New Zealand's Second Biennial Report

UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

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Introduction

New Zealand is pleased to submit its *Second Biennial Report* under the United Nations Framework Convention on Climate Change. The report follows the biennial reporting guidelines for developed country Parties, and is composed of six chapters:

I. Information on greenhouse gas emissions and trends

II. Quantified economy-wide emission reduction target

III. Progress in achievement of quantified economy-wide emission reduction targets

IV. Projections

V. Provision of financial, technological and capacity-building support to developing country Parties

VI. Other reporting matters.

The report also includes all of the relevant common tabular format (CTF) tables contained in Decision 19/CP.18.

Emissions data in CTF Table 1 are presented in Appendix A.

Supplementary information on projections is contained in Appendix B.

New Zealand's First Biennial Report (2013)[1] was reviewed by a UN expert review team. A table summarising the recommendations of the review report FCCC/TRR.1/NZL,[2] and how they have been addressed in the *Second Biennial Report*, is included in Appendix C.

[1] www.mfe.govt.nz/publications/climate-change/new-zealands-first-biennial-report-under-united-nations-framework.

[2] unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600008017.

Chapter I: Information on greenhouse gas emissions and trends

Introduction

New Zealand's Greenhouse Gas Inventory (the Inventory) is the official annual report of all anthropogenic (human-induced) emissions and removals of greenhouse gases in New Zealand. The Inventory measures New Zealand's progress against obligations under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol.

The reporting of emissions under the UNFCCC covers five sectors: energy, industrial processes and product use, agriculture, land use, land-use change and forestry (LULUCF), and waste. The industrial processes and product use sector is now used to report combined emissions from the industrial processes sector and the solvent and other product use sector. This is a result of adopting the Intergovernmental Panel on Climate Change (IPCC) 2006 guidelines, which have been applied for the first time in the Inventory published in 2015.

The Inventory reports emissions and removals of the greenhouse gases carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs) and perfluorocarbons[3] (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride[4] (NF_3). Only emissions and removals of these gases (direct greenhouse gases) are accounted for in total emissions under the UNFCCC and the Kyoto Protocol. Emissions of the indirect greenhouse gases, carbon monoxide (CO), sulphur dioxide (SO_2), oxides of nitrogen (NO_x) and non-methane volatile organic compounds (NMVOCs) are also included in the Inventory, but are not accounted for under the UNFCCC and the Kyoto Protocol.

New Zealand's most recent Inventory report was first submitted to the UNFCCC in April 2015 and was resubmitted in July 2015 with minor technical updates.[5] The Inventory includes information on emissions and removals of greenhouse gases from 1990 to 2013, and supplementary information required for the Kyoto Protocol.[6]

National trends: emissions by sector and by gas

The information on greenhouse gas emissions presented in this report is the same as the information published in the Inventory.

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3 Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) are referred to as 'halocarbons' in the common reporting format (CRF) tables.

4 Nitrogen trifluoride emissions do not occur in New Zealand.

5 Ministry for the Environment. 2015. *New Zealand's Greenhouse Gas Inventory 1990–2013*. www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990-2013.

6 The inventory submission is always delayed by about 15 months due to the time required for data collection and processing.

Total emissions

As presented in the Inventory submitted in 2015, New Zealand's total (gross) greenhouse gas emissions (excluding the LULUCF sector) were 80,961.64 kt CO_2 eq in 2013. Between the base year (1990), and 2013 New Zealand's total emissions increased by 21.3 per cent. The average annual growth of emissions was approximately 0.9 per cent per year.

The five sources that contributed the most to this increase in total emissions since 1990 were *Road transportation*, *Public electricity and heat production*, *Agricultural soils*, *Consumption of halocarbons and sulphur hexafluoride* (SF_6), and *Enteric fermentation*.[7]

Net emissions

New Zealand's net greenhouse gas emissions (all five sectors including the LULUCF sector) in 2013 were 54,200.53 kt CO_2 eq. This represents an increase of 16,134.82 kt CO_2 eq (42.4 per cent) since 1990.

Sector trends

The agriculture and energy sectors were the largest contributors to New Zealand's total greenhouse gas emissions in 2013, contributing 48.4 per cent and 39.1 per cent of total emissions respectively. The emissions associated with the industrial processes and product use sector and the waste sector were relatively minor at 6.3 per cent and 6.2 per cent of total emissions respectively.

Emission trends by gas

In 2013, methane and carbon dioxide contributed the largest proportion of total emissions (44.0 per cent and 42.7 per cent respectively). Nitrous oxide (11.2 per cent) and HFCs, PFCs and SF_6 (2.1 per cent) made up the balance.

More about emissions

For more information on New Zealand's greenhouse gas emissions, see the CTF tables submitted with this report and printed below, and the Inventory published in 2015 that can be viewed on the Ministry for the Environment website,[8] and is also available on the UNFCCC website.

National Inventory System

New Zealand's National Inventory System operates in line with relevant UNFCCC and Kyoto Protocol guidelines, and is constantly improved.

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7 Methane emissions produced from ruminant livestock.

8 www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990-2013.

National Inventory arrangements

The Climate Change Response Act 2002 was enacted to enable New Zealand to meet its international obligations under the UNFCCC and Kyoto Protocol. According to the UNFCCC definition, a national system for a Party included in Annex 1 includes all institutional, legal and procedural arrangements for estimating anthropogenic emissions by sources, and removals by sinks, of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

A ministerial directive for the administration of the Climate Change Response Act names the Ministry for the Environment as New Zealand's 'Inventory Agency'. The Ministry for the Environment is responsible for the overall development, compilation and submission of the Inventory to the UNFCCC secretariat. The Ministry for the Environment chairs a cross-agency Reporting Governance Group that provides leadership over the reporting, modelling and projections of greenhouse gas emissions and removals. The Climate Change Response Act also contains compliance provisions, including for the authorisation of inspectors to collect information needed to estimate emissions or removals of greenhouse gases.

New Zealand has developed its own National Inventory System Guidelines that document the tasks required for making an official submission. The guidelines cover multiple aspects of the national Inventory production including planning, Inventory processes, quality assurance and control, and communication and error management. These guidelines detail a quality assurance and control plan to formalise, document and archive the quality assurance and control procedures.

Changes to arrangements

No changes have been made in the legal or institutional arrangements in the National Inventory System since the *First Biennial Report* and *Sixth National Communication* were submitted in December 2013.

Although there were no major changes in the structure of the national system, operational improvements designed to improve the quality of New Zealand's Inventory reports have occurred during the past two years. The focus of this work was making the National Inventory System more robust, and achieving better transparency, comparability, consistency, completeness and accuracy in the Inventory. Since New Zealand's *First Biennial Report* and *Sixth National Communication* were submitted, improvements in the Inventory have focussed on:

- significant mandatory changes and improvements as part of adopting the IPCC 2006 Guidelines.[9] First applied in the Inventory published in 2015, these included changing to the web-based CRF Reporter software
- additional improvements to the accuracy of emissions and removals in all five sectors
- the review of the Terms of Reference for the Reporting Governance Group, which is responsible for approving all changes, improvements and major recalculations in the Inventory
- updated quality control processes and procedures for sectors

[9] The IPCC 2006 Guidelines for National Inventories as decided at the UNFCCC Conference of the Parties in Warsaw, November 2013 (Decision 24/CP.19).

- developing the expertise of Inventory officials
- Inventory officials undertaking training under the UNFCCC for expert review.

For more information on New Zealand's National Inventory System and changes to arrangements since the *First Biennial Report*, see Annex B of the *Sixth National Communication*,[10] and New Zealand's Greenhouse Gas Inventory.

Common Tabular Format (CTF) Tables

For ease of reading this report, the tables of emissions data are included as Appendix A.

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[10] Ministry for the Environment. 2013. *New Zealand's Sixth National Communication*. www.mfe.govt.nz/publications/climate-change/new-zealands-sixth-national-communication-under-united-nations-framework.

Chapter II: Quantified economy-wide emission reduction targets

Introduction

Climate change is a global issue, and New Zealand is fully committed to playing its part in a global response. To achieve this, New Zealand has set a number of targets for reducing emissions and contributing to the global solution. This chapter describes these targets, as well as conditions and assumptions that are relevant to achieving them.

New Zealand's targets

New Zealand has set five emission reduction targets:

1. A first commitment period target under the Kyoto Protocol to reduce emissions to 1990 levels over the period 2008–2012.
2. An unconditional target of 5 per cent below 1990 levels by 2020 for the period 2013–2020.
3. A conditional responsibility target of between 10 and 20 per cent below 1990 levels by 2020.
4. New Zealand's Intended Nationally Determined Contribution to reduce emissions by 30 per cent below 2005 levels by 2030.
5. A longer-term target to reduce emissions by 50 per cent below 1990 levels by 2050.

These targets are presented in further detail below.

First commitment period target under the Kyoto Protocol

New Zealand's target for the first commitment period of the Kyoto Protocol (2008–2012) was a zero per cent increase of greenhouse gas emissions on 1990 levels. Following completion of the additional period for fulfilling commitments (the "True-Up Period", from 10 August 2015–18 November 2015), New Zealand is expecting to have met this target through a combination of domestic emissions reductions, carbon sequestration by forest sinks, and participation in international emissions trading. New Zealand's True-Up Period report will be published by 2 January 2016, and this report will be reviewed by an international team of experts in February 2016. The publication of the final review report on the UNFCCC website is expected to confirm that New Zealand met its first commitment period target.

Quantified economy-wide emissions reduction target for 2020

New Zealand has put forward two economy-wide emission reduction responsibility targets for the period 2013–2020:

- an unconditional target of five per cent below 1990 levels by 2020
- a conditional target of between 10 and 20 per cent below 1990 levels by 2020.[11]

These targets are the same as presented in *New Zealand's First Biennial Report*. Both targets are detailed below.

New Zealand's unconditional five per cent target for 2020

On 16 August 2013, the New Zealand Government announced an unconditional 2020 climate change target to reduce emissions to five per cent below 1990 emissions by 2020. For the period 2013–2020, New Zealand has chosen not to commit to a climate change target under the Kyoto Protocol's second commitment period. Instead, New Zealand has joined countries responsible for more than 70 per cent of global greenhouse gas emissions that have made international pledges under the United Nations Framework Convention on Climate Change (UNFCCC).

Based on UNFCCC methodology, this target is equivalent to a Quantified Emissions Limitation or Reduction Objective (QELRO) of 96.8 per cent on 1990 emissions over the period 2013–2020. Based on gross emissions in 1990 as presented in Chapter I, this QELRO corresponds to a carbon budget of 516.68 megatonnes of carbon dioxide equivalent for the period 2013–2020.

New Zealand is applying the Kyoto Protocol framework of rules in reporting and measuring progress towards this unconditional target, to ensure that its actions are transparent and have integrity. This includes applying Kyoto Protocol accounting rules to the target, including those agreed in Durban in 2011 for land use, land-use change and forestry (decision 2/CMP.7 refers). For 2013–2020, as a Party to the Kyoto Protocol, New Zealand is completing activity-based reporting under Article 3.3 of the Kyoto Protocol for afforestation, reforestation and deforestation, and forest management under Article 3.4 of the Kyoto Protocol.

In addition, when reporting emissions from the LULUCF sector under the UNFCCC, New Zealand continues to use a land-based approach as required by good practice guidance for LULUCF.

Further information about this target is contained in CTF Tables 2a–2f below.

CTF Table 2a: Emission reduction target: base year and target[a]

Base year/base period	1990
Emission reduction target	5 per cent below 1990 by 2020
Period for reaching the target	2013–2020

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[11] As noted in document FCCC/SB/2011/INF.1/Rev.1.

CTF Tables 2b and 2c: Description of quantified economy-wide emission reduction target[a]

Gases covered	Base year	Global warming potential
CO_2	1990	IPCC Fourth Assessment Report
CH_4	1990	IPCC Fourth Assessment Report
N_2O	1990	IPCC Fourth Assessment Report
HFCs	1990	IPCC Fourth Assessment Report
PFCs	1990	IPCC Fourth Assessment Report
SF_6	1990	IPCC Fourth Assessment Report
NF_3	1990	IPCC Fourth Assessment Report
Sectors covered	**Comments**	
Energy		
Transport[b]		
IPPU		
Agriculture		
LULUCF	LULUCF is not included in the target's base year emissions	
Waste		

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Transport is reported as a subsector of the energy sector.

CTF Table 2d: Approach to counting emissions and removals from the LULUCF sector[a]

Role of LULUCF	Comments
Emissions and removals from the LULUCF sector are counted towards achievement of the target	The LULUCF sector is not included in the target's base year emissions
The contribution of the LULUCF sector is calculated using an activity-based approach	Using Kyoto Protocol rules (ie, under Article 3.3 of the Kyoto Protocol for afforestation, reforestation and deforestation, and forest management under 3.4 of the Kyoto Protocol)

Abbreviation: LULUCF = Land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

CTF Table 2e: Possible scale of contributions of market-based mechanisms[a]

CERs	New Zealand will measure progress against its 2020 target as if it had made a commitment under the Kyoto Protocol for the second commitment period, including participation in international carbon markets, and recognising surplus achieved during the first commitment period of the Kyoto Protocol. The scale of contributions of market mechanisms for New Zealand in meeting its 2020 target will not be known until the end of the accounting period for the period 2013–2020.
ERUs	
AAUs[b]	
Carry-over units[c]	
Other mechanism units under the Convention (specify)[d]	

Abbreviations: CER = Certified Emissions Reduction; ERU = Emission Reduction Unit; AAU = Assigned Amount Unit.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] AAUs issued to or purchased by a Party.

[c] Units carried over from the first to the second commitment periods of the Kyoto Protocol, as described in decision 13/CMP.1 and consistent with decision XX /CMP.8.

[d] As indicated in paragraph 5(e) of the guidelines contained in annex I of decision 2/CP.17.

CTF Table 2f: Any other information

New Zealand is applying the Kyoto Protocol's second commitment period rules to its unconditional 2020 target. In practice however, some technical changes may be required to reflect the status of New Zealand's target (as the target is not inscribed in the third column of Annex B of the Doha Amendment to the Kyoto Protocol). New Zealand reserves the right to review the accounting rules it applies to ensure alignment with the Kyoto Protocol and to support a smooth transition to a post-2020 regime.

New Zealand's conditional 10–20 per cent target for 2020

In August 2009, the New Zealand Government announced a 2020 target range to signal New Zealand's commitment to comprehensive efforts to address global climate change.

New Zealand is prepared to take on a responsibility target for greenhouse gas emission reductions of between 10 per cent and 20 per cent below 1990 levels by 2020, if there is a comprehensive global agreement. This means:

- the global agreement sets the world on a pathway to limit temperature rise to no more than 2°C
- developed countries make comparable efforts to those of New Zealand
- advanced and major emitting developing countries take action fully commensurate with their respective capabilities
- there is an effective set of rules for LULUCF
- there is full recourse to a broad and efficient international carbon market.

Longer-term targets

New Zealand's Intended Nationally Determined Contribution

On 7 July 2015, the New Zealand Government submitted its intended nationally determined contribution (INDC) to the UNFCCC secretariat for the period 2021-2030, along with accompanying information to facilitate clarity, transparency and understanding.[12] New Zealand commits to reduce emissions to 30 per cent below 2005 levels by 2030. The 2005 reference year has been chosen for ease of comparability with other countries. This target corresponds to a reduction of 11 per cent from 1990 levels. New Zealand's INDC will remain provisional pending confirmation of the approaches to be taken in accounting for the land sector, and confirmation of access to carbon markets.

A full version of New Zealand's INDC can be found on the UNFCCC secretariat submission portal.[13]

New Zealand's 2050 target

In March 2011, the New Zealand Government notified in the *New Zealand Gazette* a target of 50 per cent reduction in greenhouse gas emissions from 1990 levels by 2050. The 1990 level is

[12] In line with decisions 1/CP.19 and 1/CP.20.

[13] www4.unfccc.int/submissions/INDC/Published%20Documents/New%20Zealand/1/New%20Zealand%20INDC%202015.pdf.

based on New Zealand's gross greenhouse gas emissions as per the agreed accounting rules of the Kyoto Protocol under the UNFCCC.

The 2050 target is based on New Zealand's net greenhouse gas emissions and will take into account any removals or emissions arising from afforestation or deforestation since 1990, consistent with the Kyoto Protocol under the UNFCCC.

New Zealand will continue to regularly review its contributions to international mitigation action taking into account the latest science, development of new technologies, and progress by other countries.

Chapter III: Progress in achievement of quantified economy-wide emission reduction targets and relevant information

Mitigation actions and their effects

Mitigation actions

New Zealand's policy response to emission reductions is informed by a combination of its unique national circumstances, the level of its targets,[14] and recognition that climate change is a long-term issue, necessitating a global response. New Zealand is committed to being part of this response.

New Zealand's economy features a strong agricultural export focus, with around 85 per cent of agricultural production going to international markets. For many developed countries, the agricultural sector constitutes only a small proportion of emissions, on average around 12 per cent, whereas agriculture in New Zealand makes up almost half of total greenhouse gas emissions.[15]

New Zealand has abundant, diverse renewable energy resources and a proud history of renewable electricity development. Around 80 per cent of electricity has been generated from renewable sources in recent years – amongst the highest of countries within the Organisation for Economic Co-operation and Development (OECD). This is predominantly hydroelectricity, with a growing share of generation from wind, geothermal and solar. However, New Zealand's long, thin, mountainous geography, low, dispersed population, and distant location from its main trading markets have contributed to a reliance on fossil fuels in transport to date.

These particular national features mean that the cost of mitigation is likely to be higher for New Zealand than for many other developed countries. Remaining competitive with trade partners while taking responsibility for emissions reductions targets presents a challenge for New Zealand that informs its approach to addressing emissions.

New Zealand will take responsibility for meeting its unconditional target for the period 2013–20 through a combination of:

- domestic emissions reductions
- removal of carbon dioxide by forests
- participation in international carbon markets
- recognising surplus achieved during the first commitment period of the Kyoto Protocol.

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[14] Described in Chapter II of this report.

[15] Ministry for the Environment, *New Zealand's Greenhouse Gas Inventory 1990–2013* www.mfe.govt.nz/sites/default/files/media/Climate%20Change/nz-greenhouse-gas-inventory-snapshot-2015.pdf.

New Zealand continues to develop a broad portfolio of measures to reduce emissions. This takes account of the Government's wider goals, and includes both domestic and global actions. The New Zealand Emissions Trading Scheme (NZ ETS) is New Zealand's principal policy response for reducing domestic emissions, and its primary mechanism to meet international emissions reduction commitments. It is designed to create financial incentives to:

- reduce emissions in New Zealand
- invest in clean technology and renewable power generation
- invest in forests.

