awareness and builds capacity amongst government officials and community leaders and members and develops a research and evidence base.	Adaptation	Ongoing

Title	Recipient Entity	Description and Objectives	Type of Support	Status or measure of activity
Ocean Acidification Partnership	Pacific Regional/ multi-country	Supports communities in Kiribati, Tokelau and Fiji to better adapt to the impacts of climate change-induced ocean acidification through support for research and community-based Adaptation actions.	Cross-cutting	Ongoing
Consultative Group for International Agricultural Research	Global	Supports science-based innovation, targeted capacity development and provision of policy advice, across its three main action areas: food, land and water system transformation; resilient agrifood systems; and genetic innovation.	Cross-cutting	Ongoing
Alliance of Small Island States	Global	Supports a stronger SIDS voices on development during international meetings and improve collaboration with Caribbean and Pacific SIDS on climate change, development and oceans issues.	Cross-cutting	Ongoing
Recognised Employer Scheme Worker Training	Global	Supports Pacific workers under the Scheme by providing access to skills training such as numeracy, English language and other 'life-skills'.	Adaptation	Ongoing

Annex 2: Land Use, Land-Use Change and Forestry (LULUCF) accounting methodology

A2.1 General information

A2.1.1 Context

This section describes New Zealand's accounting methodology for greenhouse gas emissions from the Land Use, Land-Use Change and Forestry (LULUCF) sector. New Zealand's accounting approach for the LULUCF sector recognises additional action. It creates incentives for the establishment of new forests, recognises permanent, long-term enhancements of carbon sinks resulting from forest management activities, and takes responsibility for deforestation, while accommodating the long-term cycles in net emissions and removals that arise from management of production forests.

New Zealand is applying an activity-based accounting approach to the net emissions accounted for from the LULUCF sector for its first Nationally Determined Contribution (NDC1). New Zealand elected to account for emissions from the following LULUCF activities: *Afforestation and reforestation*, *Deforestation* and *Forest management*. The methods applied to estimate accounting quantities adhere to the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) (IPCC, 2006a) and the 2013 Kyoto Protocol Supplement (IPCC, 2014). The methods take a country-specific approach to account for emissions from *Afforestation and reforestation* activities, as communicated in New Zealand's updated NDC1 under the Paris Agreement.[320]

Afforestation and reforestation activities

To address the effects of age-class structure and account only for the long-term additional carbon sequestered in forests established from the activity start year (1990), these forests are accounted for up until they attain their long-term average (LTA) carbon stock. No further carbon gains or losses are accounted for once these forests reach their LTA, taking into account all carbon pools and activities. The net emissions from these forests above the LTA are instead tracked separately to quantify deviations from an emissions pathway consistent with attaining the LTA carbon stock. Emissions and removals from these forests will balance out to the LTA under business-as-usual management over time. Emissions and removals from *Afforestation and reforestation* activities will be reconciled against the LTA to ensure it accurately reflects the long-term removals being accounted for from these activities at the end of NDC1. This may include a recalculation of the LTA to reflect actual harvest rates occurring during the commitment period.

320 Submission under the Paris Agreement New Zealand's first Nationally Determined Contribution Updated 4 November 2021.

Deforestation activities

New Zealand continues to fully account for emissions from all deforestation activities.

Natural disturbances and harvested wood products

Accounting provisions to address natural disturbances on managed lands, non-anthropogenic effects and additionality since the activity start year are applied, building on existing guidance. Accounting for harvested wood products (HWP) is based on the production approach.

A2.1.2 Emissions summary

Forest management activities

To address the effects of age-class structure, forests established before the activity start year (1990) are accounted for under a business-as-usual reference level. For planted forests, the reference level addresses the dynamic effects of age-class structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal forest management in production forests.

New Zealand's net emissions from LULUCF activities for the period reported to date

In 2021 and 2022, net emissions from land subject to *Afforestation and reforestation*, *Forest management* and *Deforestation* activities were –25,869.2 and –24,746.7 kilotonnes carbon dioxide equivalent (kt CO_2e) respectively (table A2.1). Note these are not the accounting quantities for these activities. Accounting quantities are presented in table A2.3.

Table A2.1: Net emissions and area by activity

		2021	2022
Afforestation and reforestation	Net cumulative area since 1990 (ha)	825,951	909,130
	Area in calendar year (ha)	55,069	86,437
	Net emissions (kt CO_2e)	**–10,824.4**	**–8,576.1**
Deforestation	Net cumulative area since 1990 (ha)	237,802	241,892
	Area in calendar year (ha)	4,849[P]	4,089[P]
	Net emissions (kt CO_2e)	**3,170.8**	**2,429.4**
Forest management	Area included (ha)	9,187,215	9,186,383
	Net emissions (kt CO_2e)	**–18,215.6**	**–18,600.0**
Total area included (ha)		**10,250,968**	**10,337,405**
Total net emissions in calendar year (kt CO_2e)		**–25,869.2**	**–24,746.7**

Note: P = provisional figure. Where net emissions result in removals, they are expressed as a negative value as per section 2.2.3 of the 2006 IPCC Guidelines (IPCC, 2006a). Columns may not total due to rounding.

Net emissions from *Afforestation and reforestation* activities include:

- net emissions from the growth of forest established during or after 1990 (post-1989 forests)
- emissions from the decay of post-1989 forest harvest residues
- emissions and removals from HWP derived from post-1989 forests

- emissions from the conversion of land to post-1989 forest (biomass losses from previous land use and soil carbon changes)
- carbon dioxide (CO_2) emissions from biomass burning
- emissions associated with changes in soil carbon.

Net emissions from *Deforestation* activities include:

- emissions from deforestation of all forest land. This includes deforested pre-1990 planted forests, post-1989 forests and pre-1990 natural forests
- biomass and soil emissions and removals from the conversion of forest to another land use.

Net emissions from *Forest management* activities include:

- net emissions from the growth of forests that existed on 31 December 1989 that have not been deforested (pre-1990 forests)
- emissions from harvesting of pre-1990 forests
- emissions from the decay of pre-1990 forest harvest residues
- emissions and removals from HWP derived from pre-1990 forests
- CO_2 emissions from biomass burning
- emissions from the drainage of managed soils on land classified under *Forest management*
- emissions associated with changes in soil carbon from the conversion between pre-1990 natural and planted forest types.

Non-CO_2 emissions are incorporated in the emissions totals for each activity and include:

- emissions from biomass burning
- emissions from the mineralisation of soil nitrogen and the emissions from the drainage of managed soils associated with afforestation, reforestation or deforestation activities since 1990.

Note that annual net emissions reported here are around 3 million tonnes (Mt) CO_2e lower than the corresponding emissions reported in the *New Zealand Greenhouse Gas Inventory 1990–2022* (Inventory 2024) (Ministry for the Environment, 2024). This is due to differences in what is reported in the HWP pool and what is accounted for. In the case of *Forest management*, emissions from HWP originating from forests harvested before 2013 are excluded as are the HWP derived from wood originating from *Deforestation* activities. This is in line with the 2013 Kyoto Protocol Supplement (IPCC, 2014). For further information, see section A2.3.5.

New Zealand's net greenhouse gas emissions by gas type for each LULUCF activity for the period reported to date

Table A2.2 provides a breakdown of New Zealand's net emissions for 2021 and 2022, by greenhouse gas type for the LULUCF activities accounted for towards New Zealand's NDC1. Note these are not the accounting quantities for these activities, which are presented in table A2.3.

Table A2.2: Net emissions (kilotonnes (kt)) for each activity by greenhouse gas, and their carbon dioxide equivalent (CO_2e) for the 1 January 2021 to 31 December 2022 period

	Net emissions for 1 Jan 2021–31 Dec 2022 (kt)		
Greenhouse gas by activity	**Gas**	**Net emissions**	**Total CO_2e**
Emissions from Afforestation and reforestation	CO_2	–19,638.4	–19,638.4
Emissions from Deforestation	CO_2	5,565.9	5,565.9
Emissions from Forest management	CO_2	–36,949.4	–36,949.4
Emissions from soil nitrogen associated with land-use change	N_2O	1.2	327.4
Biomass burning	CH_4	2.0	55.5
Biomass burning	N_2O	0.1	23.3
Net emissions			**–50,615.9**

Note: Columns may not total due to rounding.

A2.1.3 Accounting summary

New Zealand will finalise the LULUCF accounting quantity for NDC1 at the end of the accounting period, and until then the LULUCF accounting quantity will be provisional. The accounting quantity comprises:

1. net emissions from the growth of *Afforestation and reforestation* forests up to their LTA carbon stock
2. net emissions from *Deforestation*
3. net emissions from *Forest management* activities relative to a pre-1990 forest reference level (FRL). The pre-1990 FRL is set using a business-as-usual projection of emissions for *Forest management* activities over the period to 2030. It represents the estimated annual average net emissions between 2021 and 2030.

The provisional LULUCF accounting quantity reported in this submission, and shown in table A2.3, comprises net emissions from the growth of *Afforestation and reforestation* forests up to their long-term average carbon stock and all net emissions from *Deforestation*, but does not include net emissions from *Forest management*. This is because the pre-1990 FRL will be technically corrected in future years to account for the reduction in the total forest area occurring as a result of deforestation (to avoid double-counting deforestation emissions) and to maintain methodological consistency. The final Biennial Transparency Report submitted for NDC1 (ie, the fifth Biennial Transparency Report) will include accounting of net emissions from *Forest management* activities against the pre-1990 FRL.

The provisional accounting quantity for 2021 is –6,067.3 kt CO_2e and the provisional accounting quantity for 2022 is –5,279.5 CO_2e (excluding *Forest management*).

Table A2.3: New Zealand's provisional accounting quantities for 2021 and 2022

		Emissions (kt CO_2e)		
Net emissions by activity		**2021**	**2022**	**Total**
Afforestation and reforestation		–10,824.4	–8,576.1	–19,400.5
Deforestation		3,170.8	2,429.4	5,600.2
Forest management		–18,215.6	–18,600.0	–36,815.5
Total net emissions in calendar year		**–25,869.2**	**–24,746.7**	**–50,615.9**
Excluded emissions from natural disturbances		–	–	–

Provisional accounting quantities by activity		Emissions (kt CO_2e)		
Afforestation and reforestation	Below long-term average accounting emissions	−9,238.1	−7,708.9	−16,947.0
	Cumulative emissions	**−9,238.1**	**−16,947.0**	**−16,947.0**
Deforestation	Deforestation	3,170.8	2,429.4	5,600.2
	Cumulative emissions	**3,170.8**	**5,600.2**	**5,600.2**
Forest management	Reference level	−18,566.1	−18,566.1	−37,132.2
	Annual emissions against reference level	350.5	−33.8	316.7
Accounting quantity	**Excluding Forest management**	**−6,067.3**	**−5,279.5**	**−11,346.8**

A2.1.4 Definitions of forest land

New Zealand is using the same *Forest land* definition for accounting for NDC1 as that used in Inventory 2024 (Ministry for the Environment, 2024), and previously for accounting under the Kyoto Protocol. Table A2.4 provides the defining parameters for *Forest land*.

Table A2.4: Parameters defining *Forest land* in New Zealand

Forest parameter	New Zealand selected value
Minimum land area (ha)	1
Minimum crown cover (%)	30
Minimum height (m)	5

New Zealand also uses a minimum forest width of 30 metres, which excludes linear shelterbelts from the *Forest land* category. Linear shelterbelts can vary in width and height, because they are trimmed and topped from time to time. Further, they form part of non-forest land uses, namely *Cropland* and *Grassland*, as shelter for crops and/or animals.

For reporting under the Paris Agreement and United Nations Framework Convention on Climate Change, New Zealand has categorised its forests into four types: pre-1990 natural forest, pre-1990 planted forest, post-1989 natural forest and post-1989 planted forest. Post-1989 planted forest is subdivided into production forest – planted for wood supply and undergoing a regular cycle of harvesting and replanting, and permanent forest – planted for carbon storage and/or for other ecosystem services, such as erosion control.