The NZ ETS creates an obligation on emitters that are participants in the scheme to report on their emissions and surrender emission units that correspond to their obligations. Before June 2015, NZ ETS participants were required to surrender New Zealand Units (NZU) (the primary unit of trade in the scheme), or eligible international units, to meet their NZ ETS obligations. However, from June 2015 the NZ ETS transitioned into a domestic-only scheme, with only NZUs now eligible to meet surrender obligations.

The NZ ETS creates reporting and surrender obligations on participants within the forestry, industrial processes, stationary energy, liquid fossil fuels and waste sectors. Additionally, the agriculture sector has been required to report on its major emissions sources (methane and nitrous oxide from fertiliser use and livestock) since 1 January 2012. The Government has indicated that emissions from agriculture will be subject to surrender obligations in the NZ ETS only if there are economically viable and practical technologies available to reduce emissions and New Zealand's trading partners make more progress on tackling their emissions in general.

Other key mitigation actions introduced by New Zealand since the last biennial report include:

- Investing in programmes run by the Energy Efficiency and Conservation Authority to improve energy and fuel efficiency through the following initiatives:
  - the Fuel Efficient Tyres programme, which aims to increase the market share of fuel efficient tyres and promote correct tyre inflation
  - the Wood Energy South programme, which aims to promote the switch from fossil fuel to wood energy as a heat source in the Southland region of New Zealand
  - an expanded Heavy Vehicle Fleet programme, which aims to reduce fuel use in heavy vehicle fleets of a medium size
  - the Energy Efficient Meat and Dairy Plant programme, which aims to reduce the use of carbon-intensive fuels in New Zealand's meat and dairy sectors.
- Making considerable investments in public and active transport, including:
  - lifting investment in public transport, with over $1 billion allocated by central government through the National Land Transport Fund to fund public transport infrastructure and services between 2015 and 2018
  - making significant improvements to cycling infrastructure in main urban centres through an overall investment of $333 million generated from central government's commitment of $100 million over four years through the Urban Cycleways Fund. Of this overall investment, $128 million will come from the National Land Transport Fund and $105 million from local government.
- New funding over the next five years to encourage and support the planting of new forests, through the Afforestation Grant Scheme.

In addition, New Zealand continues to take action to reduce emissions in New Zealand and globally in the following areas:

- Research, technology development and sharing of technical expertise, most notably in the agricultural sector. In particular:
  - in 2009, New Zealand led the establishment of the Global Research Alliance on Agricultural Greenhouse Gases to increase:
    - international cooperation and collaboration
    - investment in research, development and the extension of technologies and practices that will help deliver ways to grow more food (and more climate-resilient food systems) without growing greenhouse gas emissions
  - establishing the New Zealand Agricultural Greenhouse Gas Research Centre in 2010, which currently focuses on practical ways to reduce methane and nitrous oxide emissions from pastoral livestock systems, while improving productivity.
- A domestic target to increase renewable electricity to 90 per cent of total generation by 2025.
- Ongoing funding and support to encourage energy efficiency and the uptake of renewable energy through programmes run by the Energy Efficiency and Conservation Authority.
- Playing a leading role in the Friends of Fossil Fuel Subsidy Reform, a group aimed at encouraging the global phase out of harmful and inefficient subsidies to fossil fuel consumption that totalled $510 billion (USD) globally in 2014.
- Sharing New Zealand's long-standing expertise in geothermal energy development. Through the Geothermal New Zealand initiative, government and industry are actively working with other countries as they explore and develop their geothermal energy potential.

A full list of relevant policies and measures that will enable New Zealand to meet its unconditional 2020 target is provided in CTF Table 3 of this chapter.

Key domestic policy reviews completed since *New Zealand's First Biennial Report*,[16] and upcoming planned reviews include:

- a review of the NZ ETS, started in November 2015
- an evaluation of the NZ ETS undertaken in 2015, including interviews with participants within the scheme
- an annual survey of forest owners' intentions, including the effect of the NZ ETS and other policy measures[17]

[16] For a copy of the *Biennial Report*, please see the Ministry for the Environment's website, www.mfe.govt.nz/publications/climate-change/new-zealands-first-biennial-report-under-united-nations-framework.

[17] For copies of the annual survey, please see the Ministry for Primary Industries' website, https://mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/.

- voluntary participation in an APEC Fossil Fuel Subsidy Reform peer review in March 2015 aimed at identifying any inefficient fossil fuel subsidies that lead to wasteful consumption.[18]

Domestic institutional arrangements

New Zealand ratified the Kyoto Protocol in December 2002, and ratified the second commitment period of the Kyoto Protocol by accepting the Doha Amendment on 30 November 2015. The Climate Change Response Act 2002 (the Act) established the legal framework to enable New Zealand to meet its obligations under both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Act includes powers for the Minister of Finance to manage New Zealand's holdings of assigned amount units under the Protocol, and enables the Minister to trade those units on the international market. It established an Inventory Agency[19] and a registry to record holdings and transfers of units.

The NZ ETS was established through the Act, and came into effect in 2008. The Act also provided for the phased entry of sectors into the NZ ETS. A review of the NZ ETS was undertaken in 2011, while New Zealand's economy continued to recover from the global financial crisis. Consequential amendments were made in 2012 to ensure the NZ ETS more effectively supports the Government's economic growth objectives and is flexible enough to cater for a range of future international outcomes in the period 2013–20.[20] A second review of the operation and effectiveness of the NZ ETS began in November 2015.

The Ministry for the Environment is a statutory entity[21] and Government's primary advisor on matters relating to climate change, the environment, and international matters affecting the environment. A Prime Ministerial directive for the administration of the Climate Change Response Act 2002 names the Ministry for the Environment as New Zealand's Inventory Agency, with responsibility for recording and reporting information related to greenhouse gas emissions in accordance with international requirements.

The Ministry for the Environment coordinates climate change policy across government, with many policies and/or their implementation being led by other departments. The full list of these departments and details about their roles and functions is outlined in Chapter 4 of New Zealand's *Sixth National Communication*.[22] There have been no significant changes to domestic institutional arrangements since the release of New Zealand's *Sixth National Communication* and *First Biennial Report*.

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18 The findings of the review can be found on the Ministry of Business, Innovation and Employment's website, www.mbie.govt.nz/info-services/sectors-industries/energy/international-relationships/apec-fossil-fuel-subsidy-reform-peer-review.

19 The Climate Change Response Act 2002 describes the responsibilities of the Inventory Agency as including data collection, reporting and archiving of information. See Chapter 13 of New Zealand's *Greenhouse Gas Inventory* for a description of New Zealand's national system for its greenhouse gas inventory.

20 More detail on this can be found in Chapter 4 of New Zealand's *Sixth National Communication*.

21 The Ministry for the Environment was established under the Environment Act 1986.

22 For a copy of the National Communication, see the Ministry for the Environment's website, www.mfe.govt.nz/publications/climate-change/new-zealands-sixth-national-communication-under-united-nations-framework.

The Environmental Protection Authority (EPA) administers operational elements of the NZ ETS. This includes processing and making decisions about industrial allocations, entitlements and non-forestry emissions returns. The EPA helps participants to ensure they meet their obligations, and it can take compliance action where necessary. The EPA also manages the New Zealand Emission Unit Register (NZEUR), and ensures the integrity, security and availability of the NZEUR. Penetration testing of the security processes that support the NZEUR was successfully completed in 2012 and 2015. The NZEUR continues to conform to all the technical requirements for registries under the Kyoto Protocol, including its connection to the International Transaction Log.

Economic and social impacts of response measures

Legislative decisions on climate change response measures made by the New Zealand Government must have the support of the majority of the Parliament before they can be passed into law. The public consultation phase of the legislative process allows any member of the public, or organisations, to raise concerns and issues about proposed measures. In addition, any legislation introduced to Parliament must be underpinned by a regulatory impact analysis that assesses the economic and social impacts of the measure.

The Act provides for review of the NZ ETS, and the first review was undertaken in 2011. This included an examination of the environmental, social and economic impacts across sectors of the economy – including lower income households and Māori. The second review of the NZ ETS, beginning in 2015, will also take into consideration the distribution of impacts of the scheme between sectors and groups.

The Ministry of Foreign Affairs and Trade provides the Government with advice on international aspects of proposed policies. New Zealand's regular trade, economic and political consultation with other governments, including some non-Annex I Parties, also provides opportunities for those countries to raise any concerns directly. More detailed information on the implementation of policies and measures that minimise adverse social, environmental and economic impacts on non-Annex 1 Parties can be found in Chapter 15 of New Zealand's Greenhouse Gas Inventory 1990–2013.[23]

Estimates of emission reductions and removals and the use of units from the market-based mechanism and land use, land-use change and forestry activities

Table 3.1 below presents New Zealand's total (gross) greenhouse gas emissions in 1990 and 2013. This table is based on New Zealand's Greenhouse Gas Inventory (the Inventory), as submitted to the UNFCCC secretariat in July 2015.

[23] Ministry for the Environment. 2015. *New Zealand's Greenhouse Gas Inventory 1990–2013*. Retrieved from www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990-2013.

Table 3.1: New Zealand's emissions of greenhouse gases, by sector, in 1990 and 2013

Sector	kt CO_2 eq 1990	2013	Change from 1990 (kt CO_2 eq)	Change from 1990 (per cent)
Energy	23,994.6	31,658.9	+7,664.3	+31.9
Industrial processes and product use	3,276.0	5,071.5	+1,795.4	+54.8
Agriculture	34,350.6	39,177.3	+4,826.7	+14.1
Waste	5,099.0	5,054.0	–45.0	–0.9
Total (excluding LULUCF)	**66,720.2**	**80,961.6**	**+14,241.5**	**+21.3**
Land use, land-use change and forestry (LULUCF)	–28,654.4	–26,761.1	+1,893.3	+6.6
Net total (including LULUCF)	**38,065.7**	**54,200.5**	**+16,134.8**	**+42.4**

Note: Net removals from the LULUCF sector as reported under the UNFCCC (chapter 6 of New Zealand's Inventory). Columns may not total due to rounding.

Source: Ministry for the Environment, 2015. *New Zealand's Greenhouse Gas Inventory 1990–2013.* Wellington: Ministry for the Environment.

Accounting under the first commitment period of the Kyoto Protocol[24]

New Zealand's initial assigned amount under the first commitment period (2008-12) of the Kyoto Protocol is recorded as 309,564,733 tonnes CO_2 equivalent (309,565 kt CO_2 eq). The initial assigned amount is five times the total 1990 emissions reported in the inventory submitted as part of *New Zealand's Initial Report under the Kyoto Protocol*.[25]

The initial assigned amount did not change during the first commitment period (2008–12) of the Kyoto Protocol. In contrast, the time series of emissions reported in each inventory submission are subject to continuous methodological improvements. As a result, the total emissions in 1990 as reported in New Zealand's 2014 Greenhouse Gas Inventory[26] are 2.1 per cent lower than the 1990 level of 61,912.9 kt CO_2 eq, which was estimated in 2006 and used in the initial assigned amount calculation.

As noted in Chapter II, New Zealand's True-Up Period report for the first commitment period is expected to be reviewed by an international team of experts in February 2016. The publication of the final review report is expected to confirm that New Zealand met its first commitment period target.

Table 3.2 below presents New Zealand's net emissions and removals from land reported for the first commitment period of the Kyoto Protocol. This includes land subject to afforestation, reforestation and deforestation as reported under Article 3.3 of the Kyoto Protocol.

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[24] New Zealand's target under the first commitment period of the Kyoto Protocol is accounted for using 100 year Global Warming Potentials (GWPs) from the IPCC 2nd Assessment Report. Given this, values reported for the first commitment period will differ from those reported elsewhere in this report which use 100 year GWPs from the IPCC 4th Assessment Report.

[25] Ministry for the Environment. 2006. *New Zealand's Initial Report under the Kyoto Protocol: Facilitating the calculation of New Zealand's assigned amount and demonstrating New Zealand's capacity to account for its emissions and assigned amount in accordance with Article 7 paragraph 4 of the Kyoto Protocol*. Wellington: Ministry for the Environment.

[26] Ministry for the Environment. 2014. *New Zealand's Greenhouse Gas Inventory 1990–2012*. Retrieved from www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990-2012.

Table 3.2: New Zealand's net emissions and removals from land as reported under the first commitment period of the Kyoto Protocol

Source	2008	2009	2010	2011	2012
Afforestation/reforestation (AR)					
Net removals from AR land not harvested in first commitment period (kt CO_2 eq)	–17,405.4	–17,957.2	–18,458.1	–18,828.8	–19,145.9
Emissions from AR land harvested in first commitment period (kt CO_2 eq)	41.9	121.1	265.0	253.1	180.8
Net removals in calendar year (kt CO_2 eq)	**–17,363.5**	**–17,836.0**	**–18,193.1**	**–18,575.7**	**–18,965.1**
Deforestation					
Emissions in calendar year (kt CO_2 eq)	3,166.9	5,616.0	4,087.2	3,376.0	3,996.5
Net removals (kt CO_2 eq)	**–14,196.6**	**–12,220.0**	**–14,105.9**	**–15,199.7**	**–14,968.6**
Accounting quantity (kt CO_2 eq)	**–14,238.5**	**–12,341.2**	**–14,370.9**	**–15,452.8**	**–15,149.5**

Note: Accounted for using 100 year Global Warming Potentials (GWPs) from the IPCC 2nd Assessment Report.

The accounting quantity for the first commitment period is calculated by applying the accounting rules from Decision 16/CMP.1 to net emissions.

Source: Ministry for the Environment. 2014. *New Zealand's Greenhouse Gas Inventory 1990–2012*. Wellington: Ministry for the Environment.

Reporting for the period 2013–20

As noted in Chapter II of this report, New Zealand is applying the Kyoto Protocol framework of rules in reporting and measuring progress towards its unconditional target for the period 2013–20, to ensure such reports are transparent and have integrity.

Based on UNFCCC methodology, New Zealand's unconditional target for 2013–20 is equivalent to a Quantified Emissions Limitation or Reduction Objective (QELRO) of 96.8 per cent on 1990 emissions over the period 2013-20. Based on gross emissions in 1990 as presented in Chapter I and this chapter, this QELRO corresponds to a carbon budget of 516.68 million tonnes of carbon dioxide equivalent for the period 2013–20.

Table 3.3 below presents New Zealand's net emissions and removals from land reported under New Zealand's 2020 target. This includes not only land reported under Article 3.3 of the Kyoto Protocol (afforestation/reforestation and deforestation) but also land reported under Article 3.4 (Forest Management), though accounting for this land is against the forest management reference level.[27]

[27] New Zealand Government Submission – Forest Management Reference Level, 12 April 2011. Available at unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/newzealand_frml.pdf.

Table 3.3: New Zealand's net emissions and removals from land as reported for the period 2013–20

Source	2013
Article 3.3	
Afforestation/reforestation	
Net removals in calendar year (kt CO_2 eq)	**–17,057.4**
Deforestation	
Emissions in calendar year (kt CO_2 eq)	**4,892.2**
Article 3.4	
Forest management	
Net removals in calendar year (kt CO_2 eq)	**–9,029.9**
Forest management reference level as inscribed in Decision 2/CMP.7[28]	11,150.0[29]
Net removals (kt CO_2 eq)	**–21,195.1**
Accounting quantity (kt CO_2 eq)	**–12,165.2**

Note: The accounting quantity for the period 2013-20 is calculated by applying the accounting rules from Decision 2/CMP.7 to net emissions.

Source: Ministry for the Environment. 2015. *New Zealand's Greenhouse Gas Inventory 1990–2013.* Wellington: Ministry for the Environment.

[28] As noted in Decision 2/CMP.7 forest management reference levels are required to be technically corrected to maintain consistency with the reporting against them. New Zealand will make technical corrections to the reference level submitted to make sure it maintains consistency with changes to reporting made subsequent to the New Zealand Government's 2011 Forest Management Reference Level Submission.

[29] Annual average for the period 2013–20.

CTF Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
New Zealand Emissions Trading Scheme (NZ ETS)	Yes	Forestry, Energy, Fishing, Industry, Liquid fossil fuels, Synthetic gases, Waste	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6.	Aims to reduce emissions by making emitters pay for emissions covered by the scheme.	Economic, regulatory	Implemented	The NZ ETS covers all sectors and all gases with reporting and/or surrender obligations. The 2012 amendments removed the date for biological emissions from agriculture to assume surrender obligations.	2008 (Entry has been phased by sector)	Environmental Protection Authority, Ministry for the Environment, Ministry for Primary Industries	4,168[30]
ENERGYWISE Homes	Yes	Energy	CO_2	Aims to increase energy efficiency in homes by providing information and grants.	Fiscal, information	Implemented	ENERGYWISE Homes is the overall brand for a residential energy efficiency programme that encompasses a number of different initiatives. These include various information tools and campaigns.	Warm Up New Zealand: Heat Smart Programme ran from 2009–14. This was replaced with Warm Up New Zealand: Healthy Homes Programme which began rolling out from August 2013.	Energy Efficiency and Conservation Authority	28

[30] This number is the difference between projected 2020 emissions using 'with measures' and 'without measures' scenarios, after quantifiable policies and measures have been accounted for. The NZ ETS is assumed to be responsible for the majority of emissions avoided in 2020 by key quantifiable policies and measures, but its exact effect has not been quantified. This is because the impacts of the NZ ETS are difficult to entirely distinguish from impacts of other policies. Also, the NZ ETS is a long-term intervention, and its impacts need to be evaluated on that basis.

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
Efficient Products Programme	Yes	Energy	CO_2	Aims to help New Zealand families and businesses to purchase and use products that use less energy and save money.	Regulatory, voluntary, information	Implemented	A joint Equipment Energy Efficiency (E3) 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.	2006	Energy Efficiency and Conservation Authority	231
Business programmes	Yes	Energy	CO_2	Promotes best practice energy management in energy intensive businesses.	Fiscal, information	Implemented	A specific focus is on the top 200 energy users and their long-term energy management programmes focusing on efficiency and fuel switching. Projects include increased use of wood in the Southland region, and the identification of opportunities for the use of renewable energy in meat, dairy and seafood processing.	The current suite of business programmes began in 2012.	Energy Efficiency and Conservation Authority	115

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
Energy efficiency in Government – Sustainable Government Procurement	No	Energy	CO_2	The programme aims to make sustainable procurement an integral part of everyday Government procurement practice.	Fiscal, information	Implemented	The reforms are based around three core elements: policy transformation, capability building, and greater use of collaborative contracts.	2009	Ministry of Business, Innovation and Employment	NE
Vehicle fuel economy labelling	Yes	Transport	CO_2	A compulsory scheme requiring vehicle traders and online vendors to display information relating to fuel economy.	Regulatory	Implemented	Allows consumers to make more informed vehicle purchase choices and to place an appropriate value on fuel economy.	2008	New Zealand Transport Agency and the Energy Efficiency and Conservation Authority	41
Voluntary Biofuels Sustainability Reporting Scheme	No	Transport	CO_2	Information about sustainable biofuels to give consumers confidence in the environmental credibility of biofuels sold in New Zealand.	Information, education	Implemented	The Voluntary Biofuels Sustainability Reporting Scheme lists the availability of biofuel blends around the country, GHG emissions reductions from the use of biofuels, and other sustainability benefits from biofuel blends.	2009	Energy Efficiency and Conservation Authority	NA

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
Heavy Vehicle Fuel Efficiency Programme	Yes	Transport	CO_2	To improve heavy vehicle fuel efficiency.	Education, fiscal	Implemented	The programme provides support and training to industry professionals who can then assist freight companies to implement the programme. It includes a website providing comprehensive advice for the freight industry on implementing a range of strategies for improving fuel efficiency.	2012	Energy Efficiency and Conservation Authority	23
Extended Heavy Vehicle Fuel Efficiency Programme	Yes	Transport	CO_2	To improve heavy vehicle fuel efficiency.	Education, fiscal	Implemented	Expansion of core programme above.	2014	Energy Efficiency and Conservation Authority	7
Fuel Efficient Tyres	Yes	Transport	CO_2	To encourage the uptake of Energywise approved tyres which meet both fuel efficiency and safety standards.	Information, voluntary	Implemented	Allows consumers to make more informed purchase choices about fuel efficient tyres which promote fuel economy.	2014	Energy Efficiency and Conservation Authority	5

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
Electric vehicles	No	Transport	CO_2	Promotes uptake of electric vehicles in New Zealand, by exempting them from road-user charges.	Fiscal	Implemented	In 2012, the exemption on road user charges for electric vehicles was extended until 2020.	2009	New Zealand Transport Agency	NE
Other transport measures	No	Transport	CO_2	A range of other measures affecting greenhouse gas emissions from rail and road transport.	Fiscal, education	Implemented	These include research and driver training to promote more efficient driving practices in the commercial fleet, research into intelligent transport systems, improvements to roading and rail infrastructure, and promoting the use of public transport in New Zealand.	NA	Ministry of Transport and the New Zealand Transport Agency	NE
Global Alliance on Agricultural Greenhouse Gases	No	Agriculture	CH_4, N_2O, CO_2	Increase international collaboration and investment in research into increasing agricultural and food production without growing greenhouse gas emissions.	Research, information, training, education	Implemented	The Global Research Alliance on Agricultural Greenhouse Gases was launched in December 2009 and now has 46 member countries from all regions of the world. More information is available at globalresearchalliance.org/.	2009	Secretariat support and Co-chair of the Livestock Research Group provided by New Zealand	NE

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
Primary Growth Partnership	No	Agriculture	CH_4, N_2O, CO_2	To boost the economic growth and sustainability of New Zealand's primary, forestry and food sectors.	Research, information, training	Implemented	Provides funding for programmes of research and innovation.	2009	Ministry for Primary Industries	NE
New Zealand Agricultural Greenhouse Gas Research Centre	No	Agriculture	CH_4, N_2O, CO_2	Focuses on ways to increase productivity and reduce on-farm methane and nitrous oxide emissions.	Research, information, capability building, education	Implemented	Brings together nine research organisations.	2010	Ministry for Primary Industries	NE
Pastoral Greenhouse Gas Research Consortium	No	Agriculture	CH_4, N_2O	To provide livestock farmers with the information and means to mitigate their greenhouse gas emissions.	Research, information, education	Implemented	A research partnership between the Government and the dairy and fertiliser industries.	2002	Ministry for Primary Industries and the Ministry of Business, Innovation and Employment	NE
Sustainable Land Management and Climate Change Plan of Action	No	Agriculture	CH_4, N_2O, CO_2	Research programmes in agricultural and forestry sectors.	Research, information, education, capability building	Implemented	Initiatives and programmes in the agricultural and forestry sectors that focus on adaptation to climate change, reducing emissions and enhancing sinks, and new business opportunities.	2007	Ministry for Primary Industries	NE

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
Permanent Forest Sinks Initiative	Yes	Forestry	CO_2	Promote the establishment of permanent forests on previously unforested land.	Fiscal, voluntary agreement	Implemented	Offers assigned amount units for carbon sequestered in permanent forests established after 1 January 1990.	2008	Ministry for Primary Industries	NE
East Coast Forestry Project	Yes	Forestry	CO_2	The main purpose of this project is to reduce erosion by encouraging tree planting on erosion-prone land. The project also enhances the sequestration of carbon in forest sinks.	Fiscal, voluntary agreement	Implemented	Since 1992, the Ministry for Primary Industries has provided funding to landholders to prevent and control erosion. The grant can be used to control erosion on the worst eroding or erosion-prone land in the district by providing effective tree cover through planting or encouraging natural reversion to native bush.	1992	Ministry for Primary Industries	NE
Afforestation Grant Scheme	Yes	Forestry	CO_2	The Scheme offers a contestable fund that aims to increase the area of Kyoto forest in New Zealand by offering a simpler alternative to the NZ ETS for landowners establishing new forests.	Fiscal, voluntary agreement	Implemented	Landowners who have received a grant have ongoing obligations to maintain their grant forests.	2008	Ministry for Primary Industries	NE

Name of mitigation action	Included in 'with measures' GHG projection scenario	Sectors affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact (not cumulative) (kt CO_2 eq) 2020
Waste Minimisation Act 2008	No	Waste	CH_4, CO_2	The purpose is to encourage waste minimisation and decrease waste disposal to protect the environment from harm and provide environmental, social, economic and cultural benefits.	Regulatory	Implemented		2008	Ministry for the Environment	NE
National Environmental Standard for Landfill Methane	No	Waste	CH_4	The objective of the landfill gas standards is the effective management of discharges to air of greenhouse gases (mainly methane) generated from large landfills.	Regulatory	Implemented	Requires landfill sites with a lifetime design capacity of greater than 1 million tonnes of refuse to collect and destroy methane emissions.	Standard came into effect in 2004 with full compliance required by 2007.	Ministry for the Environment and regional and local councils	711
Waste Minimisation Fund	No	Waste	CH_4, CO_2	Helps fund waste minimisation projects. The purpose of the fund is to increase resource efficiency, increase reuse, recovery and recycling, and decrease waste to landfill.	Fiscal	Implemented	The funding comes from a waste disposal levy imposed under the Waste Minimisation Act 2008.	Funding began in 2010.	Ministry for the Environment	NE

Note: The two final columns specify the year identified by the Party for estimating impacts (based on the status of the measure and whether an ex post or ex ante estimation is available).

Abbreviations: GHG = greenhouse gas; LULUCF = land use, land-use change and forestry. NE = not estimated, NA = not applicable

a Parties should use an asterisk (*) to indicate that a mitigation action is included in the 'with measures' projection.

b To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors, cross-cutting, as appropriate.

c To the extent possible, the following types of instrument should be used: economic, fiscal, voluntary agreement, regulatory, information, education, research, other.

d To the extent possible, the following descriptive terms should be used to report on the status of implementation: implemented, adopted, planned.

e Additional information may be provided on the cost of the mitigation actions and the relevant timescale.

f Optional year or years deemed relevant by the Party.

CTF Table 4: Reporting on progress

Year[c]	Total emissions excluding LULUCF ($kt CO_2 eq$)	Contribution from LULUCF[d] ($kt CO_2 eq$)	Quantity of units from market-based mechanisms under the Convention (number of units)	Quantity of units from market-based mechanisms under the Convention ($kt CO_2 eq$)	Quantity of units from other market based mechanisms (number of units)	Quantity of units from other market based mechanisms ($kt CO_2 eq$)
Base year/base period	66,720.16	NA	NA	NA	NA	NA
2010	79,667.73	–32,056.58	NA	NA	NA	NA
2011	80,079.87	–29,883.05	NA	NA	NA	NA
2012	82,077.89	–27,848.76	NA	NA	NA	NA
2013	80,961.64	–26,761.11	NA	NA	NA	NA

Abbreviation: LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] For the base year, information reported on the emission reduction target shall include the following: (a) total GHG emissions, excluding emissions and removals from the LULUCF sector; (b) emissions and/or removals from the LULUCF sector based on the accounting approach applied taking into consideration any relevant decisions of the Conference of the Parties and the activities and/or land that will be accounted for; (c) total GHG emissions, including emissions and removals from the LULUCF sector. For each reported year, information reported on progress made towards the emission reduction targets shall include, in addition to the information noted in paragraphs 9(a–c) of the UNFCCC biennial reporting guidelines for developed country Parties, information on the use of units from market-based mechanisms.

[c] Parties may add additional rows for years other than those specified below.

[d] Information in this column should be consistent with the information reported in table 4(a)I or 4(a)II, as appropriate. The Parties for which all relevant information on the LULUCF contribution is reported in table 1 of this common tabular format can refer to table 1.

CTF Table 4(a)ii: Progress in achievement of the quantified economy-wide emission reduction targets: further information on mitigation actions relevant to the counting of emissions and removals from the land use, land-use change and forestry sector in relation to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

New Zealand did not include the data related to the KP-LULUCF emissions and accounting in the BR2 because the relevant CRF portion has not been included in the latest (July 2015) inventory submission.

According to decision FCCC/CP/2011/9/Add.1 (Annex I, Part II, paragraph 2), summary information from the national greenhouse gas (GHG) inventory on emissions and emission trends in the Biennial Report "shall be prepared for the period from 1990 to the latest year in the most recent inventory submission available. The information provided in the Biennial Report should be consistent with that provided in the most recent annual inventory submission". Due to problems with the KP-LULUCF portion of the CRF Reporter software recognised in decision 13/CP.20 (paragraphs 12 and 13), the latest New Zealand's inventory submission was made under the UNFCCC rules, which excludes the KP-LULUCF portion in the CRF.

Although this CTF table has not been submitted, similar information is included in *New Zealand's Second Biennial Report* in table 3.3.

CTF Table 4(b): Reporting on progress

	Quantity of units	kt CO_2 eq
2013		
Kyoto Protocol Units [d]		
AAUs	0.00	0.00
ERUs	0.00	0.00
CERs	0.00	0.00
tCERs	0.00	0.00
lCERs	0.00	0.00
Units from market-based mechanisms under the Convention [d, e]		
Units from other market-based mechanisms [d, e]		
Total		
2014		
Kyoto Protocol Units [d]		
AAUs	0.00	0.00
ERUs	0.00	0.00
CERs	0.00	0.00
tCERs	0.00	0.00
lCERs	0.00	0.00
Units from market-based mechanisms under the Convention [d, e]		
Units from other market-based mechanisms [d, e]		
Total		

Note: New Zealand understands 'surrender' to mean retire. New Zealand has not surrendered (retired) any international units in 2013 and 2014 to fulfil its emissions target for the First Commitment Period of the Kyoto Protocol.

Abbreviations: AAUs = assigned amount units, CERs = certified emission reductions, ERUs = emission reduction units, lCERs = long-term certified emission reductions, tCERs = temporary certified emission reductions.

Note: 2013 is the latest reporting year.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] For each reported year, information reported on progress made towards the emission reduction target shall include, in addition to the information noted in paragraphs 9(a-c) of the reporting guidelines, on the use of units from market-based mechanisms.

[c] Parties may include this information, as appropriate and if relevant to their target.

[d] Units surrendered by that Party for that year that have not been previously surrendered by that or any other Party.

[e] Additional rows for each market-based mechanism should be added, if applicable.

Chapter IV: Projections and the total effect of policies and measures

Introduction

This chapter reports on projections of New Zealand's greenhouse gas emissions and removals to 2030 and addresses findings from the review of *New Zealand's First Biennial Report* (BR1). The projections presented in this chapter update those in *New Zealand's Sixth National Communication* (6NC) and BR1.[31] The projections of greenhouse gas emissions and removals cover the following sectors:

- energy
- transport
- industrial processes and product use (IPPU)
- agriculture
- land use, land-use change and forestry (LULUCF)
- waste.

The projections presented are 'with measures' unless otherwise stated, ie, they include the effects of key quantifiable policies and measures currently implemented. Detailed information on the methodologies used is available in Appendix B.

The chapter also provides 'without measures' projections, which estimate what New Zealand's emissions and removals could be in the absence of current policies. All projections are measured in kilotonnes of gas (kt) unless specifically noted otherwise. Where applicable, emissions have been converted to a CO_2 equivalent (CO_2 eq) using global warming potentials (GWPs) from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4).[32]

A cross-government technical group, led by the Ministry for the Environment, produces New Zealand's projections of emissions and removals on a sector by sector basis. The Ministry for Primary Industries projects the net emissions and removals from LULUCF, and emissions from agriculture. The Ministry for Business, Innovation and Employment projects the emissions from stationary energy and transport, and carbon dioxide emissions from IPPU. And finally, the Ministry for the Environment projects the emissions of fluorinated gases from IPPU, and emissions from waste.

Projections of emissions and removals are inherently uncertain. Variables such as economic and population growth, commodity prices, the assumed carbon price, the assumed rate of afforestation and deforestation, and the harvest age of forests, have significant effects on projected emissions and removals. Seasonal changes, especially variation in rainfall, can affect both energy and agricultural emissions. There is also uncertainty in the methodology to estimate emissions from biological sources such as agriculture and forestry.

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[31] www.mfe.govt.nz/climate-change/reporting-greenhouse-gas-emissions/nzs-national-communication-and-biennial-report.

[32] www.ipcc.ch/report/ar4/.

Projected greenhouse gas emissions and removals, 'with measures'

CTF Table 6 summarises New Zealand's actual and projected greenhouse gas emissions and removals, by sector and gas respectively. Emissions and removals from 1990 to 2013 are based on data reported in *New Zealand's Greenhouse Gas Inventory 1990–2013*,[33] published in 2015 (2015 NIR), while values for 2014 and later are projections based on data produced for this report.

New Zealand's *gross emissions* (excluding net emissions and removals from the LULUCF sector) are projected to rise to:

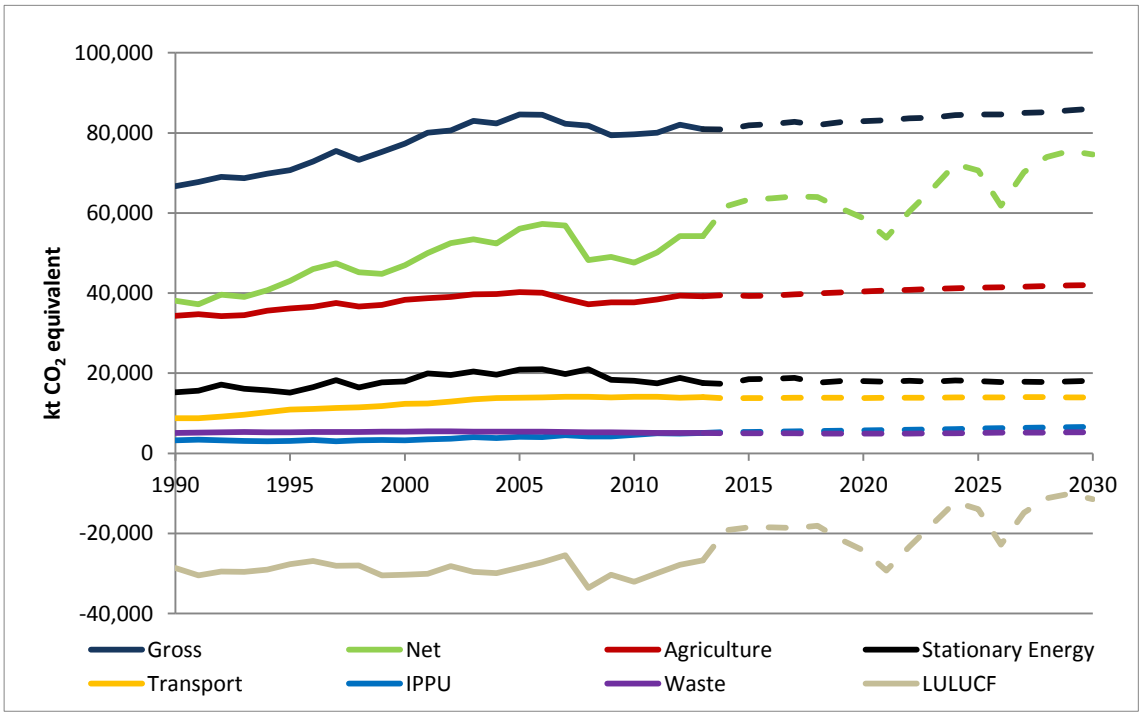
- 82,937 kt CO_2 eq in 2020 (24 per cent above 1990 levels or 2 per cent above 2013 levels)
- 86,028 kt CO_2 eq in 2030 (29 per cent above 1990 levels or 6 per cent above 2013 levels).

New Zealand's *net emissions* (including emissions and removals from the LULUCF sector) are projected to rise to:

- 58,722 kt CO_2 eq in 2020 (54 per cent above 1990 levels or 8 per cent above 2013 levels)
- 74,594 kt CO_2 eq in 2030 (96 per cent above 1990 levels or 38 per cent above 2013 levels).

The significant differences in trends between net and gross emissions projections are due to the age-class profile of New Zealand's planted forests. More information on this is included in the LULUCF section of this chapter (page 41).

Figure 4.1: New Zealand's actual and projected emissions 1990–2030 under the UNFCCC



[33] www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990-2013.

Energy

Projections

For the purposes of projections, the energy sector includes:

- electricity generation
- stationary energy
- industrial and commercial use of fossil fuels and/or production of energy
- fugitive emissions.

Projections of emissions from transport are presented separately.

Emissions from the energy sector are projected to be:

- 18,007 kt CO_2 eq in 2020 (18 per cent above 1990 levels, or 2 per cent above 2013 levels)
- 18,115 kt CO_2 eq in 2030 (19 per cent above 1990 levels, or 3 per cent above 2013 levels).

Total energy demand is expected to continue to grow throughout the modelled period, but at the same time the emissions intensity of energy (emissions per unit of energy delivered) is expected to decline.

Energy emissions are expected to increase between 2013 and 2015, but then fall between 2015 and 2020. The remaining coal-fired power plant in New Zealand is expected to be decommissioned by 2018, reducing emissions from coal. Coal-fired electricity generation is expected to be replaced mainly by a combination of hydroelectricity, geothermal, wind, and gas-fired peaking plants in the modelled scenario. From 2020 to 2030 emissions are projected to increase slightly, by 1 per cent.

Transport

Emissions from the transport sector are projected to be:

- 13,822 kt CO_2 eq in 2020 (58 per cent above 1990 levels, or 2 per cent below 2013 levels)
- 13,996 kt CO_2 eq in 2030 (60 per cent above 1990 levels, or 1 per cent below 2013 levels).

Transport emissions remain relatively constant or slightly decrease over the projection period, as fuel efficiency continues to improve.