For all post-1989 forests that have not been deforested, emissions and removals from carbon losses and gains are reported under *Afforestation and reforestation* activities.[321] These activities are further subdivided into *Afforestation and reforestation Below LTA* for forests with carbon stocks below the age when the long-term average carbon stock is reached, and *Afforestation and reforestation Above LTA* for post-1989 forests above the age when the long-term average carbon stock is reached. Forests remain in the *Afforestation and reforestation Below LTA* category until the end of the year in which they reach the 'LTA age' (see section A2.3.2).

Emissions from deforestation events in all forest types are reported and accounted for under *Deforestation* activities.

321 Including emissions from harvesting of post-1989 forest.

For all pre-1990 forests that have not been deforested, emissions and removals from carbon losses and gains are reported under *Forest management* activities. Emissions and removals from the harvest and conversion of forest plantations and establishment of new forests that satisfy the definition of carbon equivalent forests as specified in section 2.7.7.2 of the 2013 Kyoto Protocol Supplement (IPCC, 2014) are reported under *Forest management*.

The definition of forest used for reporting to the Food and Agriculture Organization is currently different from that used for reporting under the United Nations Framework Convention on Climate Change and the Paris Agreement. For reporting to the Food and Agriculture Organization, New Zealand has subdivided forests into two estates based on their biological characteristics, the management regimes applied to the forests and their respective roles and national objectives (Ministry of Agriculture and Forestry, 2002). The two estates are indigenous and planted production forest. The indigenous estate is included within the pre-1990 natural forest as reported in this submission. The planted production forest area largely equates to the productive area in pre-1990 planted forest and post-1989 planted forest.

A2.1.5 Activity tracking

In 2022, *Afforestation and reforestation*, *Deforestation* and *Forest management* activities covered 10,337,405 hectares, or 38.4 per cent, of New Zealand's total land area.

Allocation of land parcels to the correct activity is achieved by tracking areas during the land use mapping and emissions calculation processes.

Once a forest area has been identified as deforested, it remains reported in this category. Therefore, all subsequent stock changes, emissions and removals on this land are reported under *Deforestation*. The process for identification of deforested land is outlined in section A2.5.2.

Areas subject to the carbon equivalent forest provision are also tracked during the land use mapping and are reported under *Forest management* (see sections A2.2.2 and A2.3.4, for more detail).

Areas of *Afforestation and reforestation* land remain in the *Below LTA* subcategory until the end of the year that they reach the LTA, then they transition into the *Afforestation and reforestation Above LTA* subcategory.

Table A2.5 shows the movement of land between activity categories during the first two years of NDC1 from 1 January 2021 to 31 December 2022.

Table A2.5: Area changes between activity categories between 1 January 2021 and 31 December 2022 (kilohectares (kha))

To 31 Dec 2022	From 1 Jan 2021 A & R Below LTA	A & R Above LTA	Deforestation	Forest management	Inventory only*	Areas as at 31 Dec 2022 (kha)
A & R Below LTA	446.6	NA	NA	NA	141.5	588.1
A & R Above LTA	78.3	242.7	NA	NA	NA	321.0
Deforestation	1.5	4.4	233.0	3.0	NA	241.9
Forest management	NA	NA	NA	9,186.4	NA	9,186.4
Inventory only*	NA	NA	NA	NA	16,587.7	16,587.7
Areas as at 1 Jan 2021 (kha)	**526.4**	**247.1**	**233.0**	**9,189.4**	**16,729.2**	**26,925.1**
Net change 1 Jan 2021 –31 Dec 2022 (kha)	**61.7**	**73.9**	**8.9**	**–3.0**	**–141.5**	
Net change 1 Jan 2021 –31 Dec 2022 (%)	**11.7**	**29.9**	**3.8**	**0.0**	**–0.8**	

*Inventory only refers to non-forest land that is included in New Zealand's Greenhouse Gas Inventory of all land-based emissions but is not eligible for inclusion in the activities accounted for in New Zealand's NDC1.

Note: A & R = Afforestation and reforestation; LTA = long-term average; NA = not applicable.

A2.2 Land-related information

A2.2.1 Spatial assessment unit

New Zealand is using a minimum mapping unit of 1 hectare.

A2.2.2 Methodology for land transition matrix

The land transition matrix is derived from a combination of:

- wall-to-wall land use mapping completed every five years
- deforestation mapping completed every two years
- forest survey data
- interpolation and extrapolation of trends to obtain annual land transitions.

For the period from 1990 to 2022, land transitions are derived from the following data sources:

- the 1990, 2008, 2012, 2016 and 2020 land use maps (Ministry for the Environment, 2024)
- an estimate of total afforestation for planted forest for 2017 to 2022 is based on the National Exotic Forest Description (NEFD) (Ministry for Primary Industries, 2023a)
- the annual area of afforestation of post-1989 natural forest for 2017 to 2021 is estimated from the Ministry for Primary Industries afforestation scheme data
- the area of post-1989 natural afforestation for 2022 is estimated from the *Afforestation and Deforestation Intentions Survey* for 2020 by taking the total area of 'natural reversion' and 'indigenous tall planted' (Manley, 2023)

- for post-1989 natural forest dominated by wilding exotic conifers, a linear extrapolation of the mapped area of land-use change between 2012 and 2016 (for this forest type) was used to estimate afforestation for 2017 to 2022
- deforestation mapping for 2008 to 2020
- estimates of 2021 and 2022 planted forest deforestation based on extrapolation of the planted forest deforestation trend occurring over the period 2014 to 2020
- estimates of 2021 and 2022 natural forest deforestation calculated as the average of the three previous mapped years (2017 to 2020).

Due to the land use category definitions used by New Zealand, which split forests established before 1990 from those established after 1989 (section A2.1.4), the land transition matrix is derived from the sequence of land-use changes occurring through the reporting period. Using the 1990 land use map as the baseline, areas of deforestation are tracked through time to ensure that, regardless of subsequent land-use change, the net emissions that occur on the deforested land are reported under *Deforestation*. Where a pre-1990 planted forest is harvested and converted to another land use under the carbon equivalent forest provision, the land is tracked spatially and its net emissions are reported under *Forest management*, as are the areas and net emissions due to the new forest that was established to compensate for the harvested and converted forest.

The relationship between mapped land-use changes and activities reported under *Afforestation and reforestation*, *Deforestation* and *Forest management* is shown in table A2.6.

Table A2.6: Relationship between mapped land-use changes and LULUCF activities accounted for towards NDC1

Initial \ Final	Pre-1990 natural forest	Pre-1990 planted forest	Post-1989 forest	Grassland	Cropland	Wetland	Settlements	Other land
Pre-1990 natural forest	FM	FM	NA	D	D	D	D	D
Pre-1990 planted forest	FM	FM	NA	D/FM	D/FM	D/FM	D/FM	D/FM
Post-1989 forest	NA	NA	A	D	D	D	D	D
Grassland	*D	*D	A/FM					
Cropland	*D	*D	A/FM					
Wetland	*D	*D	A/FM					
Settlements	*D	*D	A/FM					
Other land	*D	*D	A/FM					

Note: A = *Afforestation and reforestation*; D = *Deforestation*; FM = *Forest management*; A/FM indicates that a forest establishment activity could be accounted for under *Forest management* if the land is subject to the carbon equivalent forest provision; D/FM indicates that a forest harvest and conversion activity could be accounted for under *Forest management* if the land is subject to the carbon equivalent forest provision; 'NA' denotes land-use changes that are not applicable given the land use definitions; '*D' denotes land-use changes that are valid only if the land was forested at 1990, in which case the land use transition is accounted for under deforestation (eg, pre-1990 planted forest converted to grassland since 1990 that is later converted back to pre-1990 planted forest would be reported under *Deforestation*).

Further information on the mapping of land-use change and the estimation of the total area of afforested and reforested land occurring between 1990 and 2022 can be found in annex 5.2 Inventory 2024 (Ministry for the Environment, 2024).

Accurate classification of pre-1990 forest is essential to correctly determine the area reported as afforested and reforested in the land transition matrix. Satellite imagery at various dates near to 1990 and mapping from the New Zealand Emissions Trading Scheme (NZ ETS) have been used to ensure these forests are classified correctly. This process is also shown in annex 5.2 of Inventory 2024 (Ministry for the Environment, 2024).

Transitions to *Deforestation* are based on deforestation mapping to 2020 and estimates of deforestation by forest type for 2021 and 2022. In both cases, the identification of the forest type allows the transitions from *Afforestation and reforestation* (post-1989 forest) to *Deforestation* and *Forest management* (pre-1990 forest) to *Deforestation* to be identified.

A2.2.3 Identifying geographical locations

New Zealand uses wall-to-wall mapping, completed every four to five years, with national statistics and ancillary mapping data in the intervening years to estimate afforested, reforested and deforested land areas (Ministry for the Environment, 2024).

Included in New Zealand's geographical extent are the following uninhabited offshore islands: Kermadec Islands, Three Kings Islands and subantarctic islands (Auckland Islands, Campbell Island, Antipodes Islands, Bounty Islands and Snares Islands). These islands are protected conservation sites with a total area of 74,052 hectares. They are not subject to land-use change and are therefore reported in a steady state of land use.

A2.3 Activity-specific information

A2.3.1 Estimating carbon stock change

Emissions and removals from *Afforestation and reforestation*, *Deforestation* and *Forest management* activities are estimated using the Land Use and Carbon Analysis System (LUCAS) forest plot network for each type of forest (pre-1990 natural forest, pre-1990 planted forest, post-1989 planted forest and post-1989 natural forest). Carbon analyses are performed to estimate the carbon stored per hectare per pool and are described in chapter 6, section 6.1.2 and section 6.4.2 of Inventory 2024 (Ministry for the Environment, 2024). For planted forests, yield tables are derived from the forest plot data (Paul et al, unpublished). Survey and scheme data (Manley, 2023; Ministry for Primary Industries, 2023a) provide other important inputs to model forest age, harvest age and harvest age profiles (see annex 5, section A5.2.5 for Inventory 2024 (Ministry for the Environment, 2024)).

A2.3.2 Afforestation and reforestation

Between 1990 and 2022, it is estimated that 970,700 hectares of new forest (post-1989 forest) were established as a result of *Afforestation and reforestation* activities (table A2.7). The net area of post-1989 forest (calculated from the total area of new forest planted since 31 December 1989 minus the deforestation of post-1989 forest since 1 January 1990) as at the end of 2022 was 909,130 hectares. Net emissions from this land were –10,824.4 kt CO_2e in 2021 and –8,576.1 kt CO_2e in 2022. Of the total area afforested or reforested between 1990 and 2022, an estimated 61,570 hectares were deforested (table A2.7). The emissions for this area are reported under *Deforestation*.

Table A2.7: New Zealand's estimated annual area (hectares)+ under *Afforestation and reforestation* from 1990 to 2022

Year	Post-1989 planted forest		Post-1989 natural forest	Harvesting	Deforestation	Net cumulative area
	Production	Permanent				
1990	12,898	813	981	–	–	14,692
1991	12,580	793	1,145	–	–	29,210
1992	41,069	2,584	1,309	–	–	74,171
1993	50,333	3,170	1,145	–	–	128,819
1994	80,246	5,054	981	–	–	215,101
1995	60,451	3,803	818	–	–	280,173
1996	68,501	4,303	818	–	–	353,795
1997	52,167	3,279	2,619	–	–	411,859
1998	41,855	2,635	2,944	–	–	459,293
1999	32,702	2,059	3,271	–	–	497,325
2000	27,579	1,729	4,089	–	–	530,722
2001	24,590	1,549	4,907	–	–	561,768
2002	18,043	1,137	3,926	–	820	584,053
2003	16,244	1,024	4,416	–	2,586	603,152
2004	8,653	546	5,888	–	2,376	615,862
2005	4,926	309	6,870	200	2,703	625,264
2006	2,122	134	7,851	500	2,317	633,054
2007	1,959	124	7,360	500	5,562	636,936
2008	2,608	169	1,765	571	1,187	640,290
2009	5,873	382	1,722	707	2,078	646,189
2010	8,195	532	1,722	1,208	1,775	654,864
2011	16,389	1,065	1,722	1,555	2,269	671,771
2012	15,706	1,020	1,722	1,195	1,745	688,475
2013	5,884	377	2,120	3,099	2,949	693,906
2014	4,436	288	2,116	2,467	3,537	697,210
2015	4,439	288	2,116	3,671	2,794	701,259
2016	2,133	137	2,116	5,653	3,859	701,785
2017	4,632	301	4,687	9,924	4,773	706,632
2018	5,489	357	4,108	14,806	4,861	711,725
2019	19,552	1,269	5,242	17,239	2,736	735,053
2020	35,968	2,336	4,909	18,875	4,710	773,556
2021	48,003	3,118	3,947	19,557	2,674P	825,951
2022	74,710	4,853	6,874	21,428	3,258P	909,130
Total	**810,935**	**51,536**	**108,230**	**123,154**	**61,570**	**909,130**

Note: P = provisional figure; + = gross area including forestry roads and other unstocked areas in forestry land use. Columns may not total due to rounding. Net cumulative area represents the total cumulative forest area under *Afforestation and reforestation* in any given year including additions for areas of new planting and subtractions for areas of deforestation. The area of harvest does not contribute to the annual change in net cumulative forest area.