The New Zealand vehicle fleet is near saturation on a per capita basis. Population growth is the main driver of the increase in emissions for transport out to 2020 and 2030. This is offset by fuel efficiency improvements for new vehicles. The vehicle recycling rate is slower in New Zealand than many other countries, and fuel efficiency improvements take longer to have an effect in New Zealand relative to other developed countries.

Emissions from international air and sea transport

Emissions from fuel used in international air and sea transport are reported separately and are not included in the historical or projected national totals of transport emissions. These are emissions from bunker fuels sold in New Zealand for the purpose of international transport, and are presented in table 4.1 and table 4.2.

Table 4.1: Actual and projected New Zealand emissions from international air transport, 1990–2030

	International air transport GHG emissions and removals (kt)							
Gas	1990	1995	2000	2005	2010	2013	2020	2030
CO_2	1,406	1,700	1,901	2,342	2,443	2,651	3,095	3,782
CH_4	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
N_2O	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
CO_2 eq	1,419	1,715	1,919	2,363	2,465	2,675	3,123	3,816

Table 4.2: Actual and projected New Zealand emissions from international sea transport, 1990–2030

	International sea transport GHG emissions and removals (kt)							
Gas	1990	1995	2000	2005	2010	2013	2020	2030
CO_2	1,093	1,198	788	1,033	1,102	968	1,050	1,162
CH_4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
N_2O	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO_2 eq	1,107	1,213	797	1,045	1,113	978	1,061	1,174

Industrial processes and product use (IPPU)

Emissions from the IPPU sector are projected to be:

- 5,744 kt CO_2 eq in 2020 (75 per cent above 1990 levels, or 13 per cent above 2013 levels)
- 6,600 kt CO_2 eq in 2030 (101 per cent above 1990 levels, or 30 per cent above 2013 levels).

CO_2 emissions from IPPU in New Zealand result from the manufacture of iron and steel, aluminium, urea, cement, lime and hydrogen. The level of output from these industries is assumed to remain steady between 2013 and 2030 in these projections.

CO_2 emissions from IPPU are expected to stabilise out to 2030. Emissions of PFCs have declined since the 1990s as a result of the New Zealand Aluminium Smelter making changes to its processing methods, and the low level of PFC emissions from aluminium processing is projected to continue. Emissions of HFCs are projected to increase out to 2030 under current policies, however New Zealand is actively contributing to negotiations under the Montreal Protocol for a global phase-down of HFCs. The 2011 peak in emissions of fluorinated gases shown in *New Zealand's First Biennial Report* (BR1) does not appear to be indicative of a longer-term trend.

Agriculture

Agricultural greenhouse gas emissions in New Zealand are projected to be:

- 40,418 kt CO_2 eq in 2020 (18 per cent above 1990 levels, or 3 per cent above 2013 levels)
- 42,036 kt CO_2 eq in 2030 (22 per cent above 1990 levels, or 7 per cent above 2013 levels).

Dairy cattle population is expected to be the main driver of this increase.

Projections of emissions from the agriculture sector are highly sensitive to future livestock numbers and productivity assumptions. The projections should be interpreted in light of both

uncertainties in the economic circumstances of the agricultural industry (which are largely driven by international markets) and New Zealand's susceptibility to climate variability.

Agricultural emissions increased 14.1 per cent between 1990 and 2013. Although agriculture was New Zealand's largest emitting sector in 2013, the emissions intensity per unit of New Zealand's agricultural production has declined since 1990. This is due to increases in agricultural productivity from improvements in technology, feed and stock management, and animal breeding.

Agricultural emissions decreased between 2006 and 2008 due to a reduction in the populations of sheep, non-dairy cattle and deer as a result of widespread drought. The drought also reduced livestock performance. Since 2008, agricultural emissions have been increasing slightly, due to more favourable growing conditions, as well as greater production in the dairy sector driven by high international dairy prices. A widespread drought during the 2012/13 summer did not affect 2012 emissions, but resulted in reduced agricultural emissions for 2013, reflecting the decrease in national livestock populations and performance.

We note that agriculture emissions from 1990 to 2012 are those reported in the 2015 National Inventory Report (NIR). Emissions for 2013 have been updated and improved using national statistical data published in June 2015.[34]

Land use, land-use change and forestry (LULUCF)

New Zealand's LULUCF sector is a net sink of carbon throughout the modelled period. Net emissions and removals from LULUCF are projected to be:

- 24,215 kt CO_2 eq of removals in 2020 (15 per cent less removals than 1990 levels and 10 per cent less removals than 2013 levels)
- 11,433 kt CO_2 eq of removals in 2030 (60 per cent less removals than 1990 levels and 57 per cent less removals than 2013 levels).

LULUCF removed 26,761 kt CO_2 eq in 2013, a slight decrease compared to the 28,654 kt CO_2 eq net removals in 1990. New Zealand's planted forests have an uneven age-class distribution, so a greater proportion will reach harvest maturity over the next decade. This means that net removals from LULUCF will be lower over the 2020s compared with 1990 and 2013.

Changes were made to assumptions regarding harvested wood products and natural forests since the *Sixth National Communication* (6NC) and BR1 that have a significant impact on projections of emissions and removals from LULUCF (see page 44).

As with projections for any sector, LULUCF is sensitive to the underlying assumptions used. Consistent with the BR1, the assumptions used for the midpoint projection scenario as described in the 6NC are applied here.

Waste sector

Emissions from the waste sector under a 'with measures' scenario are projected to be:

- 4,946 kt CO_2 eq in 2020 (3 per cent below 1990 levels or 2 per cent below 2013 levels)
- 5,281 kt CO_2 eq in 2030 (4 per cent above 1990 levels or 4 per cent above 2013 levels).

[34] Statistics New Zealand Final Agricultural Production Survey, 2014.

The majority of waste emissions are CH_4 resulting from solid waste disposal to land. Emissions from this source peaked around 2002. Since 2002 a greater proportion of landfill gas (CH_4) has been captured, however this decrease will likely be offset in the future by an increase in gross landfill gas emissions due to population growth.

Differences since the *First Biennial Report* and *Sixth National Communication*

Emissions for all sectors were projected using the same models that were used for the 6NC and BR1, updated to:

- include improvements in inventory reporting
- include emissions for 2012 and 2013, as reported in the 2015 NIR submission
- apply the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (2006 IPCC guidelines)
- use Global Warming Potentials (GWPs) from the IPCC Fourth Assessment Report (AR4).

For more information see Appendix B.

Differences in emissions projections reported in the BR1 compared with those in this report are shown in table 4.3 and table 4.4.

Table 4.3: Differences with emissions reported in the BR1 for the year 2020

	Projected emissions 2020 (kt CO_2 eq)						
	Second Biennial Report (AR4)	First Biennial Report (AR4) difference			First Biennial Report (AR2) difference		
Sector		kt CO_2 eq	absolute	per cent	kt CO_2 eq	absolute	per cent
Energy	18,007	18,058	–52	–0.3	17,854	152	0.9
Transport	13,822	14,876	–1,053	–7.1	14,872	–1,050	–7.1
Industrial processes and product use[35]	5,744	6,311	–568	–9.0	5,346	398	7.4
Agriculture	40,418	41,516	–1,098	–2.6	37,046	3,373	9.1
LULUCF	–24,215	–2,191	–22,025	–1005.4	–2,201	–22,015	–1000.4
Water management/waste	4,946	2,453	2,493	101.6	2,100	2,846	135.6
Total gross emissions (excluding LULUCF)	82,937	83,215	-278	-0.3	77,218	5,719	7.4
Total net emissions (including LULUCF)	58,722	81,025	–22,303	–27.5	75,018	–16,296	–21.7

Note: BR1 emissions are given in both AR2 GWPs (as reported in the BR1), and in AR4 GWPs (to aid comparison with this report).

[35] IPPU aggregates industrial processes and solvents for the First Biennial Report.

Table 4.4: Differences with emissions reported in the BR1 for the year 2030

Sector	Second Biennial Report (AR4)	Projected Emissions 2030 (kt CO_2 eq) First Biennial Report (AR4) difference			First Biennial Report (AR2) difference		
		kt CO_2 eq	absolute	per cent	kt CO_2 eq	absolute	per cent
Energy	18,115	18,522	–407	–2.2	18,311	–196	–1.1
Transport	13,996	15,902	–1,906	–12.0	15,900	–1,903	–12.0
Industrial processes and product use[35]	6,600	6,304	296	4.7	6,121	479	7.8
Agriculture	42,036	44,302	–2,266	–5.1	39,598	2,437	6.2
LULUCF	–11,433	2,598	–14,031	–540.1	2,588	–14,021	–541.8
Water management/waste	5,281	2,705	2,575	95.2	2,315	2,966	128.2
Total gross emissions (excluding LULUCF)	86,028	87,736	–1,709	–1.9	82,244	3,783	4.6
Total net emissions (including LULUCF)	74,594	90,334	–15,740	–17.4	84,832	–10,238	–12.1

Note: BR1 emissions are given in both AR2 GWPs (as reported in the BR1), and in AR4 GWPs (to aid comparison with this report).

Energy

There have been improvements in emission factors and activity data since the 6NC and BR1, along with a shift to the 2006 IPCC Guidelines. The combination of these changes has had an impact on both historical estimates and projections. The most significant difference was the change in oxidation factors, which has resulted in an increase in historical emissions figures. For further details refer to section 3 of *New Zealand's Greenhouse Gas Inventory 1990–2013,* published in 2015 (2015 NIR submission).

In addition, a dynamic carbon price increasing from $7.40 / tonne CO_2 eq in 2015 to $25 / tonne CO_2 eq in 2030 has been used in this report.

Transport

The transport sector also incorporates the improvements that were made to the energy projections outlined above. Road transport projections were based on the latest road transport statistics available at the time, and the assumptions are outlined in CTF Table 5.

Industrial products and product use (IPPU)

In line with 2006 IPCC guidelines, the solvents sector is now merged into the IPPU sector. The CO_2 component of IPPU incorporates the same changes as the energy sector.

There has been little change to the projections of non CO_2 emissions from industrial processes. The latest activity data has been included, and this has led to a slight rise in projected emissions.

Agriculture

Some of the more significant improvements to modelling, emission factors and activity data that have impacted on the historical and projected agriculture emissions are summarised below:[36]

- migration to the 2006 IPCC Guidelines resulted in the:
  - transfer of lime application emissions from LULUCF to the agriculture sector
  - reporting of mineralisation associated with loss of soil organic matter for cropland remaining cropland use
  - reporting of CO_2 emissions from urea fertiliser
  - reporting of indirect N_2O emissions for manure management and agricultural soils categories
  - inclusion of pasture renewal as an activity under the calculation for N_2O released from crop residues
- inclusion of a new equation for partitioning nitrogen in excreta between dung and urine from dairy, beef, sheep and deer
- adoption of a country-specific N_2O emission factor for urea fertiliser and reducing the parameters for calculating nitrogen retention in milk from beef cattle and deer velvet.

As a result, the calculated agriculture emissions for 1990–2010 have decreased by 1.0 per cent in 1990 and 0.4 per cent in 2010 since the 6NC and BR1 submission (after adjusting figures from the BR1 to AR4 GWPs).

Compared to the previous *Biennial Report*, livestock numbers are also projected to be lower due to revised assumptions on land-use change and product returns decreasing relative to previous projections. Thus, the projected emissions have decreased by 2.6 per cent at 2020 and 5.1 per cent at 2030 since the 6NC and BR1.

Land use, land-use change and forestry (LULUCF)

Projections of future net removals from the LULUCF sector are calculated using methodologies consistent with New Zealand's 2015 NIR submission and are particularly sensitive to the sequestration of, and activities within, New Zealand's natural and planted forests.[37]

There have been a number of significant changes to the LULUCF historical estimates and projections since the 6NC and BR1. These changes are influenced by general improvements to New Zealand's NIR,[38] the shift to the 2006 IPCC Guidelines, and new survey data and information. The magnitude of these improvements is highlighted when comparing the BR1 projections against actual LULUCF estimates reported in the 2015 NIR submission for the 2013 reporting year (see table 4.5).

[36] More detail is provided in sections 6.1.4 and 5.1.5 of New Zealand's 2014 and 2015 NIR submissions respectively.

[37] Such as rates of deforestation, afforestation, harvesting and other planted forest management practices.

[38] See section ES.6 of New Zealand's 2015NIR submission.

Table 4.5: Comparisons of net removals from LULUCF between the first and second Biennial Report

	Net Removals (kt CO_2 eq)										
	1990	1995	2000	2005	2010	2011	2013	2015	2020	2025	2030
First Biennial Report	–26,995	–24,150	–25,075	–23,738	–18,779	–15,042	–11,526	–6,736	–2,201	11,088	2,588
Second Biennial Report	–28,654	–27,664	–30,346	–28,599	–32,057	–29,883	–26,761	–18,521	–24,215	–13,935	–11,433

Notes: Negative values denote net removals of carbon dioxide equivalent. Positive values denote net emissions of carbon dioxide equivalent.

'Net removals' means gross removals by planted and natural forests, less non-carbon dioxide emissions and emissions from deforestation, harvesting and harvested wood products. Numbers are rounded to kilotonnes.

Projections are represented by shaded cells, all other cells represent historic emissions.

Due to uncompleted 2008 – 2012 deforestation mapping *First Biennial Report* projections begin in 2008.

Net removals from the *First Biennial Report* are reported in AR2 GWPs.

The difference between the two estimates can be explained by:[39]

- The inclusion of the harvested wood products pool resulted in additional removals of 11,300 kt CO_2 in 2013, 12,900 kt CO_2 in 2020, and 10,700 kt CO_2 in 2030 compared with the previous projections. New Zealand's 6NC and BR1 were based on methodology and guidelines consistent with New Zealand's 2013 NIR submission, so the harvested wood products pool was not included at that time. The inclusion of the harvested wood products pool in the 2015 NIR submission resulted in carbon from harvest activities that was previously instantly oxidised now being stored within wood products and decaying over a longer time period, depending on the type of product the wood is turned into.
- The 6NC and BR1 assumed that New Zealand's natural forests were in steady state consistent with New Zealand's 2013 NIR submission. Since then the final plot measurement and analysis has been completed and subsequently reported in section 6.1.4 of the 2015 NIR submission. The inclusion of carbon stock change estimates in natural forests accounts for around 6,000 kt CO_2 of the difference between LULUCF projections in the BR1 and this report.
- Other improvements make up the remainder of the difference between the LULUCF projections in the BR1 and those presented here. These improvements cover revised afforestation, deforestation and harvesting area data and improved forest carbon stock yield tables consistent with New Zealand's 2015 NIR submission, as well as updated survey information on future deforestation, afforestation and modelled harvest rates from 2014–30.

Waste

A number of amendments have been made to the methodologies for calculating emissions from the waste sector since BR1. The most substantial of these changes is the inclusion of non-municipal landfills and on-site farm fills[40] which have approximately doubled waste emissions

[39] See section 1.10 of New Zealand's 2015 NIR submission.

[40] For further details refer to section 1.11 of New Zealand's 2014 NIR submission and section 1.10 of New Zealand's 2015 NIR submission.

(see table 4.6). In addition, waste placement data collected under the Waste Minimisation Act and the NZ ETS has been incorporated into historical and projected emissions. Estimates of the annual weight of solid waste per person used for projections have reduced from 749kg in the 6NC and BR1 to 629kg in this report, based on the 2015 NIR and updated population statistics.

Table 4.6: Component of waste emissions from the recently included non-municipal and uncategorised fills

	Emissions (kt CO_2 eq)		
	2013	2020	2030
BR1 waste emissions (AR4 GWPs)	2,338	2,453	2,705
BR2 waste emissions	5,054	4,946	5,281
BR2 waste emissions from non-municipal and uncategorised fills	2,584	2,552	2,686

Total effect of policies and measures

It is estimated that policies and measures currently implemented (including those in the LULUCF sector) will reduce emissions by 8 per cent in 2020 and 7 per cent in 2030 compared to a 'without measures' scenario.

Although there are a range of policies and measures that affect greenhouse gas emissions, not all of their impacts can be accurately measured or modelled. Technical reviews of previous National Communications have noted that the total effect of New Zealand's implemented policies and measures may be underestimated because of the type of models used. Table 4.7 shows which measures are included in the 'with measures' and 'without measures' projection scenarios (see Chapter III for more details). It is difficult to model the mitigation effects of policies and measures, particularly as there is insufficient data to accurately project how sectors will respond to the policies and measures presented.

Table 4.7: Policies and measures included in the 'with measures' and 'without measures' projections

Sector	Policy or measures	With Measures	Without Measures
Energy	New Zealand Emissions Trading Scheme (NZ ETS)	Y	N
	EECA Efficient Products Programme	Y	N
	EECA ENERGYWISE Homes	Y	N
	EECA Business Programmes	Y	N
Transport	Vehicle Fuel Economy Labelling Scheme	Y	N
	Heavy Vehicle Fuel Efficiency Programme	Y	N
	Extension of Heavy Vehicle Fuel Efficiency Programme	Y	N
	Fuel efficient tyres programme	Y	N
IPPU	NZ ETS	Y	N
Forestry	NZ ETS	Y	N
	Afforestation Grant Scheme	Y	N
	Hill Country Erosion Programme	Y	N
	East Coast Forestry Project	Y	N
	Permanent Forest Sink Initiative	Y	N
Waste	National Environmental Standards for Air Quality	Y	N
	Waste Minimisation Act	Y	Y

Energy

The 'without measures' projection excludes the modelled effect of the NZ ETS. It also excludes the effect of other policies and measures relating to the energy sector, as outlined in table 4.7.

It is estimated that policies and measures have reduced emissions in the energy sector by 627 kt CO_2 eq over the period 2007–2013. Projected emissions under the 'without measures' scenario are estimated to be 397 kt CO_2 eq (2.2 per cent) greater than projected emissions under the 'with measures' scenario in 2020, and 634 kt CO_2 eq greater (3.5 per cent) than projected emissions under the 'with measures' scenario in 2030.

Most of this estimated mitigation is achieved through fuel switching, as the development and uptake of low emissions technologies are difficult to predict and include in projections.

Transport

The 'without measures' projection excludes the effect of the policies and measures relating to transport, as outlined in table 4.7.

It is estimated that policies and measures have reduced emissions in the transport sector by 54 kt CO_2 eq over the period 2009–2013. Projected emissions under the 'without measures' scenario are estimated to be 76 kt CO_2 eq (0.5 per cent) greater than projected emissions under the 'with measures' scenario in 2020 and 155 kt CO_2 eq (1.1 per cent) greater than projected emissions under the 'with measures' scenario in 2030.

Demand from the energy and transport sectors is inelastic to fuel and carbon prices, partly due to the current lack of viable substitutions. The models assume significant uptake of biofuels in the transport sector only occurs with an effective carbon price greater than $25.

Industrial processes and product use (IPPU)

Estimates of the effect of policies and measures on IPPU emissions are not made as there is insufficient information to accurately quantify these.

Agriculture

Estimates of the effect of policies and measures on agricultural emissions are not made as there is insufficient information to accurately quantify these. In particular, it is very difficult to make estimates of expected emissions reductions attributable to ongoing research.

Land use, land-use change and forestry (LULUCF)

Point-in-time comparisons between 'with' and 'without measures' net removals for the LULUCF sector can be misleading, because variations in harvesting, deforestation and afforestation rates can lead to large yearly variations. A more representative measure for comparing net removals between scenarios is cumulative net removals over a period of time.

Assuming the midpoint scenario, the inclusion of New Zealand Government initiatives is projected to increase removals in the LULUCF sector. The introduction of the NZ ETS in 2008 and other government forestry initiatives, result in estimated projected total net removals

between 2008 and 2020 of 319,067 kt CO_2, assuming the midpoint emission scenario 'with measures', compared to removals of 288,701 kt CO_2 'without measures'.

The 'without measures' scenario assumes:

- higher rates of deforestation, due to the exclusion of the NZ ETS deforestation liability on pre-1990 planted forests
- the exclusion of the flexible land-use/offsetting rule.[41] In 2013, the offsetting rule was included in the NZ ETS to allow pre-1990 planted forest landowners the opportunity to convert their forest to another land use without deforestation liabilities, provided they plant an equivalent new forest elsewhere
- the exclusion of government afforestation schemes, such as the Afforestation Grant Scheme, Hill Country Erosion Scheme, East Coast Forestry Project, and new planting resulting from the Permanent Forest Sink Initiative.

The difference between 'with measures' and 'without measures' is less than that reported in the 6NC and BR1. This is due to a number of factors, including:

- the 'with measures scenario' allows for 50 per cent harvest of government new planting schemes (see table 4.7), whereas the 'with measures' in the 6NC and BR1 did not
- low net afforestation over 2008–2013 due to the low carbon price in the NZ ETS over that period
- the 'with measures' scenario takes a more conservative approach to new planting rates and the impact of the NZ ETS, based on consultation with forestry stakeholders.

Waste

The Waste Minimisation Act 2008 encourages a reduction in the amount of waste generated and disposed of in New Zealand, and aims to lessen the environmental harm of waste. The Act provides ongoing benefits and currently does not lend itself well to quantifying its impacts on emissions.

In 2004, the Government introduced specific standards for landfills in the Resource Management (National Environmental Standards for Air Quality, NESAQ) Regulations. The policy intent of the standards is to ensure emissions of greenhouse gases generated from large landfills are effectively managed. An analysis found that application of the regulation to landfills has decreased the emissions from solid waste disposal on land by 2,469 kt CO_2 eq up to the year 2013.

Projected emissions under the 'without measures' scenario are estimated to be 711 kt CO_2 eq (14.4 per cent) greater than projected emissions under the 'with measures' scenario in 2020, and 700 kt CO_2 eq (13.3 per cent) greater than projected emissions under the 'with measures' scenario in 2030.

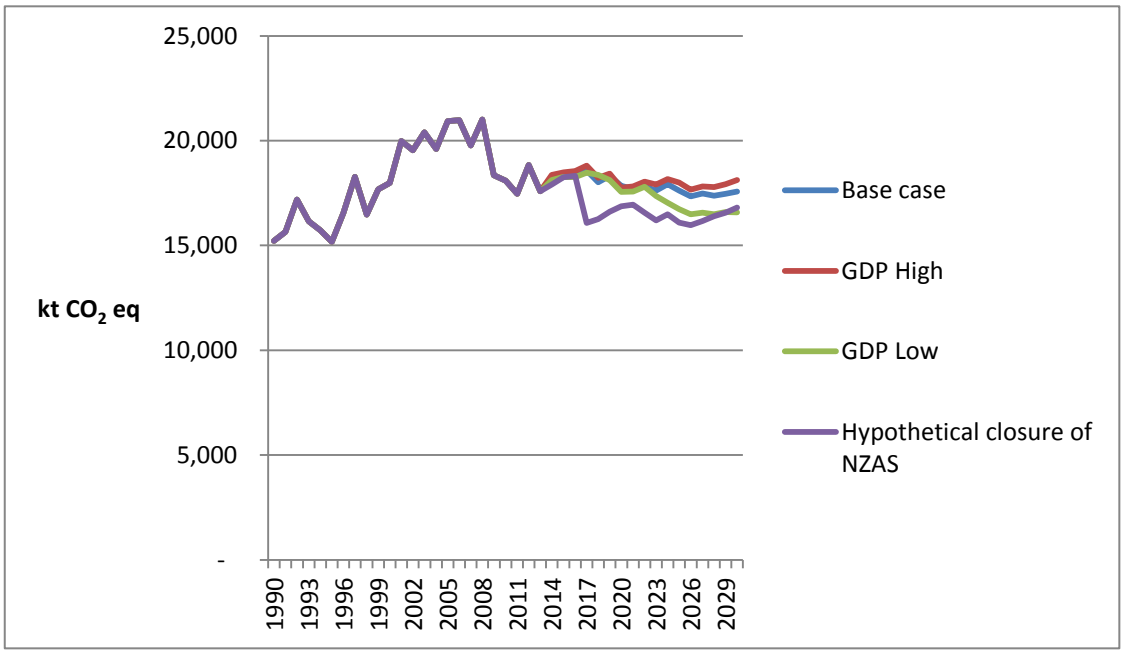
[41] www.climatechange.govt.nz/emissions-trading-scheme/participating/forestry/obligations/.

Sensitivity analysis for energy emissions

A major determinant of emissions in the energy sector is the level of demand. The scenario modelling included high and low GDP growth scenarios that respectively show a 3 per cent increase and 6 per cent decrease in emissions in 2030 from the energy sector compared to the base case.

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 the total projection. A hypothetical scenario shows the effect that a closure of New Zealand's single largest user of electricity, the New Zealand Aluminium Smelter (NZAS), could have on emissions. The scenario assumes that NZAS closes at the end of 2016, and at this point reduces national energy emissions by 13 per cent when compared to the base case.[42] Figure 4.2 shows that by 2030 the impact is similar to that in the low growth scenario.

Figure 4.2: Sensitivity analysis of energy sector emissions



New Zealand's energy emissions are low by international standards, because a high proportion of New Zealand's electricity is generated from renewable sources. In 2014, 80 per cent of New Zealand's electricity was generated from renewable sources.[43] A large share of this generation is hydroelectricity. This means that in years with below-average rainfall less electricity is available from hydroelectricity, and this must be made up for by fossil fuel-fired generation. The modelling approach accounts for various levels of hydro intakes, with a 1 in 5 chance of a dry year in each modelled year.

Other major determinants of energy use are also considered in the scenario modelling.[44]

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[42] The "base case" here refers to modelling projections from the draft Electricity Demand and Generation Scenarios (EDGS) 2015 base case scenario.

[43] www.med.govt.nz/sectors-industries/energy/energy-modelling/data/electricity.

[44] Scenario modelling here refers to MBIE draft Electricity Demand and Generation Scenarios (EDGS) 2015 scenario projections. These projections have very similar assumptions to the BR2 projection.

CTF Table 5: Summary of key variables and assumptions used in the projections analysis

		Historical						Projected			
Key underlying assumptions	**Unit**	**1990**	**1995**	**2000**	**2005**	**2010**	**2011**	**2015**	**2020**	**2025**	**2030**
GDP	real 95/96 $NZ Billion	82.00	94.00	110.00	132.00	140.00	142.00	161.00	183.00	201.00	219.00
Exchange rate*	(NZ$/US$)	0.62	0.55	0.46	0.70	0.72	0.79	0.82	0.70	0.65	0.65
Oil price**	real 2013 US$/barrel	40.00	27.00	41.00	68.00	83.00	95.00	103.00	121.00	128.00	138.00
Population	million	3.46	3.67	3.81	4.13	4.37	4.41	4.55	4.76	4.97	5.17
Gas supply from new discovery	PJ/year							0.00	38.00	128.00	184.00
Carbon price*** for non-forestry projections	$/$tCO_2$ eq							7.40	13.20	19.10	25.00
Carbon price for forestry projections	$/$tCO_2$ eq							18.75	18.75	18.75	18.75
Afforestation	ha / year	14,678.00	65,815.00	32,006.00	9,267.00	6,966.00	13,669.00	3,000.00	10,000.00	15,000.00	15,000.00
Deforestation	ha / year	–1,876.00	–1,876.00	–4,389.00	–6,124.00	–9,274.00	–6,970.00	–5,000.00	–5,000.00	–5,000.00	–5,000.00
Harvest age	years							30.00	30.00	30.00	30.00
Waste disposal per year, per capita	kg							629.00	629.00	629.00	629.00
Agriculture commodity price(s)											
Milk solids	NZ cents/kg (1996 prices)	389.13	331.95	360.44	364.32	405.79	486.87	275.69	378.05	378.05	378.05
Lamb	NZ cents/kg (1996 prices)	248.62	210.01	267.65	279.15	271.06	342.01	275.92	289.00	289.00	289.00
Prime beef	NZ cents/kg (1996 prices)	246.99	155.62	229.35	163.68	135.87	178.60	165.45	150.23	150.23	150.23
Days of soil moisture deficit for deer	days	67.23	67.02	53.33	57.73	91.27	71.43	87.93	76.48	76.48	76.48
Days of soil moisture deficit for beef cattle	days	59.50	59.95	55.86	55.05	89.11	74.38	88.60	71.13	71.13	71.13

		Historical						Projected			
Key underlying assumptions	**Unit**	**1990**	**1995**	**2000**	**2005**	**2010**	**2011**	**2015**	**2020**	**2025**	**2030**
Days of soil moisture deficit for dairy cattle	days	52.01	48.26	51.12	64.38	81.13	63.10	77.67	64.22	64.22	64.22
Days of soil moisture deficit for sheep	days	73.89	69.41	57.91	60.63	89.68	76.22	93.29	77.82	77.82	77.82
Fleet size (number of vehicles)											
Light passenger vehicles	thousands							2,707.20	2,898.10	3,087.80	3,302.60
Light commercial vehicles	thousands							415.20	441.10	465.00	486.70
Motorcycles	thousands							120.10	126.80	132.80	138.60
Heavy commercial vehicles	thousands							116.30	126.20	137.50	147.40
Buses	thousands							8.40	8.90	9.30	9.70
Engine technology (share of fleet)											
Light vehicles											
Internal combustion engines	%							100.00	99.80	99.40	98.80
Electric and plug-in	%							0.00	0.20	0.60	1.20
Heavy vehicles											
Internal combustion engines	%							99.90	99.90	99.90	100.00
Electric and plug-in	%							0.10	0.10	0.10	0.00
Energy intensity											
Light petrol vehicles	litres/km							0.10	0.09	0.08	0.08
Light diesel vehicles	litres/km							0.11	0.10	0.09	0.09
Heavy commercial vehicles	litres/km							0.33	0.33	0.32	0.31
Buses	litres/km							0.23	0.23	0.22	0.22

* The average exchange rate for the year ending August 2015 was 0.75 NZ$/US$. This differs slightly from what was used in these projections. Fluctuations in the exchange rate are expected and it is assumed that the exchange rate falls from current levels to the long run exchange rate of 0.65 NZ$/US$.

**The average oil price for the year ending August 2015 was 64 US$/barrel based on the Dubai Crude price. This is a lot lower than what was used in this modelling. However, sensitivity analysis shows that if the oil price stayed persistently low at 90 US$/barrel out to 2030 that this would not have a material impact on emissions. For more information please visit: http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/modelling/new-zealands-energy-outlook/reference-scenario/documents-image-library/energy-outlook-2011/Energy%20Outlook%202011.pdf. New Zealand's energy emissions are most sensitive to economic growth rates, and this has been included in the sensitivity analysis.

***Stationary energy participants under the NZ ETS are only required to surrender one NZU for every 2 tonnes of emissions. This policy has been accounted for in the energy emissions modelling. This means an effective price per tonne of CO_2-e is half that stated above.

CTF Table 6: Information on updated greenhouse gas projections

GHG emissions projections	Unit	Base year (1990)	GHG emissions and removals						GHG emission projections – Scenarios			
									With measures		Without measures	
			1990	1995	2000	2005	2010	2013	2020	2030	2020	2030
Sector												
Energy	kt CO_2 eq	15,219.68	15,219.68	15,169.40	17,977.58	20,936.64	18,094.48	17,584.04	18,006.67	18,115.24	18,403.47	18,748.88
Transport	kt CO_2 eq	8,774.88	8,774.88	10,942.51	12,356.45	13,844.66	14,095.02	14,074.87	13,822.23	13,996.21	13,897.92	14,151.55
Industry/industrial processes	kt CO_2 eq	3,276.03	3,276.03	3,126.49	3,286.50	4,145.94	4,600.89	5,071.48	5,743.84	6,599.77	5,743.84	6,599.77
Agriculture	kt CO_2 eq	34,350.57	34,350.57	36,162.12	38,306.28	40,267.39	37,713.19	39,177.29	40,418.09	42,035.75	40,418.09	42,035.75
Forestry/LULUCF	kt CO_2 eq	–28,654.45	–28,654.45	–27,664.41	–30,345.53	–28,598.55	–32,056.57	–26,761.11	–24,215.14	–11,433.38	–20,069.86	–7,821.03
Waste management/waste	kt CO_2 eq	5,098.99	5,098.99	5,275.00	5,415.57	5,443.00	5,164.16	5,053.96	4,946.14	5,280.73	5,656.75	5,980.54
Other sectors												
Gases												
CO_2 emissions including net CO_2 from LULUCF	kt CO_2 eq	–3,527.80	–3,527.80	165.18	1,688.29	8,681.49	2,292.02	7,648.38	10,051.20	23,072.38	14,669.68	27,460.62
CO_2 emissions excluding net CO_2 from LULUCF	kt CO_2 eq	25,392.26	25,392.26	28,111.96	32,315.11	37,600.31	34,604.69	34,610.86	34,499.88	34,739.30	34,973.08	35,515.19
CH_4 emissions including CH_4 from LULUCF	kt CO_2 eq	33,380.88	33,380.88	34,392.88	36,304.75	36,970.45	35,157.63	35,687.67	37,017.97	38,673.95	37,727.33	39,384.51
CH_4 emissions excluding CH_4 from LULUCF	kt CO_2 eq	33,291.36	33,291.36	34,305.42	36,224.48	36,826.30	35,052.19	35,615.92	36,928.76	38,584.74	37,638.12	39,295.30

GHG emissions projections	Unit	Base year (1990)	GHG emissions and removals						GHG emission projections – Scenarios			
									With measures		Without measures	
			1990	1995	2000	2005	2010	2013	2020	2030	2020	2030
N_2O emissions including N_2O from LULUCF	kt CO_2 eq	7,470.82	7,470.82	8,154.58	8,647.12	9,452.48	8,839.91	9,182.42	9,383.49	9,711.70	9,384.03	9,714.05
N_2O emissions excluding N_2O from LULUCF	kt CO_2 eq	7,294.72	7,294.72	7,959.67	8,446.08	9,276.35	8,689.25	9,052.81	9,239.16	9,567.36	9,239.70	9,569.72
HFCs	kt CO_2 eq	0.00	0.00	136.20	282.71	847.22	1,254.87	1,615.24	2,225.28	3,095.81	2,225.28	3,095.81
PFCs	kt CO_2 eq	734.56	734.56	153.28	67.61	69.38	47.56	48.13	21.12	11.86	21.12	11.86
SF_6	kt CO_2 eq	7.25	7.25	9.01	6.37	18.06	19.16	18.69	22.78	28.61	22.78	28.61
Other gases												

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

Note: 2014 is the reporting due-date year (ie, 2014 for the First Biennial Report).

a In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", at a minimum Parties shall report a 'with measures' scenario, and may report 'without measures' and 'with additional measures' scenarios. If a Party chooses to report 'without measures' and/or 'with additional measures' scenarios they are to use tables 6(b) and/or 6(c), respectively. If a Party does not choose to report 'without measures' or 'with additional measures' scenarios then it should not include tables 6(b) or 6(c) in the biennial report.

b Emissions and removals reported in these columns should be as reported in the latest GHG Inventory and consistent with the emissions and removals reported in the table on GHG emissions and trends provided in this biennial report. Where the sectoral breakdown differs from that reported in the GHG Inventory Parties should explain in their biennial report how the inventory sectors relate to the sectors reported in this table.

d In accordance with paragraph 34 of the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", projections shall be presented on a sectoral basis, to the extent possible, using the same sectoral categories used in the policies and measures section. This table should follow, to the extent possible, the same sectoral categories as those listed in paragraph 17 of those guidelines, namely, to the extent appropriate, the following sectors should be considered: energy, transport, industry, agriculture, forestry and waste management.

e To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors (ie, cross-cutting), as appropriate.

f Parties may choose to report total emissions with or without LULUCF, as appropriate.

Chapter V: Provision of financial, technological and capacity-building support to developing country Parties

New Zealand remains committed to supporting effective climate outcomes in developing countries. During the reporting period 2013–2014, New Zealand has delivered on undertakings to provide climate-related financial support, both through the financial mechanism of the UNFCCC, and in resources related to the implementation of the Convention through bilateral, regional and other multilateral channels.

New Zealand's primary focus in providing climate-related support continues to be the delivery of effective results and benefits that address the sustainable economic development and climate change priorities of developing countries. New Zealand seeks to ensure that climate-related assistance aligns with the priorities and policies of partner governments to strengthen ownership of development priorities by developing countries. A significant proportion of this climate-related support continues to be bilateral assistance managed through the New Zealand Aid Programme. New Zealand provides a range of financial, technological and capacity-building support to developing country Parties (primarily to its partner countries in the Pacific, but also to countries in Asia, Africa, and Latin America) through multilateral, bilateral and regional channels. New Zealand also provides specific resources for mitigation, adaptation and technology transfer.

New Zealand recognises the importance of private finance in contributing to effective climate outcomes. In the short term, climate-related finance and investment from New Zealand to developing countries will continue to be provided primarily as public finance. New Zealand has begun a process to consider what – if anything – the New Zealand Government can do to help mitigate risks to climate-related investment opportunities in developing countries.

New Zealand's approach of integrating environmental and climate change objectives in all activities managed by the aid programme, where appropriate to do so, is in keeping with international best practice. New Zealand considers this to be the most effective way to manage climate change risks and so aims to design and deliver development assistance with environmental and climate change benefits.

New Zealand's contributions are captured in the following tables:

- CTF Table 7 – public financial support
- CTF Table 7(a) – public financial support provided through multilateral channels
- CTF Table 7(b) – public financial support provided through bilateral, regional and other channels
- CTF Table 8 – support for technology development and transfer
- CTF Table 9 – support for capacity-building.