Averaging accounting approach

Emissions and removals from *Afforestation and reforestation* activities are accounted for until the forests attain their LTA carbon stock, taking into account all carbon pools. Thereafter, emissions and removals from these activities are tracked to ensure emissions and removals balance out over the long term under business-as-usual management.

At the end of NDC1, the actual emissions from *Afforestation and reforestation* activities will be reconciled with the emissions included in the averaging approach. Further work is planned to determine whether this will be done via a post-1989 FRL or by recalculating the LTA carbon stock at the end of the commitment period.

The LTA carbon stock is defined as the long-term average carbon stock per hectare that would be maintained (on average) across all biomass carbon pools under current management conditions. For planted forests managed under a clear-fell rotation regime (rotational planted forests), the LTA carbon stock refers to the carbon stocks of all carbon pools when averaged out over multiple rotations under current management. This includes the HWP pool resulting from the harvest of these forests. The 'LTA age' is the age at which this long-term average carbon stock is achieved, which is assumed to be an equilibrium point about which future losses and gains balance out to zero over subsequent harvest and replanting cycles, as long as current management continues.

For forests that do not undergo harvesting, such as post-1989 permanent planted forests and post-1989 natural forests, the LTA age is assumed to be over 40 years, therefore they will remain in the *Below LTA* subcategory throughout NDC1 (Wakelin, unpublished(a)).

By contrast, post-1989 rotational planted forests, which include various species with different average rotation lengths (table A2.8), have a combined LTA age of 23 years and transition from the *Below LTA* subcategory to the *Above LTA* subcategory at the end of their 23rd year. This age has been estimated in an LTA model that calculates carbon stock changes over eight rotations (Dovey and Wakelin, unpublished). This model takes the following inputs:

- forest management and growth rates for three separate species groupings: radiata pine, Douglas fir and other softwoods, and hardwoods, each represented by yield tables derived from the LUCAS forest plot network (Paul et al, unpublished)
- proportions of species groups, from the LUCAS post-1989 forest plot network (Ministry for the Environment, 2024)
- harvest age, derived from a combination of national forest survey data and industry studies (Ministry for Primary Industries, 2023a)
- lifespan of wood products and discard curves from New Zealand's HWP model (Wakelin, unpublished(b))
- proportion of domestically processed and exported roundwood and allocation of roundwood to different export markets (defined as the average over the past five years of available data, 2018 to 2022; Dovey and Wakelin, unpublished)
- decay rates for woody debris used in the LUCAS Calculation and Reporting Application (CRA) (Ministry for the Environment, 2024).

Table A2.8: Estimated average harvest age and proportion of forest species included in the rotational plantation forest long-term average

Forest species	Estimated average harvest age (years)	Proportion (%)
Radiata pine	28	82.4
Douglas fir and other softwoods	40	11.6
Hardwoods	30	5.8

The underlying principle of the LTA is that, although the carbon stock of a forest and its associated wood products may fluctuate over time with harvesting and replanting, an LTA carbon stock can be calculated that represents a net change in stock compared with the pre-existing carbon levels before afforestation (Wakelin et al, unpublished).

Following this principle of crediting forest growth up to the calculated LTA age, an accounting adjustment is made for forests harvested before and after the LTA age is reached. This adjustment effectively grows the harvested forest on to the LTA age and removes forests harvested above the LTA age.

The rationale for this adjustment is as follows.

1. All harvest emissions have implicitly been included in the calculation of the LTA carbon stock and age.
2. This early harvest is considered to be ad hoc rather than due to a short rotation forest crop within the *Afforestation and reforestation* forest estate. Therefore, across multiple rotations of these forests, it is appropriate to credit growth to the full LTA carbon stock.
3. Forests are harvested across an age profile centred around the average harvest age, which means that some area is also harvested above the average harvest age. The averaging approach means that the extra growth from this 'late' harvest is not credited. To balance accounting for both early and late harvest events, all forests need to be credited for growth up to the LTA age (see annex 5, section A5.2.5 of Inventory 2024 for further information on harvest age profiling (Ministry for the Environment, 2024)).

Table A2.9 shows the total area of post-1989 planted forest in each of the LTA subcategories by year of establishment and forest type. All permanent forests established after 1989 are considered to be below the LTA for the reporting period. Further work is planned to determine the permanent forest LTA, however, it is currently estimated to be more than 40 years, putting it beyond the NDC1 period for forests planted after 1989 (Wakelin, unpublished(a)).

Table A2.9: Area (hectares) of permanent and production planted forests established after 1989 by long-term average (LTA) subcategory on 31 December 2022

	Production forest		Permanent forest	
Planting year	Area Below LTA	Area Above LTA	Area Below LTA	Net cumulative area
1990	12,898	NA	813	13,711
1991	25,477	NA	1,606	27,083
1992	66,547	NA	4,189	70,736
1993	116,879	NA	7,360	124,239
1994	197,125	NA	12,414	209,539
1995	257,576	NA	16,218	273,794
1996	326,078	NA	20,520	346,598
1997	378,245	NA	23,799	402,043

Planting year	Production forest Area Below LTA	Area Above LTA	Permanent forest Area Below LTA	Net cumulative area
1998	420,100	NA	26,434	446,534
1999	452,801	NA	28,493	481,294
2000	480,380	NA	30,222	510,602
2001	504,970	NA	31,771	536,741
2002	522,192	NA	32,909	555,100
2003	535,850	NA	33,933	569,783
2004	542,127	NA	34,478	576,605
2005	544,350	NA	34,787	579,137
2006	544,155	NA	34,921	579,076
2007	540,553	NA	35,045	575,597
2008	541,987	NA	35,213	577,200
2009	545,837	NA	35,595	581,432
2010	552,286	NA	36,127	588,413
2011	566,495	NA	37,192	603,687
2012	580,516	NA	38,212	618,728
2013	576,706	6,861	38,589	622,156
2014	571,710	12,919	38,877	623,506
2015	542,290	44,109	39,165	625,563
2016	501,925	82,909	39,302	624,136
2017 P	437,854	146,937	39,603	624,394
2018 P	390,276	195,276	39,959	625,511
2019 P	351,870	250,605	41,228	643,703
2020 P	343,288	290,559	43,565	677,411
2021 P	355,817	323,477	46,683	725,977
2022 P	402,334	348,529	51,536	802,399

Note: P = provisional figure. NA: as the long-term average (LTA) age is estimated to be 23 years, no area of *Afforestation and reforestation* can enter the Above LTA subcategory before 2013.

New Zealand estimates emissions from HWP originating from *Afforestation and reforestation* activities. This is described further in section A2.3.5.

A2.3.3 Deforestation

In 2022, net emissions from *Deforestation* activities were 2,429.4 kt CO_2e, compared with 3,170.8 kt CO_2e in 2021. All carbon stock changes and non-CO_2 emissions on land areas subject to *Deforestation* activities that have occurred since 1990 are included. This includes the emissions resulting from the loss of carbon stored in the biomass before deforestation; soil carbon stock changes due to the land-use change, including lagged emissions from previous deforestation events; mineralisation of soil nitrogen associated with the land-use change; emissions from burning biomass associated with the land-use change; and the carbon stock changes from the increase in biomass pools on the new land use.

The estimated area of deforestation, across all forest types, for 2021 was 4,849 hectares and for 2022 was 4,089 hectares. Table A2.10 shows the areas of *Forest land* subject to *Deforestation* activities since 1990 by forest category.

Table A2.10: Area (hectares) of New Zealand subject to deforestation

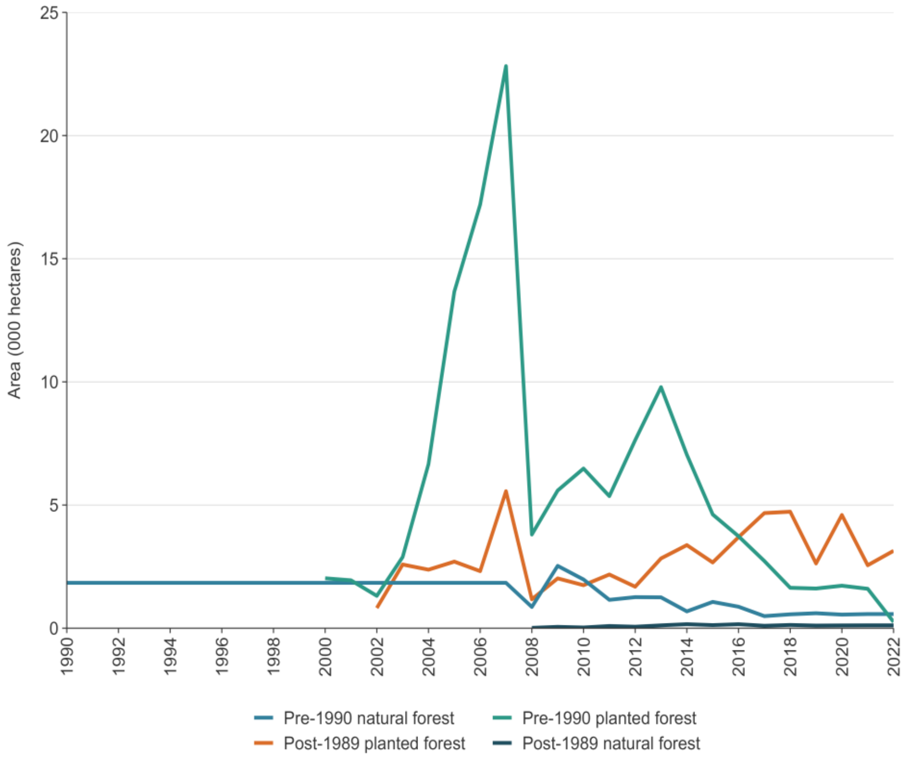
Year	Pre-1990 natural forest	Pre-1990 planted forest	Post-1989 planted forest	Post-1989 natural forest	Total	Cumulative total area
1990	1,843	–	–	–	1,843	1,843
1991	1,843	–	–	–	1,843	3,685
1992	1,843	–	–	–	1,843	5,528
1993	1,843	–	–	–	1,843	7,370
1994	1,843	–	–	–	1,843	9,213
1995	1,843	–	–	–	1,843	11,055
1996	1,843	–	–	–	1,843	12,898
1997	1,843	–	–	–	1,843	14,741
1998	1,843	–	–	–	1,843	16,583
1999	1,843	–	–	–	1,843	18,426
2000	1,843	2,027	–	–	3,870	22,296
2001	1,843	1,944	–	–	3,787	26,082
2002	1,843	1,314	820	–	3,976	30,059
2003	1,843	2,890	2,586	–	7,319	37,377
2004	1,843	6,661	2,376	–	10,880	48,257
2005	1,843	13,663	2,703	–	18,210	66,467
2006	1,843	17,197	2,317	–	21,356	87,823
2007	1,843	22,818	5,562	–	30,222	118,045
2008	863	3,803	1,173	14	5,853	123,898
2009	2,531	5,590	2,023	55	10,199	134,097
2010	1,979	6,482	1,746	29	10,236	144,333
2011	1,152	5,362	2,180	89	8,783	153,117
2012	1,261	7,634	1,685	60	10,641	163,757
2013	1,253	9,786	2,833	116	13,988	177,745
2014	683	7,043	3,374	163	11,262	189,008
2015	1,068	4,619	2,669	125	8,481	197,489
2016	872	3,732	3,697	162	8,463	205,952
2017	491	2,727	4,674	99	7,991	213,944
2018	564	1,641	4,729	132	7,066	221,010
2019	609	1,611	2,629	107	4,956	225,966
2020	553	1,725	4,596	114	6,988	232,953
2021[P]	575	1,600	2,556	117	4,849	237,802
2022[P]	575	256	3,141	117	4,089	241,892

Note: P = provisional figures that will be updated once mapping is completed; Areas are as at 31 December 2022. Deforestation differs from that reported in Inventory 2024, due to the application of the carbon equivalent forests accounting provision and this table only recording the first deforestation event on any given area of land since 1990.