This *Biennial Report* covers the two calendar years, 2013 and 2014. Funds are reported in New Zealand dollars (NZD). The methodology used for calculating currency exchange is the Annual Average exchange rates, as used by the Organisation for Economic Cooperation and Development (OECD). The rates used are as follows:

- 2013: US$1 = NZ$1.2203
- 2014: US$1 = NZ$1.2058.

New and additional

New Zealand provided NZ$85.57 million in bilateral climate-related assistance over the reporting period 2013–2014. New Zealand also provided core funding[45] to those regional and multilateral agencies with a strategic focus on climate change, totalling NZ$106.42 million. This represents an increase of NZ$32.08 million in bilateral climate-related assistance and an increase of NZ$7.55 million in core funding for regional and multilateral agencies, as compared with figures reported in the *First Biennial Report*.

The New Zealand Official Development Assistance (ODA) allocation includes dedicated climate change funding. For the period 2015/16 to 2017/18 this funding is NZ$9.5 million. This funding is being directed to initiatives that aim to strengthen the resilience of infrastructure and communities in developing countries.

In the absence of an internationally agreed definition of what can be counted as 'new and additional', New Zealand's practical approach has been to report all climate-related assistance for the reporting period. This is the most transparent and appropriate way of communicating resources committed.

New Zealand's view remains that it is not effective to try and separate climate-related support from other ODA. In practical terms, any climate-related support that meets agreed ODA definitions (ie, with a strong concessional element, and a focus on economic development and welfare of developing countries as its main objective) will be reported as such, and is included in this report.

National approach to tracking and reporting provision of support

New Zealand's approach to tracking and reporting the provision of support has not changed since the last *Biennial Report*. New Zealand has systems in place to track, measure and record climate-related assistance provided to developing countries. Climate related supported provided by the New Zealand Aid Programme is tracked through our Climate Change Inventory. New Zealand has implemented the OECD Development Assistance Committee (DAC) 'Rio' markers for tracking development assistance related to climate change adaptation and mitigation. While the Rio markers capture the policy objectives of each activity, they do not attempt to quantify expenditure towards these objectives. New Zealand, therefore, has initiated a system to standardise the quantification of climate-related finance based on the

[45] These contributions represent the full amounts provided to the organisations for the full range of activities covered by their programmes, which include climate change mitigation and adaptation.

DAC Rio markers.[46] New Zealand will continue to strengthen its systems and practices to enhance transparency.

In this report, New Zealand reports on bilateral, regional and multilateral contributions as follows:

- Reported bilateral contributions includes funding for aid activities where addressing climate change is assessed as being the principal, or significant, outcome of the activity, based on the DAC Rio markers.
- Reported regional and multilateral contributions include core funding provided to regional and multilateral organisations. Core funding provided to regional and multilateral organisations is not monitored at a level that tracks their specific climate change allocations and actions. As such, the figures provided in CTF Tables 7, 7(a), and 7(b) represent total contributions to multilateral and regional organisations "that Parties cannot specify as climate specific". This approach is in keeping with the Guidelines and footnotes c) and d) in these tables.

For the purposes of this report, 'provided' means funds that have been transferred from the New Zealand Government to a recipient, including any multilateral organisation.

Technology transfer and building capacity

During the reporting period, New Zealand contributed to technology and knowledge distribution through various initiatives. Details of support for country level 'technology development and transfer support' and 'capacity building support' is set out in CTF Tables 7(b), 8, 9.

New Zealand's contributions are not currently tracked at a level that differentiates between the provision of 'technology development and transfer support' and 'capacity building support'. Therefore, the figures in CTF Tables 7(b), 8 and 9 represent a combined figure for those contributions, and are replicated throughout those tables.

New Zealand aims to ensure that 'capacity building support' provided to non-Annex I Parties reflects their priorities and needs through effective development cooperation. This support is facilitated through agreed Joint Commitments for Development and Strategic Frameworks for Development that are based on partner country national plans and needs. New Zealand's development cooperation is reviewed through regular participation in the OECD DAC Peer Reviews, and through the Pacific Island Forum Compact Development Partner Review, which was initiated in 2014.

New Zealand has used the OECD DAC definition for capacity development[47] to identify activities that include capacity building support.

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[46] Further information can be found in the New Zealand Submission to the Conference of the Parties – Information on the appropriate methodologies and systems used to measure and track climate finance, May 2014.

[47] Capacity development is the process whereby people, organisations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time. Capacity development is more likely to be effective when capacity development is treated as a goal in its own right and that increased efforts are made to identify the objectives it seeks to achieve. Support for capacity development addresses three dimensions: human capacity, organisational capacity, and broader institutional capacity.

New Zealand's provision of capacity building support includes support to ensure developing countries have the capability to engage effectively on climate change issues in the international and domestic arenas, while also providing assistance to ensure the long-term sustainability of individual activities. Capacity building support has been most effective where it has aligned with partner needs and priorities. One example of this is the New Zealand initiated Global Research Alliance on Agricultural Greenhouse Gases. The alliance is focused on agricultural greenhouse gas mitigation research, knowledge sharing, collaborative projects and the extension of technologies and practices.

CTF Table 7_2013: Provision of public financial support: summary information in 2013

Allocation channels	Year: New Zealand dollar – NZD					Year: USD[b]				
		Climate-specific[d]					Climate-specific[d]			
	Core/ general[c]	Mitigation	Adaptation	Cross-cutting[e]	Other[f]	Core/ general[c]	Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	40.00					32.78				
Multilateral climate change funds[g]	1.87					1.53				
Other multilateral climate change funds[h]										
Multilateral financial institutions, including regional development banks	29.53					24.20				
Specialised United Nations bodies	8.60					7.05				
Total contributions through bilateral, regional and other channels		12.82	13.44	1.79	14.64		10.49	11.03	1.47	11.99
Total	40.00	12.82	13.44	1.79	14.64	32.78	10.49	11.03	1.47	11.99

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should provide an explanation on methodology used for currency exchange for the information provided in table 7, 7(a) and 7(b) in the box below.

[c] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

CTF Table 7_2014: Provision of public financial support: summary information in 2014

Allocation channels	Year	New Zealand dollar - NZD				USD[b]				
		Climate-specific[d]				Climate-specific[d]				
	Core/ general[c]	Mitigation	Adaptation	Cross-cutting[e]	Other[f]	Core/ general[c]	Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	37.68					31.25				
Multilateral climate change funds[g]	1.41					1.17				
Other multilateral climate change funds[h]										
Multilateral financial institutions, including regional development banks	27.67					22.95				
Specialised United Nations bodies	8.60					7.13				
Total contributions through bilateral, regional and other channels		43.74	12.37	1.44	14.10		36.29	10.27	1.20	11.69
Total	37.68	43.74	12.37	1.44	14.10	31.25	36.29	10.27	1.20	11.69

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should provide an explanation on methodology used for currency exchange for the information provided in table 7, 7(a) and 7(b) in the box below.

[c] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

CTF Table 7(a)_2013: Provision of public financial support: contribution through multilateral channels in 2013

Donor funding	Total amount				Status[b]	Funding source[f]	Financial instrument[f]	Type of support[f, g]	Sector[c]
	Core/general[d]		Climate-specific[e]						
	New Zealand dollar – NZD	USD	New Zealand dollar – NZD	USD					
Total contributions through multilateral channels	40.00	32.78							
Multilateral climate change funds [g]	1.87	1.53							
1. Global Environment Facility	1.87	1.53			Provided	ODA	Other (Capital Subscription)	Other (Core Contribution)	Not applicable
2. Least Developed Countries Fund									
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds									
Multilateral financial institutions, including regional development banks	29.53	24.20							
1. World Bank	19.15	15.69			Provided	ODA	Other (Capital Subscription)	Other (Core Contribution)	Not applicable
2. International Finance Corporation									
3. African Development Bank									
4. Asian Development Bank	10.38	8.51			Provided	ODA	Other (Capital Subscription)	Other (Core Contribution)	Not applicable
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other									
Specialised United Nations bodies	8.60	7.05							

Donor funding	Total amount								
	Core/general[d]		Climate-specific[e]						
	New Zealand dollar – NZD	USD	New Zealand dollar – NZD	USD	Status[b]	Funding source[f]	Financial instrument[f]	Type of support[f, g]	Sector[c]
1. United Nations Development Programme	8.00	6.56							
	8.00	6.56			Provided	ODA	Grant	Other (Core Contribution)	Not applicable
2. United Nations Environment Programme	0.60	0.49							
	0.60	0.49			Provided	ODA	Grant	Other (Core Contribution)	Not applicable
3. Other									

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States Dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

CTF Table 7(a)_2014: Provision of public financial support: contribution through multilateral channels in 2014

Donor funding	Total amount				Status[b]	Funding source[f]	Financial instrument[f]	Type of support[f, g]	Sector[c]
	Core/general[d]		Climate-specific[e]						
	New Zealand dollar – NZD	USD	New Zealand dollar – NZD	USD					
Total contributions through multilateral channels	37.68	31.25							
Multilateral climate change funds [g]	1.41	1.17							
1. Global Environment Facility	1.33	1.10			Provided	ODA	Other (Capital Subscription)	Other (Core Contribution)	Not applicable
2. Least Developed Countries Fund									
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities	0.08	0.07			Provided	ODA	Grant	Other (Core Contribution)	Not applicable
7. Other multilateral climate change funds									
Multilateral financial institutions, including regional development banks	27.67	22.95							
1. World Bank	17.29	14.34			Provided	ODA	Other (Capital Subscription)	Other (Core Contribution)	Not applicable
2. International Finance Corporation									
3. African Development Bank									
4. Asian Development Bank	10.38	8.61			Provided	ODA	Other (Capital Subscription)	Other (Core Contribution)	Not applicable
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other									

Donor funding	Total amount								
	Core/general[d]		Climate-specific[e]						
	New Zealand dollar – NZD	USD	New Zealand dollar – NZD	USD	Status[b]	Funding source[f]	Financial instrument[f]	Type of support[f, g]	Sector[c]
Specialised United Nations bodies	8.60	7.13							
1. United Nations Development Programme	8.00	6.63							
	8.00	6.63			Provided	ODA	Grant	Other (Core Contribution)	Not applicable
2. United Nations Environment Programme	0.60	0.50							
	0.60	0.50			Provided	ODA	Grant	Other (Core Contribution)	Not applicable
3. Other									

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States Dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

CTF Table 7(b)_2013: Provision of public financial support: contribution through bilateral, regional and other channels in 2013

Recipient country/ region/project/programme[b]	Total amount Climate-specific[f] New Zealand dollar – NZD	USD	Status[c]	Funding source[g]	Financial instrument[g]	Type of support[g, h]	Sector[d]	Additional information[e]
Total contributions through bilateral, regional and other channels	42.69	34.98						
Afghanistan	5.29	4.33	Provided	ODA	Grant	Mitigation	Energy	
Africa	0.02	0.02	Provided	ODA	Grant	Mitigation	Energy	
Asia (South-East) Regional	0.57	0.47	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Caribbean Regional	0.02	0.01	Provided	ODA	Grant	Mitigation	Energy	
Colombia	0.02	0.01	Provided	ODA	Grant	Adaptation	Agriculture	
Comoros	0.01	0.01	Provided	ODA	Grant	Mitigation	Energy	
Cook Islands	0.05	0.04	Provided	ODA	Grant	Adaptation	Transport	
Cook Islands	1.08	0.88	Provided	ODA	Grant	Adaptation	Water and sanitation	
Cook Islands	0.62	0.51	Provided	ODA	Grant	Mitigation	Energy	
Fiji	0.18	0.15	Provided	ODA	Grant	Adaptation	Other (Reconstruction)	
Fiji	0.58	0.48	Provided	ODA	Grant	Adaptation	Other (Housing)	
Fiji	0.06	0.05	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Indonesia	0.24	0.19	Provided	ODA	Grant	Mitigation	Energy	
Indonesia	0.12	0.10	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Indonesia	0.01	0.01	Provided	ODA	Grant	Adaptation	Agriculture	
Kenya	0.43	0.35	Provided	ODA	Grant	Adaptation	Water and sanitation	
Kiribati	0.11	0.09	Provided	ODA	Grant	Adaptation	Cross-cutting	
Kiribati	0.15	0.13	Provided	ODA	Grant	Adaptation	Water and sanitation	
Kiribati	0.07	0.06	Provided	ODA	Grant	Mitigation	Water and sanitation	

Recipient country/ region/project/programme[b]	Total amount Climate-specific[f] New Zealand dollar – NZD	USD	Status[c]	Funding source[g]	Financial instrument[g]	Type of support[g, h]	Sector[d]	Additional information[e]
Pacific Regional	0.27	0.22	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Pacific Regional	0.23	0.19	Provided	ODA	Grant	Cross-cutting	Other (Environment)	
Pacific Regional	0.79	0.65	Provided	ODA	Grant	Mitigation	Energy	
Pacific Regional	0.55	0.45	Provided	ODA	Grant	Adaptation	Other (Fisheries)	
Papua New Guinea	0.12	0.10	Provided	ODA	Grant	Mitigation	Energy	
Papua New Guinea	0.39	0.32	Provided	ODA	Grant	Cross-cutting	Agriculture	
Papua New Guinea	0.12	0.10	Provided	ODA	Grant	Adaptation	Agriculture	
Philippines	2.04	1.68	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Samoa	0.12	0.09	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Samoa	0.03	0.02	Provided	ODA	Grant	Adaptation	Other (Tourism)	
Solomon Islands	4.40	3.61	Provided	ODA	Grant	Adaptation	Transport	
Solomon Islands	0.30	0.25	Provided	ODA	Grant	Adaptation	Other (Fisheries)	
Timor-Leste	0.13	0.11	Provided	ODA	Grant	Adaptation	Agriculture	
Tokelau	1.17	0.96	Provided	ODA	Grant	Cross-cutting	Cross-cutting	
Tokelau	0.20	0.16	Provided	ODA	Grant	Mitigation	Energy	
Tonga	5.27	4.32	Provided	ODA	Grant	Mitigation	Energy	
Tonga	0.07	0.06	Provided	ODA	Grant	Adaptation	Cross-cutting	
Tuvalu	0.12	0.10	Provided	ODA	Grant	Mitigation	Energy	
Tuvalu	0.04	0.03	Provided	ODA	Grant	Adaptation	Other (Environment)	
Uruguay	0.06	0.05	Provided	ODA	Grant	Adaptation	Agriculture	
Vanuatu	0.17	0.14	Provided	ODA	Grant	Adaptation	Water and sanitation	
Vanuatu	0.13	0.11	Provided	ODA	Grant	Adaptation	Agriculture	

Recipient country/ region/project/programme[b]	Total amount Climate-specific[f] New Zealand dollar – NZD	USD	Status[c]	Funding source[g]	Financial instrument[g]	Type of support[g, h]	Sector[d]	Additional information[e]
Vanuatu	0.09	0.07	Provided	ODA	Grant	Adaptation	Other (Education)	
Vanuatu	0.13	0.10	Provided	ODA	Grant	Adaptation	Transport	
Vanuatu	0.03	0.02	Provided	ODA	Grant	Mitigation	Forestry	
Vanuatu	0.04	0.04	Provided	ODA	Grant	Adaptation	Other (Tourism)	
Vanuatu	0.02	0.01	Provided	ODA	Grant	Mitigation	Energy	
Viet Nam	0.27	0.22	Provided	ODA	Grant	Adaptation	Other (Environment)	
Viet Nam	1.00	0.82	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Viet Nam	0.12	0.10	Provided	ODA	Grant	Adaptation	Agriculture	
Other regional channels	14.64	11.99	Provided	ODA	Grant	Other (Core/General)	Other (Core/General)	Core/General Contributions are provided to regional organisations.

Abbreviations: ODA = official development assistance, OOF = other official flows; USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

CTF Table 7(b)_2014: Provision of public financial support: contribution through bilateral, regional and other channels in 2014

Recipient country/ region/project/programme[b]	Total amount Climate-specific[f] New Zealand dollar – NZD	USD	Status[c]	Funding source[g]	Financial instrument[g]	Type of support[g, h]	Sector[d]	Additional information[e]
Total contributions through bilateral, regional and other channels	71.65	59.45						
Afghanistan	2.25	1.87	Provided	ODA	Grant	Mitigation	Energy	
Asia (South-East) Regional	0.36	0.30	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Cambodia	0.14	0.12	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Caribbean Regional	0.17	0.14	Provided	ODA	Grant	Mitigation	Energy	
Central Americas Regional	0.03	0.03	Provided	ODA	Grant	Cross-cutting	Agriculture	
Colombia	0.05	0.05	Provided	ODA	Grant	Adaptation	Agriculture	
Comoros	0.05	0.04	Provided	ODA	Grant	Mitigation	Energy	
Cook Islands	0.46	0.38	Provided	ODA	Grant	Adaptation	Water and sanitation	
Cook Islands	15.91	13.20	Provided	ODA	Grant	Mitigation	Energy	
Cook Islands	0.01	0.01	Provided	ODA	Grant	Adaptation	Other (Fisheries)	
Cook Islands	0.07	0.06	Provided	ODA	Grant	Adaptation	Other (Environment)	
Fiji	0.25	0.21	Provided	ODA	Grant	Adaptation	Other (Housing)	
Fiji	0.04	0.03	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Global/International	0.50	0.41	Provided	ODA	Grant	Mitigation	Energy	
Indonesia	3.54	2.93	Provided	ODA	Grant	Mitigation	Energy	
Indonesia	1.21	1.00	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Indonesia	0.01	0.01	Provided	ODA	Grant	Adaptation	Agriculture	
Indonesia	0.10	0.08	Provided	ODA	Grant	Adaptation	Cross-cutting	
Kiribati	0.06	0.05	Provided	ODA	Grant	Adaptation	Cross-cutting	

Recipient country/ region/project/programme[b]	Total amount Climate-specific[f] New Zealand dollar – NZD	USD	Status[c]	Funding source[g]	Financial instrument[g]	Type of support[g, h]	Sector[d]	Additional information[e]
Kiribati	0.05	0.04	Provided	ODA	Grant	Mitigation	Water and sanitation	
Kiribati	0.40	0.33	Provided	ODA	Grant	Adaptation	Water and sanitation	
Kiribati	0.08	0.07	Provided	ODA	Grant	Mitigation	Energy	
Myanmar	0.01	0.01	Provided	ODA	Grant	Cross-cutting	Agriculture	
Nepal	0.07	0.06	Provided	ODA	Grant	Cross-cutting	Agriculture	
Pacific Regional	0.38	0.31	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Pacific Regional	0.01	0.01	Provided	ODA	Grant	Cross-cutting	Other (Environment)	
Pacific Regional	0.03	0.03	Provided	ODA	Grant	Mitigation	Energy	
Pacific Regional	0.04	0.03	Provided	ODA	Grant	Adaptation	Water and sanitation	
Pacific Regional	0.52	0.44	Provided	ODA	Grant	Adaptation	Other (Fisheries)	
Papua New Guinea	0.78	0.64	Provided	ODA	Grant	Mitigation	Energy	
Papua New Guinea	0.15	0.12	Provided	ODA	Grant	Cross-cutting	Agriculture	
Peru	0.02	0.02	Provided	ODA	Grant	Mitigation	Agriculture	
Philippines	2.73	2.26	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Samoa	7.36	6.10	Provided	ODA	Grant	Mitigation	Energy	
Solomon Islands	1.17	0.97	Provided	ODA	Grant	Adaptation	Transport	
Solomon Islands	0.03	0.03	Provided	ODA	Grant	Mitigation	Energy	
Solomon Islands	0.15	0.13	Provided	ODA	Grant	Adaptation	Other (Fisheries)	
Suriname	0.02	0.02	Provided	ODA	Grant	Adaptation	Agriculture	
Timor-Leste	0.15	0.12	Provided	ODA	Grant	Adaptation	Agriculture	
Tokelau	1.17	0.97	Provided	ODA	Grant	Cross-cutting	Cross-cutting	
Tokelau	0.20	0.17	Provided	ODA	Grant	Mitigation	Cross-cutting	
Tonga	3.17	2.63	Provided	ODA	Grant	Mitigation	Energy	
Tonga	0.07	0.06	Provided	ODA	Grant	Adaptation	Cross-cutting	

Recipient country/ region/project/programme[b]	Total amount Climate-specific[f] New Zealand dollar – NZD	USD	Status[c]	Funding source[g]	Financial instrument[g]	Type of support[g, h]	Sector[d]	Additional information[e]
Tuvalu	8.68	7.20	Provided	ODA	Grant	Mitigation	Energy	
Tuvalu	0.61	0.50	Provided	ODA	Grant	Adaptation	Other (Environment)	
Uruguay	0.26	0.22	Provided	ODA	Grant	Adaptation	Agriculture	
Vanuatu	0.17	0.14	Provided	ODA	Grant	Adaptation	Water and sanitation	
Vanuatu	0.21	0.17	Provided	ODA	Grant	Adaptation	Agriculture	
Vanuatu	0.06	0.05	Provided	ODA	Grant	Adaptation	Other (Education)	
Vanuatu	0.75	0.62	Provided	ODA	Grant	Adaptation	Transport	
Vanuatu	0.01	0.01	Provided	ODA	Grant	Mitigation	Forestry	
Vanuatu	0.16	0.13	Provided	ODA	Grant	Adaptation	Other (Tourism)	
Vanuatu	0.91	0.76	Provided	ODA	Grant	Mitigation	Energy	
Viet Nam	0.44	0.37	Provided	ODA	Grant	Adaptation	Other (Environment)	
Viet Nam	1.05	0.87	Provided	ODA	Grant	Adaptation	Other (Vulnerability Assessment)	
Viet Nam	0.27	0.23	Provided	ODA	Grant	Adaptation	Agriculture	
Other regional channels	14.10	11.69	Provided	ODA	Grant	Other (Core/General)	Other (Core/General)	Core/General Contributions are provided to regional organisations

Abbreviations: ODA = official development assistance, OOF = other official flows; USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

CTF Table 8: Provision of technology development and transfer support

Recipient country and/or region	Targeted area	Measures and activities related to technology transfer	Sector[c]	Source of the funding for technology transfer	Activities undertaken by	Status
Afghanistan	Mitigation		Energy	Public	Public	Implemented
Africa Regional	Mitigation		Energy	Public	Private	Implemented
Caribbean Regional	Mitigation		Energy	Public	Public	Implemented
Central Americas Regional	Mitigation and Adaptation		Agriculture	Public	Private	Implemented
Colombia	Adaptation		Agriculture	Public	Private	Implemented
Comoros	Mitigation		Energy	Public	Private	Implemented
Cook Islands	Adaptation		Water and sanitation	Public	Public	Implemented
Cook Islands	Mitigation		Other (Environment)	Public	Private	Implemented
Cook Islands	Mitigation		Energy	Public	Public	Implemented
Fiji	Adaptation		Other (Housing)	Public	Private and Public	Implemented
Global/International	Mitigation		Energy	Public	Private and Public	Implemented
Indonesia	Mitigation		Energy	Public	Public	Implemented
Indonesia	Adaptation		Other (Vulnerability Assessment)	Public	Public	Implemented
Indonesia	Adaptation		Agriculture	Public	Public	Implemented
Kenya	Adaptation		Water and sanitation	Public	Private	Implemented
Kiribati	Adaptation		Other (Cross-cutting)	Public	Public	Implemented
Kiribati	Adaptation		Water and sanitation	Public	Public	Implemented
Kiribati	Mitigation		Water and sanitation	Public	Public	Implemented
Kiribati	Mitigation		Energy	Public	Private and Public	Implemented
Myanmar	Mitigation and Adaptation		Agriculture	Public	Private	Implemented
Nepal	Adaptation		Agriculture	Public	Private	Implemented
Pacific Regional	Adaptation		Water and sanitation	Public	Public	Implemented

Recipient country and/or region	Targeted area	Measures and activities related to technology transfer	Sector[c]	Source of the funding for technology transfer	Activities undertaken by	Status
Pacific Regional	Adaptation		Other (Environment), Other (Vulnerability Assessment)	Public	Public	Implemented
Papua New Guinea	Mitigation		Energy	Public	Private and Public	Implemented
Papua New Guinea	Mitigation and Adaptation		Agriculture	Public	Private	Implemented
Peru	Mitigation		Agriculture	Public	Private	Implemented
Samoa	Adaptation		Other (Vulnerability Assessment)	Public	Private	Implemented
Samoa	Mitigation		Energy	Public	Public	Implemented
Solomon Islands	Mitigation		Energy	Public	Public	Implemented
Suriname	Adaptation		Agriculture	Public	Public	Implemented
Timor-Leste	Adaptation		Agriculture	Public	Private	Implemented
Tokelau	Mitigation		Energy	Public	Public	Implemented
Tonga	Mitigation		Energy	Public	Private and Public	Implemented
Tuvalu	Mitigation		Energy	Public	Public	Implemented
Uruguay	Adaptation		Agriculture	Public	Private	Implemented
Vanuatu	Adaptation		Agriculture	Public	Private	Implemented
Vanuatu	Adaptation		Water and sanitation	Public	Private	Implemented
Vanuatu	Mitigation		Energy	Public	Private	Implemented
Viet Nam	Adaptation		Other (Cross-cutting)	Public	Private and Public	Implemented
Viet Nam	Adaptation		Agriculture	Public	Private	Implemented
Other regional channels	Mitigation and Adaptation		Other (Core/General)	Public	Public	Implemented

[a] To be reported to the extent possible.

[b] The tables should include measures and activities since the last national communication or biennial report.

[c] Parties may report sectoral disaggregation, as appropriate.

CTF Table 9: Provision of capacity-building support

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Kiribati	Adaptation	Urban Development: Temaiku Subdivision	Other (Vulnerability Assessment): Support for development of a "climate proofed" residential subdivision at Temaiku, South Tarawa to accommodate natural urban growth and ease overcrowding in existing villages.
Vanuatu	Mitigation	Vanuatu Rural Electification Project	Energy: Support for the Department of Energy to establish a robust private sector business model that will meet demand.
Indonesia	Mitigation	Geothermal Energy Human Resource Development (HRD)	Energy: Assistance to produce a Strategic Geothermal Energy Human Resource Development Plan for Indonesia's geothermal energy sector.
Myanmar	Multiple Areas	Rakhine Winter Cropping Activity	Agriculture: Assistance to improve sustainable agriculture in Rakhine State, Myanmar.
Caribbean Regional	Mitigation	Caribbean Geothermal Energy Support	Energy: Establishment of Caribbean Geothermal Advisor and implementation of technical assistance activities to support geothermal development in the Eastern Caribbean.
Solomon Islands	Adaptation	Mekem Strong Solomon Islands Fisheries (MSSIF)	Other (Fisheries): Support to Solomon Islands to develop the fisheries and marine resources sector. The activity will develop capability and implement policy.
Nepal	Adaptation	Cooperative Enterprise in Nepal	Agriculture: Working with Caritas New Zealand to increase the economic sustainability and social well-being of communities in Western Nepal through: micro-credit to support agricultural and livestock enterprises; technical training; environmentally safe inputs.
Vanuatu	Adaptation	Central Vanuatu Community Economic Development	Agriculture: Working with World Vision to establish a sustainable system for farmers to develop market opportunities, overcome constraints to market access and improve capacity of farmer groups in Vanuatu.
Tokelau	Mitigation	Tokelau renewable energy	Energy: Support for the installation of three solar photovoltaic-based mini-grids to supply approximately 90% of Tokelau's current electricity demand.
Cook Islands	Adaptation	Drought response	Other (Vulnerability Assessment): Provision of equipment and technical assistance, enabling the Cook Islands to prevent a humanitarian crisis and potential disease outbreak following drought conditions in the Southern Group islands.

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Tuvalu	Mitigation	Tuvalu renewable energy	Energy: Support for a Renewable Energy and Energy Efficiency Unit, part of the Tuvalu Electricity Corporation, and a plan for infrastructure development for greater use of renewable energy generation.
Papua New Guinea	Adaptation	Sustainable Agriculture and Fisheries	Agriculture: Working with Caritas NZ to support agriculture and fishery-based alternative livelihoods for rural Papua New Guineans. This will be achieved through providing training in crop diversification, fishery activities, marketing and product development.
Cook Islands	Mitigation	Renewable Energy (Northern Group)	Energy: Support to enable the Cook Islands Government to progress establishment of renewable electricity generation in the Northern Group of the Cook Islands.
Other regional channels	Multiple Areas	Secretariat of the Pacific Community (SPC)	Multiple Areas: Other (Core/General): These contributions represent the full amounts provided to the organisation for the full range of activities covered by their programmes, which include climate change mitigation and adaptation.
Viet Nam	Adaptation	GNS Dam Safety Project	Other (Vulnerability Assessment): Provision / assistance with skills, tools, and processes to Vietnamese dam owners, industry professionals and government agencies to reduce the risk of catastrophic dam failure.
Fiji	Adaptation	Fiji Rotahomes Koroipita Project (Phase 2)	Other (Housing): Support for the provision of affordable and sustainable housing (using building codes to standard cyclones) to impoverished families.
Vanuatu	Adaptation	Tanna Water and Sanitation Project	Water and Sanitation: Working with World Vision New Zealand to address water, sanitation, hygiene, health and nutrition issues through community-led interventions in five communities in south west Tanna, Vanuatu (target population is 1857).
Other regional channels	Multiple Areas	Forum Secretariat (PIFS)	Multiple Areas: Other (Core/General): These contributions represent the full amounts provided to the organisation for the full range of activities covered by their programmes, which include climate change mitigation and adaptation.
Papua New Guinea	Mitigation	Enga Hydro	Energy: Assistance to determine the feasibility of mini-hydro to supply electricity in the Tsak Valley.
Papua New Guinea	Mitigation	Increasing Access to Electricity for Rural Communities	Energy: Assistance to extend the power distribution grid to rural communities in Bougainville, West New Britain and Northern Province of PNG.
Pacific Regional	Adaptation	Ministry of Civil Defence and Emergency Management	Other (Vulnerability Assessment): Provision of support from the Ministry of Civil Defence and Emergency Management to improve levels of resilience and enhanced capability to prepare for and respond to natural disasters in the Pacific.

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Tokelau	Mitigation	Tokelau Asset Management	Cross-cutting: Assistance to undertake a comprehensive audit of all major publicly owned assets and provide Tokelau with a comprehensive report on the state of these assets, and recommendations for infrastructure asset management.
Kiribati	Mitigation	Kiritimati Island Energy Sector Programme	Energy: Support to enable the Government of Kiribati to progress establishment of renewable electricity generation on Kiritimati Island.
Tokelau	Multiple Areas	Tokelau Budget Support	Cross-cutting: Budget support for Tokelau. Climate change is a significant element of Tokelau's national development plans.
Pacific Regional	Multiple Areas	Alliance of Small Island States (AOSIS)	Other (Environment): The Alliance of Small Island States is a coalition of small island and low-lying coastal countries that share similar development challenges and concerns, especially their vulnerability to the adverse effects of global climate change.
Fiji	Adaptation	Fiji flood recovery – infrastructure projects	Other (Reconstruction): Assistance for a range of infrastructure projects to assist citizens following the Nadi floods in January 2009.
Cook Islands	Adaptation	Waste Management and Sanitation	Water and Sanitation: Enhanced sustainable economic and human development by reducing pollution of Rarotonga lagoons through the provision of technical assistance to the Ministry of Infrastructure to upgrade domestic, commercial and farming sanitation systems and waste management.
Indonesia	Adaptation	Community Resilience and Economic Development (CaRED)	Other (Vulnerability Assessment): The Community Resilience and Economic Development activity is a partnership between the University of Gadja Mada faculties and NZ institutions including GNS Science, Auckland and Canterbury universities which includes support to build capacity to manage natural disasters in eastern Indonesia.
Solomon Islands	Adaptation	Munda Runway, Nusatupe Runway, Noro-Munda Rd	Transport: Making the infrastructure more resistant to the forces of the weather, and some of the road work is also linked to improving access across low lying flood prone areas.
Vanuatu	Adaptation	Vanuatu Tourism Assistance Programme	Other (Tourism): Assistance with repairing the Port Vila seawall (and considering climate change in the design).
Papua New Guinea	Mitigation	Geothermal kick-start activities in Papua New Guinea.	Energy: Technical assistance to the Department of Mineral Policy and Geohazards Management and the Mineral Resource Authority

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Tonga	Mitigation	Energy: Village Network Upgrade	Energy: Tonga Village Network Upgrade Project will install new power distribution networks including new poles, low voltage and high voltage lines, high voltage transformers, underground, tamper-proof metered connections to dwellings.
Caribbean Regional	Mitigation	Caribbean Geothermal Workshop	Energy: A workshop on the development of geothermal energy in the Caribbean.
Samoa	Mitigation	Samoa Renewable Energy Partnership	Energy: A Renewable Energy Partnership between the Government of Samoa, the European Union and New Zealand that includes the development of large-scale photovoltaics, wind energy, hydro power, and technical assistance to increase renewable energy generation.
Kiribati	Adaptation	Infrastructure Capacity Support	Water and Sanitation: Funding for the management of Urban Development initiatives in Water and Sanitation, Solid Waste Management and Urban Housing.
Viet Nam	Adaptation	Oxfam Climate Change Project	Other (Environment): Enhanced capacity of coastal communities in Binh Dai and Thanh Phu districts to identify and manage the impacts of climate change and natural disasters on their livelihoods.
Vanuatu	Mitigation	Geothermal Energy Support	Energy: Provision of technical advice to help Vanuatu develop its geothermal potentials in a way that serves the best long-term interests of ni-Vanuatu.
Tonga	Adaptation	Ama Takiloa Tonga Sustainable Development	Agriculture: Working with the Christian World Service and Tonga Community Development Trust to support 319 women's groups in villages in Tonga, including through the growth of disaster resistant crops.
Indonesia	Mitigation	Technical assistance for Geothermal Scale-Up	Energy: Provision of technical assistance for capacity building for the transformational scale-up of geothermal development in Indonesia.
Kiribati	Multiple Areas	Strategic Policy Unit	Cross-cutting: Provision of support to the Strategic Policy Unit within the Office of the President, covering issues such as climate change and population.
Timor-Leste	Adaptation	Bobonaro Food Security & Economic Development	Agriculture: Working with World Vision to support farmers in Timor Leste to increase their yields of subsistence crops through the introduction of innovative, sustainable production, processing and storage techniques.
Cook Islands	Mitigation	Cook Islands Renewable Energy	Energy: Support to enable the Cook Islands Government to progress establishment of renewable electricity generation on Rarotonga.

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Tonga	Mitigation	Renewable Energy	Energy: Support for the construction and five-year ongoing management of the 1 megawatt Popua Solar Photovoltaic Power Plan.
Caribbean Regional	Mitigation	Energy Summit Caribbean Attendance	Energy: Support for attendance by Caribbean delegations at the Pacific Energy Summit.
Indonesia	Mitigation	GNS Geothermal training in Indonesia	Energy: Provision of training (in partnership with the University of Gadjah Mada) to increase the geothermal skill base in Indonesia.
Pacific Regional	Mitigation	Pacific Energy Summit	Energy: Funding / coordination in preparation of the Pacific Energy Summit.
Samoa	Adaptation	Indigenous housing as a solution to climate change	Other (Vulnerability Assessment): Support for indigenous housing as a solution to climate risk in Samoa.
Uruguay	Adaptation	Uruguay Family Farm Improvement Project	Agriculture: A four year programme of activities to support Uruguay's development in three key areas: profitable and resilient farm systems; productive and persistent forage systems; and effective rural networks and extension systems.
Cambodia	Adaptation	Disaster Resilience through Improved Education	Other (Vulnerability Assessment): Save the Children NZ will implement a 3-year activity that focuses on increasing awareness of Disaster Risk Reduction and Climate Change Adaptation and promoting hazard mapping, land-use planning and better environmental management in the coastal regions.
Afghanistan	Mitigation	Power Generation – Bamyan Province	Energy: Electrification of Bamyan Town and Nayak through solar Photovoltaics (PV).
Asia (South-East) Regional	Adaptation	Strengthening Disaster Risk Reduction: Asian Disaster Preparedness Centre (ADPC)	Other (Vulnerability Assessment): Support enables the Asian Disaster Preparedness Centre to improve disaster risk reduction capacity in Lao PDR, Myanmar, the Philippines and Viet Nam by standardising systems for sharing of disaster risk assessment information and enhancing preparedness for the recovery phase of disasters.
Samoa	Adaptation	Tourism Tsunami Rebuilding Programme	Other (Tourism): Support for rehabilitated beach fales, budget tourist accommodation businesses, and related tourist support services following the 2009 tsunami.
Pacific Regional	Adaptation	Pacific Disaster Risk Management	Other (Vulnerability Assessment): Initiatives to improve levels of resilience and enhance national capability to prepare for and respond to natural disasters in the Pacific.