Figure A2.1 shows the annual areas deforested since 1990 by forest category. This shows the increase in pre-1990 planted forest deforestation that occurred in the four years leading up to 2008.

While the conversion of land from one land use to another is not uncommon in New Zealand, plantation forest deforestation on the scale seen between 2004 and 2008 was a new phenomenon. Most of the area of planted forest that was deforested from the mid-2000s onwards has subsequently been converted to grassland. This conversion is due in part to the relative profitability of some forms of pastoral farming (particularly dairy farming), compared with forestry, as well as the anticipated introduction of the NZ ETS.

Figure A2.1: New Zealand's annual areas of deforestation from 1990 to 2022



No deforestation of pre-1990 planted forest, post-1989 planted forest or post-1989 natural forest was estimated to have occurred between 1990 and 2000. Deforestation of these forest classes was not significant during this period and insufficient data exist to reliably report the small areas of deforestation that may have occurred.

Since the introduction of the NZ ETS in 2008, owners of pre-1990 planted forest have been able to deforest a maximum of two hectares in any five-year period without having to surrender emission units. Above this level of deforestation, they are required to surrender units equal to the reported emissions, with some exemptions for smaller forest owners and tree weeds within protected areas (Ministry for Primary Industries, 2024). Since 2007, a significant reduction has occurred in the rate of deforestation of pre-1990 planted forest. Post-1989 forest owners, who are registered in the scheme, also have legal obligations to surrender units if the carbon stocks in their registered forest area fall below a previously reported level (eg, due to deforestation, harvesting or fire).

It was expected that the level of deforestation during the first Kyoto Protocol commitment period (2008 to 2012) would be less than that seen before the introduction of the NZ ETS in 2008 (Manley, 2009). However, following the introduction of the NZ ETS, the carbon price went into a steady decline. The low carbon price reduced the liability on pre-1990 planted forest owners for deforestation. Consequently, more deforestation has occurred since 2008 than previously expected. Carbon prices have since increased, following the exclusion of international units from the scheme on 31 May 2015, an NZ ETS review and the passing of the Climate Change Response (Emissions Trading Reform) Amendment Act in 2020. This legislated major changes to the NZ ETS, including incentives for afforestation and the introduction of a unit cap to the scheme. These higher carbon prices are coincident with reduced deforestation activities.

The area of deforestation of pre-1990 natural forest before 2008 has been estimated by linear interpolation from the average land-use change mapped between 1 January 1990 and 1 January 2008. However, several factors suggest the rate of pre-1990 natural forest deforestation is unlikely to have been constant over the 18 years between 1990 and 2007, but instead mostly occurred before 2002. The area available for harvesting (and potentially deforestation) was higher before 1993 when amendments were made to the Forests Act 1949 that restricted natural forest harvesting. Further restrictions on the harvesting of natural forests were also introduced in 2002, resulting in the end of harvesting of publicly owned forests on the West Coast of New Zealand from that time on. Both developments are likely to have reduced pre-1990 natural forest deforestation since 2002.

Further detail on the methods employed for estimating deforestation is provided in annex 5, section A5.2.1 of Inventory 2024 (Ministry for the Environment, 2024).

A2.3.4 Forest management

New Zealand reports emissions and removals from *Forest management* activities from 2021 onwards. New Zealand has applied the broad approach to interpreting the definition of forest management so that it includes the whole area classified as pre-1990 natural forest and pre-1990 planted forest. The area in this category excludes any area deforested since 1990, because this is reported under *Deforestation*, and includes areas to which the carbon equivalent forest accounting provision is applied.

In 2021 and 2022, emissions on this land were –18,215.6 kt CO_2e and –18,600.0 kt CO_2e respectively. This includes emissions of –7,163.9 kt CO_2e for 2021 and –4,873.4 kt CO_2e for 2022 from HWP originating from *Forest management*.

The total area remaining in *Forest management* at the end of 2022 was 9,186,383 hectares; this is a decrease of 175,387 hectares (or 1.9 per cent) since 1990.

The source of the activity data and emission factors applied to *Forest management* activities is described in more detail in Inventory 2024 (Ministry for the Environment, 2024). This is because New Zealand applies the same methods to estimating emissions from *Forest management* activities as those applied to the equivalent land use category, *Forest land remaining forest land*, of Inventory 2024.

Where the land reported under *Forest management* has remained in the same land use category for more than 20 years, mineral soil carbon stocks are assumed to have reached steady state. New Zealand models the effects of land-use change on mineral soil carbon based on empirical measurements collected from each land use subdivision in steady state, specifically to model land-use change and management effects. The pre-1990 forests are subdivided into natural and planted forest types, which allows the different management methods to be taken into account.

Where organic soil is present on land reported under *Forest management* that is no longer in its natural state, the soil organic carbon pool is reported as an ongoing source of emissions.

Forest management activities are accounted for against the pre-1990 FRL. This means New Zealand is required to take responsibility for net emissions from *Forest management* activities when they exceed the pre-1990 FRL and conversely account for the additional sequestration when they are under the pre-1990 FRL.

The pre-1990 FRL was set using a business-as-usual projection of net emissions from *Forest management* activities during NDC1 and represents the estimated annual average emissions over that period (see section A2.4.1, for further information).

Carbon equivalent forests

The carbon equivalent forests accounting provision allows pre-1990 planted forests that meet the conditions specified in section 2.7.7.2 of the 2013 Kyoto Protocol Supplement (IPCC, 2014) to be harvested and converted to another land use without being classified as deforested, provided a new forest that will reach carbon equivalence is established elsewhere. The carbon stock changes in New Zealand's carbon equivalent forests for 2021 and 2022 are summarised in table A2.11. A detailed list of individual applications is shown in table A2.12.

Table A2.11: Carbon equivalent forests from 2021 to 2022

		2021	2022
Newly established	Area change (ha)	–	–
	Net change (kt CO_2)	–47.2	–92.5
Harvested and converted	Area change (ha)	74	113
	Net change (kt CO_2)	65.8	104.8
Total (kt CO_2)		**18.5**	**12.3**

Notes:

1. Net change in carbon stocks includes ongoing changes in these forests, which were established from 2013 onwards. This is why an increase has occurred in the carbon in *Newly established* forests even though no area was added to these forests in 2021 or 2022.
2. Area changes for *Newly established* and *Harvested and converted* forests do not match for individual years because conversion activities associated with each application are spread over several years.

Table A2.12: Breakdown of carbon equivalent forests (CEFs) by domestic scheme application from 2021 to 2022

Scheme ID	Management type	2021	2022
CEF - 2	Net change (kt CO_2)	–4.2	–6.7
CEF - 3	Net change (kt CO_2)	–7.2	–11.8
CEF - 4	Net change (kt CO_2)	–0.4	–0.4
CEF - 8	Net change (kt CO_2)	–1.5	–2.2
CEF - 9	Net change (kt CO_2)	–0.7	–1.1
CEF - 11	Harvested and converted (ha)	55	113
	Net change (kt CO_2)	36.7	77.3
CEF - 12	Net change (kt CO_2)	–4.8	–6.8
CEF - 13	Net change (kt CO_2)	–3.1	–4.5
CEF - 14	Net change (kt CO_2)	–2.5	–4.4
CEF - 15	Net change (kt CO_2)	–3.2	–5.5
CEF - 17	Net change (kt CO_2)	–0.1	–0.2
CEF - 18	Net change (kt CO_2)	–1.0	–2.1

Scheme ID	Management type	2021	2022
CEF - 19	Net change (kt CO_2)	–0.8	–1.9
CEF - 20	Net change (kt CO_2)	–0.2	–0.4
CEF - 21	Net change (kt CO_2)	–2.9	–5.1
CEF - 24	Net change (kt CO_2)	–0.4	–0.6
CEF - 25	Harvested and converted (ha)	19	–
	Net change (kt CO_2)	17.7	-4.6
CEF - 27	Net change (kt CO_2)	–0.8	–1.4
CEF - 31	Net change (kt CO_2)	–0.1	–0.2
CEF - 35	Net change (kt CO_2)	0.0	–0.1
CEF - 36	Net change (kt CO_2)	–0.6	–1.6
CEF - 38	Net change (kt CO_2)	0.0	–0.1
CEF - 39	Net change (kt CO_2)	–0.4	–1.0
CEF - 40	Net change (kt CO_2)	–0.1	–0.3
CEF - 41	Net change (kt CO_2)	0.0	–0.1
CEF - 42	Net change (kt CO_2)	–0.3	–0.7
CEF - 43	Net change (kt CO_2)	–0.2	–0.4
CEF - 44	Net change (kt CO_2)	–0.1	–0.2
CEF - 45	Net change (kt CO_2)	0.0	–0.1
CEF - 47	Net change (kt CO_2)	0.0	–0.2
CEF - 49	Net change (kt CO_2)	–0.1	–0.3
CEF - 51	Net change (kt CO_2)	0.0	–0.1
Total	**Harvested and converted (ha)**	**74**	**113**
	Net change (kt CO_2)	**18.5**	**12.3**

Note: Values of 0.0 represent an amount greater than 0 but smaller than the two decimal place thresholds for rounding.

A carbon equivalent forest provision is included and administered domestically by the New Zealand Ministry for Primary Industries as part of the NZ ETS settings. The domestic carbon equivalent forest rules are broadly aligned with those in the 2013 Kyoto Protocol Supplement (IPCC, 2014). Misalignments between the international rule set and the domestic scheme include:

- the carbon equivalent forest can be established before the forest land is converted to another land use
- the newly established carbon equivalent forest can be established on land that was forested on 31 December 1989.

Where these misalignments are observed, these activities are instead reported and accounted for as separate afforestation and deforestation events and excluded from the carbon equivalent forest accounting provision that is applied to *Forest management* activities.

Emissions from the conversion of forest land under the carbon equivalent forest accounting provision are calculated as a deforestation event. Net emissions are calculated as outlined in section A2.3.3. The emissions from the establishment of the new forest under the provision are calculated as an afforestation event as outlined in section A2.3.2. Net emissions from these activities are reported under *Forest management* and monitored over time, to ensure carbon equivalence is achieved within the normal harvesting cycle of the harvested and converted forest plantation.

The carbon equivalent forest accounting provision creates a misalignment between the reporting of afforestation and deforestation areas here and in Inventory 2024. This land is reported as *Land converted to forest land* (afforestation) and *Forest land converted to other land uses* (deforestation) in the LULUCF sector of Inventory 2024. Further misalignment occurs due to the Inventory transition of areas of *Afforestation and reforestation* land (*Land converted to forest land)* into *Forest land remaining forest land* after a period of 20 years.

Table A2.13 shows the correspondence between forest land categories reported in the Biennial Transparency Report and in Inventory 2024 for 2022.

Table A2.13: Comparison of forest areas reported under each LULUCF Inventory category and LULUCF activities 2022 (kha)

LULUCF activity \ Inventory land category	Forest land remaining forest land	Land converted to forest land	Total
Forest management (excluding CEF)	9,177.0	NA	**9,177.0**
Afforestation and reforestation	524.2	384.9	**909.1**
Deforestation (replanting on deforested land)	–	3.0	**3.0**
CEF – newly established	–	4.9	**4.9**
Total	**9,701.3**	**392.8**	**10,094.1**

Note: CEF = carbon equivalent forest; kha = kilohectare; NA = not applicable. Columns may not total due to rounding.

A2.3.5 Harvested wood products

New Zealand has a large, planted forest estate that provides most of the wood products consumed domestically. The remainder of domestic production is exported in either product or raw material form. A more detailed description of the forest estate and New Zealand wood use is provided in annex 5, section A5.2.6 of Inventory 2024 (Ministry for the Environment, 2024).

The HWP pool comprises all wood material that leaves a harvest site and is subsequently processed. This pool constitutes a carbon reservoir (section 12.1, IPCC, 2006a).

New Zealand accounts for the changes in the HWP pool using the production approach. For *Afforestation and reforestation* and *Forest management*, estimates are derived from a modified IPCC (2006a) reporting model.

The emissions from HWP originating from *Deforestation* activities have been instantly oxidised since 2008 when New Zealand began accounting for its emissions.

Net emissions from HWP derived from *Afforestation and reforestation* activities in 2021 and 2022 were –4,985.5 kt CO_2e and –5,115.7 kt CO_2e respectively. Net emissions from HWP derived from *Forest management* activities in 2021 and 2022 were –7,163.9 kt CO_2e and –4,873.4 kt CO_2e respectively. Overall, higher emissions from HWP were reported in 2022 than in 2021 due to a decrease in harvesting between years, as described in chapter 6, section 6.10 of Inventory 2024 (Ministry for the Environment, 2024). In addition, fewer removals were reported from HWP derived from *Forest management* activities in 2022 compared with 2021, due to harvesting activity shifting to forests reported under *Afforestation and reforestation*, because a large cohort of the latter are reaching harvest age.

New Zealand's accounting approach to *Afforestation and reforestation* activities includes the HWP pool in the LTA calculation (Dovey and Wakelin, unpublished). New Zealand's accounting approach to *Forest management* activities includes the HWP pool in the pre-1990 FRL calculation.

New Zealand has developed a Tier 2 method to report on net emissions from the HWP pool. New Zealand uses the default Tier 2 methodology, as described in the IPCC guidance (IPCC, 2014), and some country-specific activity data and parameters where available. Country-specific half-life values are applied to sawnwood and wood-based panels processed from domestic roundwood consumption and consumed in the domestic and export market (Ministry for Primary Industries, 2022; Wakelin, unpublished(b); Wekesa, 2022). IPCC default half-life values are used for paper and paperboard (Ministry for the Environment, 2024). More information on the sub-product half-life values and their proportions for the domestic and export market are provided in annex 5, section A5.2.6 and tables A5.2.22, A5.2.23, A5.2.24, A5.2.25 and A5.2.26 of Inventory 2024 (Ministry for the Environment, 2024). Country-specific conversion factors are used for domestically produced sawnwood and veneer sheets (see chapter 6, section 6.10 of Inventory 2024 (Ministry for the Environment, 2024)).

Activity data on roundwood production volume and roundwood export volume are sourced from the Ministry of Primary Industries (Ministry for Primary Industries, 2023b). Data on wood product production and export are sourced from the Food and Agriculture Organization statistical database (FAOSTAT) that is provided to the Food and Agriculture Organization by the Ministry for Primary Industries.

Activity data used for compiling LULUCF sector accounting estimates for HWP are the same as that used for Inventory 2024, except the time series begins in 1990 for *Afforestation and reforestation* and 2013 for *Forest management* whereas the Inventory 2024 time series for all forests starts at 1990. Also, the *Solid wood* category used for LULUCF sector reporting is disaggregated into *Sawnwood* and *Wood-based panels* for LULUCF sector accounting.

Emissions from HWP derived from *Afforestation and reforestation* activities are reported from 1990 onwards, including from harvest. Harvest activities provide a growing contribution to the HWP pool as the forests reach harvest age. HWP originating from *Afforestation and reforestation* activities each year are estimated by prorating the above-ground biomass carbon losses from the harvest of these lands to the total above-ground biomass carbon losses from all harvesting and deforestation activities.

Harvesting is the primary driver of emissions from *Forest management* activities. Emissions from HWP derived from *Forest management* activities each year are estimated as they are for *Afforestation and reforestation* activities, by prorating the above-ground biomass carbon losses from the harvest of these lands to the total above-ground biomass carbon losses from all harvesting and deforestation activities. Accounting for HWP from *Forest management* activities is against New Zealand's projected pre-1990 FRL.

While the HWP originating from *Deforestation* activities are accounted for as an instant emission, the production statistics do not identify products that were derived originally from the wood that was harvested as part of the deforestation activity. The share of roundwood volume originating from *Deforestation* is estimated by comparing the above-ground biomass carbon losses from *Deforestation* with the above-ground biomass carbon losses from harvesting. This provides a proportion to apply to the production statistics to separate HWP originating from *Deforestation*.

Non-forest harvest is treated as an instant emission. Harvest from these lands is assumed to be used for fuel wood. Therefore, the HWP contribution from non-forest lands is assumed to be zero.

A2.3.6 Other greenhouse gas sources

Direct nitrous oxide emissions from nitrogen fertilisation

New Zealand's activity data on nitrogen fertilisation are not currently disaggregated by land use; therefore, all nitrous oxide (N_2O) emissions from nitrogen fertilisation are reported under the Agriculture sector in the category *Direct N_2O emissions from managed soils* and are therefore fully accounted for.

Methane and nitrous oxide emissions from drained and rewetted organic soils

New Zealand reports on N_2O emissions, as a result of oxidation of organic matter, from the drainage of organic soils subject to *Afforestation and reforestation*, *Deforestation* and *Forest management* activities. Emissions are estimated following the methodology outlined in the 2006 IPCC Guidelines (IPCC, 2006a) and described in chapter 6, section 6.11.2 of Inventory 2024 (Ministry for the Environment, 2024). Total annual emissions for these three activities in 2021 and 2022 are 0.4 kt N_2O. The emissions occurring under each activity are reported in table A2.14.

Methane emissions from drained organic soils are assumed to be negligible, in accordance with the 2006 IPCC Guidelines (IPCC, 2006a).

Table A2.14: Nitrous oxide emissions from the drainage of organic soils in 2021 and 2022 by activity

	Emissions 2021		Emissions 2022	
Activity	(kt N_2O)	(kt CO_2e)	(kt N_2O)	(kt CO_2e)
Afforestation and reforestation	0.2	44.7	0.2	44.7
Deforestation	0.0	2.2	0.0	2.2
Forest management	0.2	53.1	0.2	53.1
Total	**0.4**	**100.0**	**0.4**	**100.0**

Note: Columns and conversions between units may not total due to rounding.

Nitrous oxide emissions from nitrogen mineralisation and immobilisation associated with land use conversions and management in mineral soils

Nitrous oxide emissions, resulting from nitrogen mineralisation and immobilisation associated with land conversion, occur on land subject to *Afforestation and reforestation*, *Deforestation* and *Forest management* activities. The emissions are calculated following the 2006 IPCC Guidelines (IPCC, 2006a). Total annual emissions from these three activities in 2021 and 2022 are 0.3 kt N_2O. The emissions occurring under each activity are reported in table A2.15.

Table A2.15: Nitrous oxide emissions from nitrogen mineralisation and immobilisation in soils in 2021 and 2022 by activity

Activity	Emissions 2021 (kt N_2O)	(kt CO_2e)	Emissions 2022 (kt N_2O)	(kt CO_2e)
Afforestation and reforestation	0.2	55.2	0.3	67.2
Deforestation	0.0	1.7	0.0	1.7
Forest management	0.0	0.9	0.0	0.9
Total	**0.3**	**57.8**	**0.3**	**69.8**

Note: Columns and conversions between units may not total due to rounding.

Emissions associated with *Indirect N_2O emissions from managed soils* are reported under the Agriculture sector.

Biomass burning

Non-CO_2 emissions are estimated for each activity by apportioning wildfire activity data to the forest type burned, as described in annex 5, section A5.2.7 of Inventory 2024 (Ministry for the Environment 2024). The emissions occurring under each activity are reported in table A2.16.

Table A2.16: Non-carbon dioxide emissions from biomass burning in 2021 and 2022

Activity	2021 Emissions (kt CO_2e)	2022 Emissions (kt CO_2e)
Afforestation and reforestation	8.0	18.4
Deforestation	10.5	15.8
Forest management	13.2	12.7
Total	**31.8**	**46.9**

Note: Columns may not total due to rounding.

Afforestation and reforestation

An age-based carbon yield table is used to estimate non-CO_2 emissions from *Afforestation and reforestation* activities. This approach assumes that the carbon stock affected by wildfire is equivalent to the carbon stock at the average stand age each year throughout the time series (Wakelin, unpublished(c)). Carbon dioxide emissions resulting from wildfire events are assumed to be captured in the harvest emissions of salvage logged stands.

A survey of controlled burning activities in planted forests was carried out in 2011. The survey indicated that, on average, 5 per cent of conversions to planted forest between 1990 and 2011 involved burning to clear vegetation. This area is allocated to *Forest management* (land converted from *Pre-1990 natural forest*) and *Afforestation* (land converted from *Grassland with woody biomass*) on a pro rata basis (Wakelin, unpublished(d)).

All non-CO_2 emissions associated with biomass burning from *Afforestation and reforestation* activities are fully accounted for. These emissions are not included in the calculation of the LTA age (Dovey and Wakelin, unpublished).

Deforestation

An estimate is provided for controlled burning of post-harvest residues associated with *Deforestation* activities. It is assumed that 30 per cent of the area subject to deforestation involves burning as part of land use conversion. This percentage is chosen as a conservative proportion of one of the four main methods for disposing of post-harvest residues in New Zealand. The other methods for post-harvest residue disposal are chipping and removal, mulching into the soil and leaving to decay (Goulding, unpublished).

To estimate emissions from the burning of post-harvest residue, the IPCC default combustion proportion for non-eucalypt temperate forest (0.62) (table 2.6, IPCC, 2006a) is applied to an emission factor derived from the national plot network. The emission factor excludes the proportion of logs taken offsite (70 per cent of above-ground biomass) and is taken from the relevant yield tables at the average age of harvest in New Zealand.

Estimates are provided for non-CO_2 emissions from wildfire occurring on deforested land (*Forest land converted to grassland*) in Inventory 2024. The activity data do not identify deforested land; therefore, non-CO_2 emissions resulting from wildfire are attributed to deforested land by the proportion of area that deforested land makes up of the total *Grassland* area. The methodology follows that described in annex 5, section A5.2.7 of Inventory 2024 (Ministry for the Environment, 2024).

Forest management

Estimates are provided for non-CO_2 emissions from wildfires occurring on land subject to *Forest management* activities. A plot-network-derived biomass density is used. Aggregated wildfire activity data have been attributed to each forest management category by proportion of forest type estimated to be burned over the time series.

A survey of controlled burning in planted forest was carried out in 2011 (Wakelin, unpublished(d)). Estimates were provided for burning associated with the clearing of vegetation (ie, natural forest and shrubland before the establishment of exotic planted forest (see ‘Afforestation and reforestation’ above).

The survey also provided data on the burning of post-harvest residues before restocking. This activity was found to occur mainly as a training exercise for wildfire control or for the clearing of slash heaps on skid sites. The data indicated that 0.8 per cent of the restocked area was burned annually in recent years (Wakelin, unpublished(d)). This estimate was combined with two earlier estimates of controlled burning in planted forest (Forest Industry Training and Education Council, 2005; Robertson, 1998) to provide activity data throughout the time series. It is assumed that 1.6 per cent of restocked area was burned from 1990 to 1997 (Wakelin, unpublished(d)). From 1997, the area burned declines linearly to 0.8 per cent, which is used from 2005 onwards (Wakelin, unpublished(d)).

A more detailed description of *Biomass burning* on *Forest land* is provided in chapter 6, section 6.11.8 and annex 5, section A5.2.7 of Inventory 2024 (Ministry for the Environment, 2024).

A2.3.7 Natural disturbance

New Zealand applied the default method described in section 2.3.9.6 of the 2013 Kyoto Protocol Supplement (IPCC, 2014) for calculating its background level of natural disturbances for both *Afforestation and reforestation* and *Forest management* activities.

The types of natural disturbances New Zealand intends to exclude from the accounting are:

- wildfires
- invertebrate and vertebrate pests and diseases

- extreme weather events
- geological disturbances.

In all cases except wildfire, New Zealand assumes a zero baseline over the calibration period (1990 to 2009). While other natural disturbance events occurred throughout the calibration period, assumptions were made for the purposes of calculating the background level.

It is assumed that salvage logging takes place in planted forests subject to *Afforestation and reforestation* and *Forest management* activities that are also subject to natural disturbances.

The LUCAS forest plot measurement programme captures emissions from natural disturbances occurring in pre-1990 natural forests implicitly, and the emissions from natural disturbance events, apart from wildfires, cannot be separated from other disturbance events. The background levels of small-scale natural disturbance events are included in the natural forest stock change estimates.

Only direct oxidation of biomass in wildfires is considered for the purposes of calculating a background level of natural disturbance for both *Afforestation and reforestation* and *Forest management* activities, regardless of forest type. The data used are as reported in Inventory 2024 for the period 1990 to 2009 (see chapter 6, section 6.11.8 of Inventory 2024).

Afforestation and reforestation

Due to the nature of the carbon stock change estimation methods for *Afforestation and reforestation* activities, the background level of CO_2 emissions from natural disturbance is already captured implicitly within the reported emissions estimates.

New Zealand separately estimates and reports the non-CO_2 emissions from natural disturbances on land subject to *Afforestation and reforestation* activities.

The background level of natural disturbances has been calculated using the default method described in section 2.3.9.6 of the 2013 Kyoto Protocol Supplement (IPCC, 2014). Both the post-1989 forest area and the carbon stock increase during the calibration period. To account for the annual change, the background level for the calibration period is calculated as a proportion of the post-1989 forest estate. This proportion is then multiplied by the carbon stock in post-1989 forest for each year in the reporting period (2021–30). This approach provides the background level and corrects for the increasing area and age (and therefore carbon stock exposed to natural disturbance) in post-1989 forests.

The background level of natural disturbance emissions from *Afforestation and reforestation* activities for 2020 was 2.26 kt CO_2e.

Avoiding the expectation of net credits or net debits from the application of the natural disturbance provision: Afforestation and reforestation

The natural disturbance background level is calculated using the default methodology described in section 2.3.9.6 of the 2013 Kyoto Protocol Supplement (IPCC, 2014). The proportion from the calibration period is then multiplied by the carbon stock in post-1989 forest for each year in the reporting period (2021 to 2030). This approach is taken for the following reasons.

- A trend is observed in natural disturbance emissions during the calibration period for *Afforestation and reforestation*. Emissions from natural disturbances have been increasing throughout the calibration period as the age of these forests, and therefore biomass, increases through time. The calibration period was used to obtain an annual emissions value by proportion of carbon stocks and then used to calculate the background level for the 2021 year onwards, based on the carbon stocks of *Afforestation and reforestation* lands in each year.

- Emissions from natural disturbances occurring within *Afforestation and reforestation* activities in any year of NDC1, which fall below the background level, are not excluded from the accounting. Emissions from natural disturbances that are greater than the background level in any year of NDC1 are able to be excluded from the accounting if a Party chooses.
- If emissions from natural disturbances are greater than the background level, they can be excluded from the accounting. Further work is planned to ensure there is no expectation of net debits arising from implementation of this exclusion when applying the LTA to account for these forests.
- If emissions are less than the background level in any year of the commitment period, all emissions from natural disturbance will still be accounted for. There is no expectation of net debits in this scenario.

Forest management

The background level of natural disturbance for *Forest management* was calculated as 9.40 kt CO_2e.

Avoiding the expectation of net credits or net debits for the application of the natural disturbance provision: Forest management

The background level has been calculated using the default methodology described in section 2.3.9.6 of the 2013 Kyoto Protocol Supplement (IPCC, 2014). Using this method, the expectation of net credits or net debits for the application of the natural disturbance provision is avoided for the following reasons.

- No observed trend is evident in natural disturbance emissions during the calibration period for *Forest management* and therefore none can be expected during NDC1.
- Emissions from natural disturbances occurring during the commitment period that fall below the background level are not excluded from the accounting. During the commitment period, emissions from natural disturbances that are above the background level are, subject to New Zealand's discretion, able to be excluded from the accounting.
- The accounting for *Forest management* is against a projected business-as-usual pre-1990 FRL. The background level is included implicitly within the pre-1990 FRL, and any emissions greater than the background level can be excluded from the accounting.

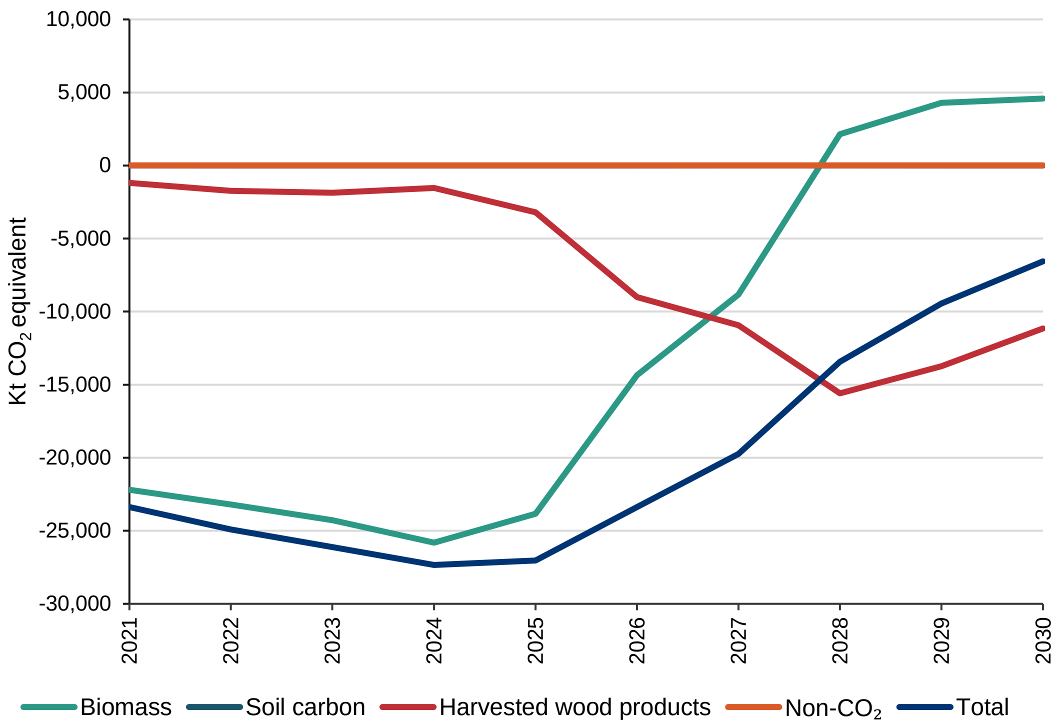
A2.4 Other methodological issues

A2.4.1 Development of the pre-1990 FRL

The pre-1990 FRL value is –20,135 kt CO_2e per year representing the projected average annual net emissions from pre-1990 forests under business-as-usual management from 2021 to 2030. This is made up of a pre-1990 planted forest FRL value of –18,735 kt CO_2e per year and a pre-1990 natural forest FRL of –1,399.5 kt CO_2e per year.

Carbon uptake in pre-1990 planted forests is initially high during the compliance period because harvesting is concentrated in post-1989 planted forests, but it then declines and pre-1990 planted forests become a net source of emissions. However, this is balanced by gains in the HWP pool. Other emissions from soil carbon loss (due to land-use change) and wildfires are relatively small (figure A2.2).

Figure A2.2: Pre-1990 Forest Reference Level for 2021–30 (kilotonnes carbon dioxide (kt CO_2))



The pre-1990 FRL was developed using the reference period 2000 to 2009 and following the main methodological steps described in the European Union approach to pre-1990 FRL development (Forsell et al, 2018), based on earlier work by Grassi and Pilli (2017). The steps, as adapted for New Zealand's activity-based accounting,[322] are as follows.

1. Stratify the area subject to *Forest management* activities based on national circumstances. Strata should be characterised by specific management objectives and practices.
2. Identify and stratify the forest management practices for each stratum during the reference period. These should be quantifiable criteria, for example, the age, diameter or volume at which thinning or harvesting occurs, and monitored over time to document changes.
3. Project the evolution of area subject to *Forest management* activities, assuming that the deforestation rate over the reference period continues.
4. Project the future carbon gains and losses in each pool and stratum including:

[322] Note that the European Union method applies a 'land-based' rather than 'activity-based' approach, in line with greenhouse gas inventory reporting, so the pre-1990 (*Forest management*) and post-1989 (*Afforestation and reforestation*) distinction made under the Kyoto Protocol is not used. New Zealand applies an activity-based approach and, therefore, stratifies this area as that subject to *Forest management* activities (ie, pre-1990 forest area) rather than the area reported under *Forest land remaining forest land* in the Inventory.

(a) growth in each forest stratum assuming continuation of management practices that applied in the reference period

(b) losses due to harvesting using a harvest fraction approach to harvest biomass available for wood supply through to the end of the compliance period.

5. Estimate projected HWP pool stock changes by applying the same HWP category proportions as during the reference period.

Wakelin (unpublished(e)) and Wakelin and Paul (unpublished) adapted and applied the methodological steps described above to develop the pre-1990 FRL for New Zealand's *Forest management* activities.

Pre-1990 planted forests were stratified into two cohorts corresponding to stands planted before 1990 and stands planted after 1989. This was done to allow the use of a different yield table for the younger stands of trees and, with this, account for the fact that these stands include faster growing genotypes (Wakelin, unpublished(e)).

To project the evolution of the pre-1990 planted forest estate, a destocking probability approach, based on the destocking profile by age class that applied from 2007 to 2009,[323] was used to generate an annual time series of harvesting and deforestation area by age from 2010 to 2030. This time series, and the corresponding yield tables for each stratum, were applied to a simulation in the LUCAS CRA, to project the corresponding carbon gains and losses for planted forests under *Forest management* from 2010 through to the end of the compliance period (Wakelin, unpublished(e)).

The LUCAS CRA is the same application that is used to model LULUCF emissions and removals reported in the Inventory and the accounting quantities for the NDC. Additional calculations were made for soil carbon stock changes, wildfire emissions and net emissions from the HWP pool (Wakelin, unpublished(e)). The resulting emissions were added to those generated by the LUCAS CRA simulation to form the pre-1990 planted forest FRL.

Pre-1990 natural forests were stratified into tall and regenerating forests, recognising that each of these strata has a different mean rate of sequestration (Wakelin and Paul, unpublished). Harvesting is not anticipated in either case, so these strata were differentiated by the mean sequestration rate derived from the LUCAS forest plot network (Wakelin and Paul, unpublished). These rates were applied to a projection of the 2009 natural forest area[324] that took into account actual deforestation from 2010 to 2020 and projected deforestation from 2021 to 2030 to generate the carbon gains and losses from changes to the forest biomass. Additional calculations were made for soil carbon stock changes and wildfire emissions, and integrated with the projected carbon gains and losses from the forest biomass to generate the natural forest FRL (Wakelin and Paul, unpublished).

Further work is planned to implement technical corrections to the pre-1990 FRL that incorporate actual deforestation and changes to the area of forests accounted for under *Forest management*.

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323 The years 2007 to 2009 were selected, because a trend was detected within the 2000 to 2009 reference period (Wakelin, unpublished(e)).

324 As reported in the *New Zealand Greenhouse Gas Inventory 1990–2022* (Ministry for the Environment, 2024).

A2.4.2 Uncertainty and time-series consistency

The uncertainties in net emissions from *Afforestation and reforestation* are ±20.1 per cent and ±19.1 per cent at the 95 per cent confidence interval in 2021 and 2022, respectively. These are based on the uncertainties in emissions from post-1989 planted forests, post-1989 natural forests and their corresponding HWP (table A2.17 and table A2.18).

The uncertainties in net emissions from *Deforestation* are determined by the forest type (table A2.17). The combined uncertainty introduced into emissions from *Deforestation*, at the 95 per cent confidence interval, in both 2021 and 2022, was ±1.9 per cent (table A2.18).

The combined uncertainties in net emissions from *Forest management* in 2021 and 2022 are ±47.8 per cent and ±47.1 per cent at a 95 per cent confidence interval (table A2.18). This is the combined uncertainty of pre-1990 natural forest and pre-1990 planted forest and includes uncertainty associated with HWP.

Further detail on the uncertainty in net emissions for pre-1990 natural forest, pre-1990 planted forest, post-1989 planted forest, post-1989 natural forest and HWP is provided in chapter 6, section 6.3.3 and section 6.9.3 of Inventory 2024 (Ministry for the Environment, 2024).

Total uncertainties in New Zealand's estimates of emissions for *Afforestation and reforestation*, *Deforestation* and *Forest management* activities were ±51.9 per cent and ±50.9 per cent at a 95 per cent confidence interval in 2021 and 2022 respectively (table A2.18).

Uncertainty also arises from the determination of the LTA carbon stock and LTA age for production planted forests in *Afforestation and reforestation*. The estimated LTA carbon stock reflects current forest management based on the best information available (Dovey and Wakelin, unpublished). Inputs include growth rates (represented by yield tables derived from the LUCAS forest plot network), rotation age, species split in the planted forest estate, and the lifespan of wood products (section A2.3.2). The simulation to determine the LTA estimate was run over eight rotations and was found to be reasonably insensitive to changes in inputs, especially given the expected average rotation lengths, relative to any delayed emissions from HWP or harvest residues (Dovey and Wakelin, unpublished). It is not clear the extent to which uncertainty in LTA carbon stock or LTA age estimates will affect overall uncertainty in emissions estimates, and further work to quantify this is planned.

Table A2.17: Uncertainty in New Zealand's estimates for *Afforestation and reforestation*, *Deforestation* and *Forest management* activities in 2021 and 2022

	Uncertainty (%) at a 95% confidence interval							
	Afforestation and reforestation		Deforestation				Forest management	
	Post-1989 planted forest	Post-1989 natural forest	Pre-1990 natural forest	Pre-1990 planted forest	Post-1989 planted forest	Post-1989 natural forest	Pre-1990 natural forest	Pre-1990 planted forest
2021 and 2022 activity data								
Land area	±8.0	±8.0	±5.0	±5.0	±5.0	±5.0	±5.0	±5.0
2021 and 2022 emission factors								
Biomass carbon stocks (losses)	±20.5	–	±27.2	±20.7	±20.5	±27.0	–	±20.7
Biomass carbon change (gains)	±9.6	±44.8	–	–	–	–	±119.6	±11.9
Soil carbon stocks	±10.4	±10.4	±7.9	±12.3	±10.4	±10.4	±7.9	±12.3
Harvested wood products	±68.2	–	–	–	–	–	–	±68.2
Total uncertainty by activity and forest type								
2021	**±20.1**	**±0.9**	**±0.2**	**±1.2**	**±1.4**	**±0.0**	**±13.8**	**±45.8**
2022	**±19.1**	**±0.9**	**±0.2**	**±0.5**	**±1.8**	**±0.0**	**±14.0**	**±45.0**

Note: All land that has been afforested or reforested since 1 January 1990 is defined as post-1989 forest, unless occurring on land deforested since 1 January 1990. Land deforested since 1 January 1990 includes land that was pre-1990 natural forest, pre-1990 planted forest, post-1989 planted forest or post-1989 natural forest.

Table A2.18: Total uncertainty in New Zealand's estimates for *Afforestation and reforestation*, *Deforestation* and *Forest management* in 2021 and 2022

Year and activity	Uncertainty in emissions (%) at a 95% confidence interval
2021	
Afforestation and reforestation uncertainty	20.1
Deforestation uncertainty	1.9
Forest management uncertainty	47.8
Total	**51.9**
2022	
Afforestation and reforestation uncertainty	19.1
Deforestation uncertainty	1.9
Forest management uncertainty	47.1
Total	**50.9**

A2.4.3 Quality control and quality assurance

Quality-control and quality-assurance procedures have been adopted for all data collection and data analyses, to be consistent with the IPCC General Guidance and Reporting (IPCC, 2006b) and New Zealand's LULUCF inventory quality-control and quality-assurance plan. Quality-control and quality-assurance plans were established for each type of data used to determine carbon stock and stock changes, as well as the areal extent and spatial location of land-use changes. All data were subject to an independent and documented quality-assurance process. Data validation rules and reports were established to ensure all data are fit for purpose and of a consistent and known quality, and that data quality continues to be improved over time. The data used to derive the country-specific yield tables and average carbon values have also undergone quality assurance, as described in annex 5, section A5.2.5 of Inventory 2024 (Ministry for the Environment, 2024).

A2.4.4 Planned improvements

The following methodological improvements are planned to support the accounting approach to the LULUCF sector.

- Technical corrections to the FRL to incorporate:
  - actual deforestation, and corresponding changes to the area of forests accounted for under *Forest management*, occurring during NDC1
  - where appropriate, updates to carbon stock changes and yield tables based on further forest plot measurements.
- Investigation of options for reconciling the actual emissions from *Afforestation and reforestation* activities with the emissions included in the averaging approach at the end of NDC1. This includes determining whether *Afforestation and reforestation Above LTA* emissions are consistent with expected values, and accounting for any difference, either through an FRL or an end-of-period recalculation of the LTA.
- Improvement to the approach for defining the background level for natural disturbances in the *Afforestation and reforestation* and *Forest management* categories. This includes the approach for implementing the natural disturbance provision when it is invoked for *Afforestation and reforestation* in the context of LTA accounting.
- Investigation to further characterise the area, species composition and management practices in permanent forests and determine the corresponding LTA carbon stock and age.
- Investigation of options for determining the effect of LTA uncertainty on accounting quantities for *Afforestation and reforestation*.
- Confirmation of areas of deforestation occurring in 2021 and 2022 through land use mapping.

A2.5 Demonstration that activities apply

A2.5.1 Year of the onset of an activity

The 2013 Kyoto Protocol Supplement requires Parties to account for Land Use, Land-Use Change and Forestry emissions and removals from afforestation, reforestation and deforestation activities beginning with the onset of the activity or the beginning of the reporting period, whichever is later (IPCC, 2014). In practical terms, this means there is a need to differentiate activities that occurred between 1 January 1990 and 31 December 2020 from those occurring during NDC1.

The area subject to *Afforestation and reforestation* activities in each year is estimated from the LUCAS land use map and the NEFD survey (Ministry for Primary Industries, 2023a), as described in annex 5, section A5.2.1 and section A5.2.2 of Inventory 2024 (Ministry for the Environment, 2024). This information ensures the activity is attributed to the correct year of onset.

Deforestation is first detected using annual satellite imagery and confirmed using high resolution satellite imagery or aerial photography. The year of onset (destocking year) is therefore determined from the first year of detection of forest loss in the annual satellite imagery time series. Because deforestation mapping has not yet been completed for activity occurring in 2021 and 2022, the total deforestation area for these years has been estimated as described in annex 5, section A5.2.2 of Inventory 2024 (Ministry for the Environment, 2024).

It can take up to four years following the loss of forest cover to determine that replanting or revegetation has occurred. This is because sometimes the land owner does not replant trees immediately, but leaves the land fallow for a time. The process for monitoring this unclassified deforestation is described in section A2.5.2. When deforestation is finally confirmed, the deforestation is attributed to the year when forest cover was removed.

A2.5.2 Distinction between harvesting and deforestation

New Zealand has used the definition of *Deforestation* from the 2006 IPCC Guidelines: "the direct human-induced conversion of forested land to non-forested land" (IPCC, 2006a, p 4.74). Deforestation is different from harvesting, in that harvesting is part of usual forest management practice and involves the temporary loss of forest cover with no change in land use.

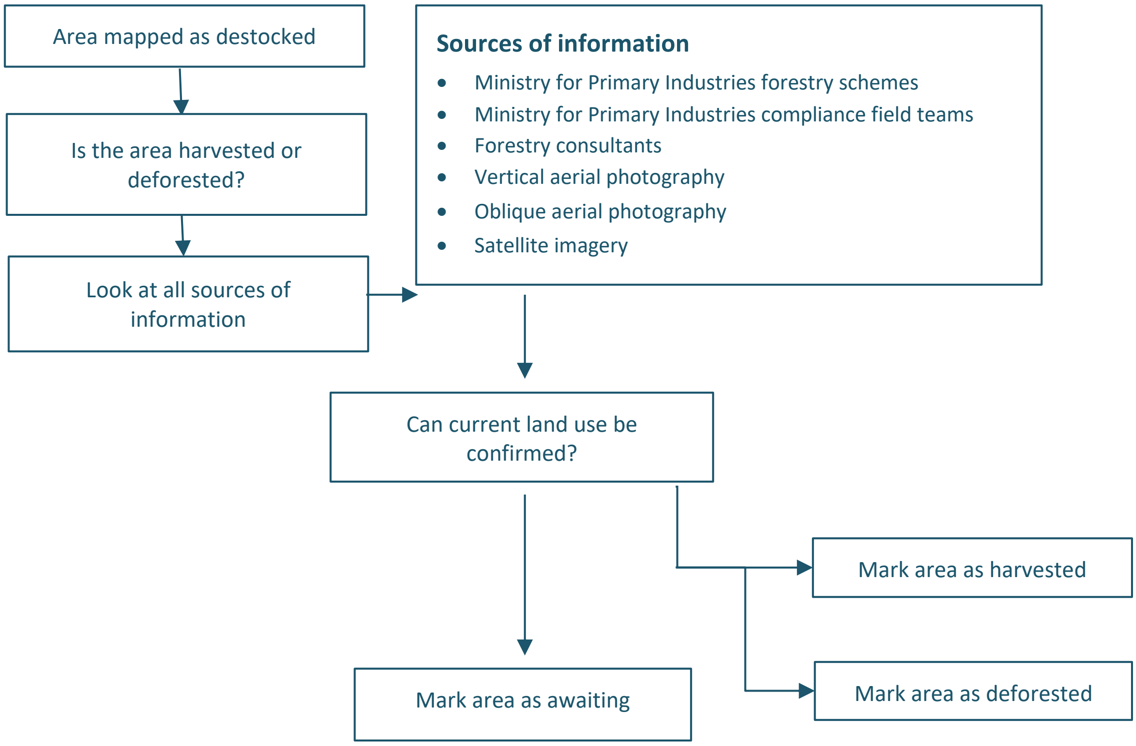
In New Zealand, temporarily unstocked or cleared areas of forest (eg, harvested areas and areas subject to disturbances) remain designated as *Forest land* unless a change in land use is confirmed or if, after four years, there is no evidence of forestry activities occurring (ie, either through replanting or regeneration). This follows the process for determining whether land is subject to direct human-induced deforestation as set out in section 2.6.2.1 of the 2013 Kyoto Protocol Supplement (IPCC, 2014). New Zealand has defined the expected period between the removal of tree cover and successful natural regeneration or planting as four years. In New Zealand, the tree grower and land owner are often different people. Forest land can be temporarily unstocked for several years while land owners decide what to do with land after harvesting.

Several activities are carried out to determine if land-use change has occurred, including the analysis of satellite imagery and aerial photography. The use of aerial photography is described in chapter 6, section 6.2 of Inventory 2024.

Evidence from the NZ ETS is also used to confirm *Deforestation*. Under the NZ ETS, owners of pre-1990 planted forest or post-1989 forest (if they are participants in the scheme) are required to notify the Government of any deforestation activity (Ministry for Primary Industries, 2024). A data-sharing agreement is in place that allows for the Ministry for Primary Industries, the agency that administers forestry aspects of the NZ ETS, to provide the Ministry for the Environment with regular updates of the area of confirmed *Deforestation*.

A summary of the decision-making process for determining whether *Deforestation* has occurred, including all sources of information, is shown in figure A2.3. Once a land-use change is mapped and confirmed, the *Deforestation* emissions will be reported in the year of forest clearance.

Figure A2.3: Verification of deforestation in New Zealand



A2.5.3 Distinction between afforestation and shrubland

For a shrubland area to be classed as forest land (and be included as an *Afforestation and reforestation* activity), as opposed to *Grassland with woody biomass*, it must meet various criteria including the forest definition criteria of having at least 30 per cent cover and being at least 1 hectare in size and 30 metres in width. It must also have the potential to reach 5 metres in height within a 30-to-40-year timeframe under current land management, and there must be evidence of intention for the land to be managed as a forest.

The potential to reach 5 metres is determined using various ancillary data including:

- location with respect to the treeline: shrub species located below but within 225 vertical metres of the treeline are not considered to have the potential to reach 5 metres in height within the required timeframe (Newsome et al, 2011)
- environmental conditions: a range of environmental conditions limit growth of shrub species in New Zealand. These include soil type, climatic conditions, geothermal activity and salt spray (Newsome et al, 2011). When a shrubland area falls within one of these zones of limitation, it is classed as *Grassland with woody biomass*
- geographical context: shrubland areas in a grazing context are unlikely to grow to 5 metres in height unless there is evidence of livestock exclusion, such as a fence line or a change to steep terrain (gully or hill), which provides a natural barrier to livestock.

The evidence that the afforestation is human induced includes data from the following.

- NZ ETS forest mapping: if an area has been accepted into the NZ ETS this is considered to be strong evidence of afforestation. The area will have been checked to verify establishment date and the potential of the area to grow to 5 metres in height. The fact the land owner has entered the area in the NZ ETS, (with associated application costs) is considered strong evidence of their intention to grow a forest.

- Aerial imagery: showing fence lines, spot spraying or regular planting patterns consistent with the establishment of indigenous forest cover.

The decision tree relating to this classification of shrubland areas is described in the Grassland with woody biomass section of the *Land Use and Carbon Analysis System: Satellite Imagery Interpretation Guide for Land-Use Classes* (Ministry for the Environment, 2012, p 28).

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Annex 3: Methodologies used to estimate greenhouse gas emission reductions or removals from policies and measures

Table A3.1: Methodologies used to estimate greenhouse gas emission reductions or removals from policies and measures

Policy description	Method description[325]
Overarching policies	
Climate Strategy	Not estimated. No direct abatements associated.
New Zealand Emissions Trading Scheme (NZ ETS)	Agriculture: Forestry driven stock change analysis based on spatial analysis, historical data and trends, and advice from subject matter experts was used to determine impacts on sheep, beef cattle, and deer populations. Energy: The NZ ETS is applied as an additional cost to fuels and this influences the fuel switching rates within the Supply and Demand Energy Model. Industrial Processes and Product Use (IPPU): Estimates based on a wide range of stakeholder opinions to assess the relative contributions to historical and future abatement (ie, difference between with existing measures (WEM) and without measures (WOM) scenarios) from the three main synthetic greenhouse gas policies (NZ ETS, Permitting scheme for imports and exports of bulk hydrofluorocarbons, and Voluntary product stewardship scheme for refrigerants). Land Use, Land-Use Change and Forestry (LULUCF): See method description for other LULUCF policies below. Transport: The NZ ETS is part of transport fuel costs. Its impact on gross transport emissions is estimated through its effects on electric vehicle (EV) uptake and travel demand. Waste: Bottom-up estimates derived from inventory models were used to generate the waste estimates for *New Zealand's Greenhouse Gas Inventory 1990–2022* (Inventory 2024),[326] in line with the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.[327]
First emissions reduction plan (ERP1)	Not estimated. The policies and associated abatement impacts attributed to implementing ERP1 are reported by policy and sector rather than as a standalone set.
Funding and finance initiatives	
New Zealand's Sovereign Green Bond Programme	Not estimated. No direct abatements associated.
New Zealand Green Investment Finance Limited (NZGIF)	Not estimated. No direct abatements associated.

325 Estimates are produced using sector-based emissions projections models.

326 Ministry for the Environment. 2024. *New Zealand's Greenhouse Gas Inventory 1990–2022*. Wellington: Ministry for the Environment.

327 IPCC. 2006. Eggleston HS, Buendia L, Miwa K, Ngara T and Tanabe K. (eds). *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Prepared by the National Greenhouse Gas Inventories Programme. Japan: IGES, Japan: Institute for Global Environmental Strategies for IPCC.

Policy description	Method description[325]
Climate-related disclosures	Not estimated. No direct abatements associated.
State Sector Decarbonisation Fund (SSDF)	Emissions reductions from state sector decarbonisation fund activities are calculated as estimated reduction (increase) in fuel use arising from projects times emissions factor of the relevant fuel.
Energy: strategies	
Electrify NZ	Consenting costs reduced for future generation build within model to reflect easier consenting process. Emissions reductions are estimated based on comparison with the counterfactual model with no consenting cost reductions.
Hydrogen Action Plan	Not estimated. No direct abatements associated.
Carbon capture, utilisation and storage (CCUS)	Not estimated. Modelling updates were not complete at time of report preparation.
Energy: energy efficiency	
Equipment Energy Efficiency programme	Not estimated.
Publicly Available Specifications	Not estimated. No direct abatements associated.
Gen Less	Not estimated. No direct abatements associated.
Support for Energy Education in Communities Programme	Not estimated. Not primarily for emissions reductions.
Energy: business decarbonisation	
Business decarbonisation programmes	Emission reduction estimates from business programme activities are calculated as estimated reduction (increase) in fuel use arising from projects multiplied by the emissions factor of the relevant fuel.
Energy Transition Accelerator Programme	Included elsewhere. Abatement impact is included as part of business decarbonisation programmes.
Regional Energy Transition Accelerator	Included elsewhere. Abatement impact is included as part of business decarbonisation programmes.
Technology Demonstration Programme	Included elsewhere. Abatement impact is included as part of business decarbonisation programmes.
Sector Decarbonisation Programme	Included elsewhere. Abatement impact is included as part of business decarbonisation programmes.
Government Investment in Decarbonising Industry (GIDI) Fund	Emissions reduction from GIDI projects is calculated as estimated reduction (increase) in fuel use arising from projects multiplied by emissions factor of the relevant fuel, against a stated project baseline (what would have happened without project funding).
Energy: other energy policies	
Māori and Public Housing Renewable Energy Fund	Not estimated. Not primarily for emissions reductions.
Community Renewable Energy Fund	Not estimated. Not primarily for emissions reductions.
National Direction for Greenhouse Gas Emissions from Industrial Process Heat	The National Direction is included in the WEM model by reducing coal use for applicable sectors and energy uses. These results are compared to model counterfactual results without these changes, to estimate emission reductions.
Energy: Building and construction	
Improvements to the energy efficiency requirements in the New Zealand Building Code	Calculation of per cent reduction using components of energy emissions forecast as baseline, with reduction estimate from Passive House Institute modelling.
Technical methodologies to measure embodied carbon and operational carbon	Not estimated. No direct abatements associated.
Energy performance ratings: National Australian Built Environment Rating System – New Zealand (NABERSNZ™)	Not estimated.

Policy description	Method description[325]
Insulation and heating grants: Warmer Kiwi Homes Programme	Emissions reduction from insulation installs is calculated as estimated reduction in heating demand use multiplied by emissions factor of the relevant fuel. Reduction estimates are derived from a multi-year study of over 100 homes, measuring actual indoor and outdoor temperature and energy use, before and after insulation treatment.
Transport	
Electric vehicle charging infrastructure	Not estimated. No implementation plan available to assist quantification.
Clean Vehicle Standard and Clean Vehicle Discount Scheme	Using the Vehicle Fleet Model (VFM), primarily based on the impact on EV uptake.
Road user charges exemptions for electric vehicles	Using the VFM, primarily based on the impact on EV uptake.
Freight and Supply Chain Strategy	Not estimated. Difficult to establish a direct relationship between the strategy and vehicle emissions.
Public transport bus decarbonisation	Using the VFM, primarily based on the impact on EV uptake.
Zero-emissions trucks and buses	Not estimated. Unable to develop a robust methodology at the time.
Low Emissions Transport Fund	Not estimated. Difficult to establish a direct relationship between the programme and vehicle emissions.
Vehicle Fuel Economy Labelling	Not estimated. Difficult to establish a direct relationship between the programme and vehicle emissions.
Industrial Processes and Product Use (IPPU)	
Synthetic greenhouse gas levy	Not estimated.
Permitting scheme for imports and exports of bulk hydrofluorocarbons	Estimates based on a wide range of stakeholder opinions to assess the relative contributions to historical and future abatement (ie, difference between WEM and WOM scenarios) from the three main synthetic greenhouse gas policies (NZ ETS, permitting scheme for imports and exports of bulk hydrofluorocarbons, and voluntary product stewardship scheme for refrigerants).
Voluntary product stewardship scheme for refrigerants	
Agriculture	
A fair and sustainable pricing system for on-farm agricultural emissions	Not estimated. Modelling updates were not complete at time of report preparation.
Centre for Climate Action on Agricultural Emissions	Not estimated. Research-based policy, no direct abatements associated.
New Zealand Agricultural Greenhouse Gas Research Centre	Not estimated. Research-based policy, no direct abatements associated.
Global Research Alliance on Agricultural Greenhouse Gases (GRA)	Not estimated. Research-based policy, no direct abatements associated.
Sustainable Food and Fibre Futures	Not estimated. Research-based policy, no direct abatements associated.
Sustainable Land Management and Climate Change Research Programme	Not estimated. Research-based policy, no direct abatements associated.
Synthetic nitrogen fertiliser cap (N-cap)	Simple Excel-based calculation based on research and advice from subject matter experts to determine impacts on fertiliser use.
Regulations to manage freshwater introduced under the Essential Freshwater package (excluding the impact of the N-cap)	Simple Excel-based calculation based on research and advice from subject matter experts to determine impacts on fertiliser use and dairy cattle populations.
Land Use, Land-Use Change and Forestry (LULUCF)	
NZ ETS	Bottom-up and based on the initiative start and registered forests to model the mitigation impact. Applies LULUCF accounting rules as described in chapter 2, section 2.3.4. Only afforestation since the establishment of the initiative is included. This creates a distinction between forests that were established before and after the initiative commenced, and ensures only forests established as a direct result of that initiative are included. The assessment of the historical and
Afforestation Grant Scheme	
One Billion Trees	
Sustainable Land Management Hill Country Erosion Programme	
Erosion Control Funding Programme	

Policy description	Method description[325]
Permanent Forest Sink Initiative (PFSI)	projected impact is primarily based on Ministry for Primary Industries data, annual evaluation surveys and external research. The NZ ETS estimates are a combination of 'additional' afforestation and 'reduced' deforestation that could be attributed to the NZ ETS.
Afforestation on Crown-owned land	Not estimated. Modelling updates were not complete at time of report preparation.
Woody biomass	Not estimated.
Maximising forest carbon programme	Not estimated.
National Environmental Standards for Commercial Forestry	Not estimated.
Waste	
Food waste reduction (behaviour change)	Bottom-up estimates derived from inventory models were used to generate the waste estimates for Inventory 2024, in line with the 2006 IPCC Guidelines.
Limits on organic waste disposal	Not estimated for the Biennial Transparency Report (BTR). Policy implementation uncertainty.
Kerbside expansion	Not estimated for the BTR. Policy implementation uncertainty.
Paper waste diversion (business)	Not estimated for the BTR. Policy implementation uncertainty.
Wood waste reduction and diversion	Bottom-up estimates derived from inventory models were used to generate the waste estimates for Inventory 2024, in line with the 2006 IPCC Guidelines.
Landfill gas capture expansion	Not estimated for the BTR. Policy implementation uncertainty.
Waste disposal levy under the Waste Minimisation Act 2008	Bottom-up estimates derived from inventory models were used to generate the waste estimates for Inventory 2024, in line with the 2006 IPCC Guidelines.
Waste Minimisation Fund	Not estimated for the BTR. Policy implementation uncertainty.
Product Stewardship	Not estimated for the BTR. Policy implementation uncertainty.
National Environmental Standard for Air Quality	Included elsewhere. Abatement impact is included within NZ ETS – impact on waste sector emissions.
Public sector leadership	
Carbon Neutral Government Programme	Not estimated. No direct abatements associated.
Sustainable Government Procurement	
Climate implications of policy assessment	