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Indonesia	Adaptation	DRM: National Disaster Management Framework	Other (Vulnerability Assessment): Assistance to develop an all-of-government framework for disaster preparedness and response that will clarify roles and accountabilities and mechanisms for coordinating disaster preparedness and response work.
Kiribati	Adaptation	Urban Development: Rainwater Harvesting	Water and Sanitation: Support for the provision of better access to safe drinking water on South Tarawa and Kiritimati Island through installation of rainwater capture and storage systems on large public buildings.
Global/International	Mitigation	International Renewable Energy Agency	Energy: New Zealand contribution to the International Renewable Energy Agency's developing country work programmes.
Papua New Guinea	Multiple Areas	Highlands Economic Development Programme	Agriculture: Working with Oxfam New Zealand to support grassroots organisations in the Jiwaka, Simbu and Eastern Highlands Province by providing technical expertise to train community members in improved farming techniques for agricultural production of cash crops.
Pacific Regional	Adaptation	Metservice – Meteorological forecasting for cyclones	Other (Vulnerability Assessment): Provision of forecasting services and warnings for tropical cyclones in the Pacific.
Pacific Regional	Adaptation	Water Security in selected Pacific Island Countries	Water and Sanitation: Assistance to strengthen the availability, reliability and quality of drinking water in vulnerable and isolated communities in Tuvalu, Tokelau, Kiribati, Cook Islands and the Republic of Marshall Islands.
Indonesia	Adaptation	GNS – Reducing Risk from Disasters	Other (Vulnerability Assessment): Training and capability building is provided to increase the disaster risk management skills of local governments, to provide specialist advice and technical support to local governments, and increase participation of the private sector, NGOs and community groups.
Asia (South-East) Regional	Adaptation	ASEAN Humanitarian Assistance Centre	Other (Vulnerability Assessment): The ASEAN Humanitarian Assistance Centre is supported by an initial two-year phase of practical level training and technical assistance in disaster risk management and risk identification.
Indonesia	Adaptation	Watershed Protection Programme in Aceh	Other (Vulnerability Assessment): Implemented by the Leuser International Foundation, this programme worked with community groups in 20 villages to protect the forest and watershed areas in the Leuser Ecosystem through agroforestry and afforestation of degraded land.

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Indonesia	Adaptation	Massey Agribusiness Innovation in Eastern Indonesia	Agriculture: Includes assistance for the development of capability in the use of tools, technologies and systems to contribute to the management and mitigation of existing climate change risks.
Vanuatu	Adaptation	Improving Vocational Training Infrastructure	Other (Vulnerability Assessment): Working with Oxfam New Zealand to strengthen three rural training centres in Vanuatu – Torgil, Lorokau and Pektel – to act as a hub for vocational training (particularly for women), and as a community refuge from natural disasters.
Kiribati	Mitigation	Urban Development: Solid Waste Management	Water and Sanitation: Provision of support to improve solid waste management in South Tarawa (with potential methane reduction benefits).
Comoros	Mitigation	ADPF Geothermal Energy technical assistance	Energy: Support for Geothermal Energy Technical Assistance for Comoros.
Solomon Islands	Adaptation	Domestic Maritime Support Project	Transport: Funding support to help build/rebuild six new wharves across Solomon Islands
Suriname	Adaptation	Suriname Improvement of Upland Rice Cultivation	Agriculture: Improved production of Upland rice in Suriname through strengthened cultivation techniques.
Indonesia	Adaptation	Disaster Risk Management: Indonesia Disaster Fund	Other (Vulnerability Assessment): The Indonesian Multi Donor Fund Facility for Disaster Recovery is a trust fund for disaster recovery established on 30 December 2009 through an memorandum of understanding between the Government of Indonesia, the World Bank and the United Nations.
Pacific Regional	Adaptation	Fisheries: Tuna Investment and Export Facilitation	Other (Fisheries): Assistance to facilitate increased investment in, and exports from, the tuna sector in Pacific Island countries by working with fisheries agencies and other stakeholders to provide technical advice and build in-country capacity.
Africa Regional	Mitigation	Renewable Energy Study Tour	Energy: The overall objective of the study tour is to contribute to the development of the Africa Clean Energy Corridor, which will accelerate the use of renewable power in East Africa, through exposure to New Zealand's renewable energy model.
Pacific Regional	Adaptation	Fisheries: Tuna Science and Information	Other (Fisheries): Assistance to improve national fisheries information systems tailored to individual Pacific Island countries' (PICs) needs, provide PICs' fisheries agencies with tuna stock assessment advice, and establish a targeted tagging programme.
Vanuatu	Mitigation	Ministry of Agriculture, Quarantine, Forestry and Fisheries Interim support – forestry training	Forestry: Supporting 15 government forestry officers to complete the two-year Diploma in Agriculture course at Hango Agriculture College in Tonga.

Recipient country/region	Targeted area	Programme or project title	Description of programme or project [b,c]
Fiji	Adaptation	Fiji Evacuation Centres Upgrade Project	Other (Vulnerability Assessment): Assistance to restore/repair key infrastructure after the severe flood of Jan 2009. The project includes the design of a prototype evacuation centre that are structurally sound, safe and accessible.
Vanuatu	Adaptation	Vanuatu Inter-Island Shipping Programme	Transport: Support for improving inter-island shipping.
Colombia	Adaptation	Colombia Dairy Value Chain Project	Agriculture: The activity will involve the adaptation of New Zealand dairy farming systems and industry knowledge into the Colombian context, and the validation of these systems, providing a foundation for the subsequent extension of the resulting models for dairy industry development throughout the tropical highland regions of Colombia.
Comoros	Mitigation	Comoros – Support for realisation of geothermal potential	Energy: Assistance for the development of potential geothermal resources on Comoros for electric power generation.
Other Regional Channels	Multiple Areas	Secretariat of the Pacific Regional Environment Programme (SPREP)	Multiple Areas: Other (Core/General): These contributions represent the full amounts provided to the organisation for the full range of activities covered by their programmes, which include climate change mitigation and adaptation.
Cook Islands	Adaptation	Alternate Jetty	Other (Vulnerability Assessment): Support for construction of an alternative jetty at Arorangi, to help contribute to improved resilience in a natural disaster should Avatiu Port become inaccessible.
Peru	Mitigation	Peru Dairy Initiative	Agriculture: Support to improve the productivity and profitability of small scale dairy producers in the Peruvian Andes.
Viet Nam	Adaptation	Building strong and resilient communities	Agriculture: Working with Childfund NZ to implement an Activity that will build stronger and more resilient communities in six rural communes in Cao Bang Province, Viet Nam, through improved agriculture, diversified livelihoods, and disaster risk management.

[a] To be reported to the extent possible.

[b] Each Party included in Annex II to the Convention shall provide information, to the extent possible, on how it has provided capacity-building support that responds to the existing and emerging capacity-building needs identified by Parties not included in Annex I to the Convention in the areas of mitigation, adaptation and technology development and transfer.

[c] Additional information may be provided on, for example, the measure or activity and co-financing arrangements.

Chapter VI: Other reporting matters

The Climate Change Response Act 2002[48] (the Act) established the New Zealand Emissions Trading Scheme (NZ ETS). The NZ ETS places requirements on all sectors of the New Zealand economy to measure and report emissions. Participants of the scheme, except those from the agriculture sector, must then surrender emission units corresponding to their reported emissions.

Audits are undertaken of participants' data to ensure their compliance with the NZ ETS. The Act provides for compliance action to enforce NZ ETS obligations, with a substantial financial penalty in addition to repayment of any outstanding emission units. Similar powers apply for any repayment obligations in case of over-allocation.

The NZ ETS has continued to evolve since the publication of New Zealand's *Sixth National Communication*.[49] Most notably this has been through barring the use of international units from June 2015. This transitioned the NZ ETS into a domestic-only scheme with only New Zealand Units now eligible for surrender.

The Government is currently undertaking a review of the NZ ETS. The aim of the review is to ensure the NZ ETS is fit for purpose to 2020 and can evolve to help New Zealand meet its post-2020 commitments.

New Zealand publishes a domestic Net Position report, which tracks New Zealand's progress towards meeting its emission reduction target. The report encompasses emissions and removals as presented in the annual greenhouse gas inventory, projections of emissions and removals to 2020, and units held by the Government. The report is published on the Ministry for the Environment's website.

[48] The Climate Change Response Act 2002 sets out all the legislated obligations and requirements referred to in this chapter. www.legislation.govt.nz/act/public/2002/0040/latest/DLM158584.html.

[49] For a copy of the National Communication, see the Ministry for the Environment's website, www.mfe.govt.nz/publications/climate-change/new-zealands-sixth-national-communication-under-united-nations-framework.

Appendix A: CTF Table 1

This appendix contains the tables of emissions data submitted to the UNFCCC as part of the Biennial Report in Common Tabular Format (CTF).

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CTF Table 1: Emission trends: summary

Greenhouse gas emissions	Base year[a] kt CO_2 eq	1990	1991	1992	1993	1994	1995	1996	1997
CO_2 emissions without net CO_2 from LULUCF	25,392.26	25,392.26	26,084.21	28,067.90	27,668.99	27,844.29	28,111.96	29,337.04	31,325.24
CO_2 emissions with net CO_2 from LULUCF	–3,527.80	–3,527.80	–4,639.16	–1,669.40	–2,201.27	–1,506.00	165.18	2,149.46	2,978.27
CH_4 emissions without CH_4 from LULUCF	33,291.36	33,291.36	33,525.89	33,209.81	33,308.44	33,971.42	34,305.42	34,985.67	35,683.61
CH_4 emissions with CH_4 from LULUCF	33,380.88	33,380.88	33,599.95	33,288.01	33,403.79	34,069.75	34,392.88	35,088.41	35,781.12
N_2O emissions without N_2O from LULUCF	7,294.72	7,294.72	7,363.14	7,311.15	7,481.83	7,755.49	7,959.67	8,047.39	8,213.87
N_2O emissions with N_2O from LULUCF	7,470.82	7,470.82	7,537.06	7,487.58	7,664.96	7,948.01	8,154.58	8,250.38	8,419.10
HFCs	NO, NA	NO, NA	NO, NA	1.43	2.86	64.69	136.20	221.23	69.91
PFCs	734.56	734.56	728.91	461.88	210.16	186.18	153.28	278.98	201.11
Unspecified mix of HFCs and PFCs	NA	NA	NA	NA	NA	NA	NA	NA	NA
SF_6	7.25	7.25	7.65	8.17	8.45	8.65	9.01	8.58	8.84
NF_3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (without LULUCF)	66,720.16	66,720.16	67,709.80	69,060.34	68,680.73	69,830.71	70,675.53	72,878.89	75,502.56
Total (with LULUCF)	38,065.71	38,065.71	37,234.41	39,577.68	39,088.95	40,771.27	43,011.12	45,997.04	47,458.34
Total (without LULUCF, with indirect)	66,720.16	66,720.16	67,709.80	69,060.34	68,680.73	69,830.71	70,675.53	72,878.89	75,502.56
Total (with LULUCF, with indirect)	38,065.71	38,065.71	37,234.41	39,577.68	39,088.95	40,771.27	43,011.12	45,997.04	47,458.34

Greenhouse gas source and sink categories	Base year kt CO_2 eq	1990	1991	1992	1993	1994	1995	1996	1997
1. Energy	23,994.57	23,994.57	24,415.01	26,328.44	25,759.48	25,993.81	26,111.91	27,625.37	29,600.95
2. Industrial processes and product use	3,276.03	3,276.03	3,414.74	3,240.40	3,083.81	2,995.39	3,126.49	3,349.50	3,021.43
3. Agriculture	34,350.57	34,350.57	34,706.10	34,250.65	34,525.03	35,614.34	36,162.12	36,588.54	37,528.92
4. Land Use, Land-Use Change and Forestry[b]	–28,654.45	–28,654.45	–30,475.39	–29,482.67	–29,591.78	–29,059.44	–27,664.41	–26,881.85	–28,044.22
5. Waste	5,098.99	5,098.99	5,173.96	5,240.85	5,312.41	5,227.18	5,275.00	5,315.49	5,351.26
6. Other									
Total (including LULUCF)	38,065.71	38,065.71	37,234.41	39,577.68	39,088.95	40,771.27	43,011.12	45,997.04	47,458.34

Note: All footnotes for this table are given on sheet 3.

[1] The common tabular format will be revised, in accordance with relevant decisions of the Conference of the Parties and, where applicable, with decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

Greenhouse gas emissions	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CO_2 emissions without net CO_2 from LULUCF	29,888.87	31,483.68	32,315.11	34,539.97	34,726.37	36,452.11	36,016.40	37,600.31	37,464.16	36,756.34
CO_2 emissions with net CO_2 from LULUCF	1,541.04	751.62	1,688.29	4,187.06	6,285.15	6,560.85	5,786.52	8,681.49	9,947.85	10,939.78
CH_4 emissions without CH_4 from LULUCF	34,874.39	35,286.92	36,224.48	36,402.28	36,346.68	36,562.89	36,517.56	36,826.30	36,940.00	35,625.91
CH_4 emissions with CH_4 from LULUCF	35,000.20	35,369.83	36,304.75	36,484.11	36,430.81	36,655.24	36,609.46	36,970.45	37,095.28	35,832.66
N_2O emissions without N_2O from LULUCF	8,048.22	8,088.75	8,446.08	8,677.75	8,895.61	9,124.90	9,167.83	9,276.35	9,203.67	8,786.26
N_2O emissions with N_2O from LULUCF	8,255.97	8,290.63	8,647.12	8,875.70	9,088.69	9,312.32	9,347.22	9,452.48	9,375.55	8,959.24
HFCs	285.83	293.67	282.71	375.16	572.20	768.59	552.94	847.22	772.80	1,087.65
PFCs	151.38	68.67	67.61	70.61	84.48	126.81	99.12	69.38	106.73	48.41
Unspecified mix of HFCs and PFCs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SF_6	8.38	7.87	6.37	10.34	14.16	16.71	21.21	18.06	14.66	14.02
NF_3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (without LULUCF)	73,257.07	75,229.55	77,342.38	80,076.10	80,639.52	83,052.02	82,375.06	84,637.62	84,502.04	82,318.59
Total (with LULUCF)	45,242.80	44,782.28	46,996.85	50,002.98	52,475.50	53,440.53	52,416.47	56,039.07	57,312.88	56,881.76
Total (without LULUCF, with indirect)	73,257.07	75,229.55	77,342.38	80,076.10	80,639.52	83,052.02	82,375.06	84,637.62	84,502.04	82,318.59
Total (with LULUCF, with indirect)	45,242.80	44,782.28	46,996.85	50,002.98	52,475.50	53,440.53	52,416.47	56,039.07	57,312.88	56,881.76

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1. Energy	27,995.24	29,494.34	30,334.03	32,423.54	32,444.94	33,854.15	33,359.35	34,781.30	34,950.93	33,854.19
2. Industrial processes and product use	3,246.86	3,322.92	3,286.50	3,450.35	3,671.86	4,076.33	3,809.36	4,145.94	4,069.12	4,528.57
3. Agriculture	36,657.31	37,036.98	38,306.28	38,751.82	39,042.12	39,698.26	39,776.55	40,267.39	40,114.08	38,598.19
4. Land Use, Land-Use Change and Forestry[b]	–28,014.27	–30,447.28	–30,345.53	–30,073.12	–28,164.02	–29,611.49	–29,958.60	–28,598.54	–27,189.16	–25,436.83
5. Waste	5,357.67	5,375.32	5,415.57	5,450.40	5,480.61	5,423.29	5,429.79	5,443.00	5,367.92	5,337.64
6. Other										
Total (including LULUCF)	45,242.80	44,782.28	46,996.85	50,002.98	52,475.50	53,440.53	52,416.47	56,039.07	57,312.88	56,881.76

Greenhouse gas emissions	2008	2009	2010	2011	2012	2013	Change from base to latest reported year (%)
CO_2 emissions without net CO_2 from LULUCF	37,643.14	34,680.52	34,604.69	34,338.44	35,604.83	34,610.86	36.30
CO_2 emissions with net CO_2 from LULUCF	3,834.65	4,090.34	2,292.02	4,234.87	7,535.13	7,648.38	–316.80
CH_4 emissions without CH_4 from LULUCF	34,559.01	35,074.70	35,052.19	35,234.99	35,781.48	35,615.92	6.98
CH_4 emissions with CH_4 from LULUCF	34,646.96	35,190.11	35,157.63	35,308.24	35,861.69	35,687.67	6.91
N_2O emissions without N_2O from LULUCF	8,615.82	8,545.45	8,689.25	8,857.49	9,061.07	9,052.81	24.10
N_2O emissions with N_2O from LULUCF	8,773.65	8,698.84	8,839.91	9,004.76	9,201.80	9,182.42	22.91
HFCs	940.70	1,015.28	1,254.87	1,597.42	1,563.66	1,615.24	
PFCs	45.47	53.86	47.56	35.15	47.46	48.13	–93.45
Unspecified mix of HFCs and PFCs	NA	NA	NA	NA	NA	NA	
SF_6	14.04	18.46	19.16	16.38	19.39	18.69	157.74
NF_3	NA	NA	NA	NA	NA	NA	
Total (without LULUCF)	81,818.18	79,388.27	79,667.73	80,079.87	82,077.89	80,961.64	21.35
Total (with LULUCF)	48,255.46	49,066.89	47,611.16	50,196.82	54,229.13	54,200.53	42.39
Total (without LULUCF, with indirect)	81,818.18	79,388.27	79,667.73	80,079.87	82,077.89	80,961.64	21.35
Total (with LULUCF, with indirect)	48,255.46	49,066.89	47,611.16	50,196.82	54,229.13	54,200.53	42.39

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year (%)
1. Energy	35,113.02	32,276.13	32,189.50	31,555.74	32,694.92	31,658.91	31.94
2. Industrial processes and product use	4,171.28	4,170.14	4,600.89	5,004.08	4,955.59	5,071.48	54.81
3. Agriculture	37,253.51	37,703.20	37,713.19	38,426.09	39,347.48	39,177.29	14.05
4. Land Use, Land-Use Change and Forestry[b]	–33,562.71	–30,321.38	–32,056.58	–29,883.05	–27,848.76	–26,761.11	–6.61
5. Waste	5,280.37	5,238.80	5,164.16	5,093.96	5,079.90	5,053.96	–0.88
6. Other							
Total (including LULUCF)	48,255.46	49,066.89	47,611.16	50,196.82	54,229.13	54,200.53	42.39

Notes:

1. Further detailed information could be found in the common reporting format tables of the Party's greenhouse gas inventory, namely "Emission trends (CO_2)", "Emission trends (CH_4)", "Emission trends (N_2O)" and "Emission trends (HFCs, PFCs and SF_6)", which is included in an annex to this biennial report.
2. 2013 is the latest reported inventory year.
3. 1 kt CO_2 eq equals 1 Gg CO_2 eq.

Abbreviation: LULUCF = land use, land-use change and forestry.

[a] 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 Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Includes net CO_2, CH_4 and N_2O from LULUCF.

CTF Table 1(a): Emission trends (CO_2)

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
1. Energy	22,498.36	22,498.36	23,006.25	24,871.59	24,325.85	24,562.58	24,648.86	25,913.00	27,965.28
A. Fuel combustion (sectoral approach)	22,038.84	22,038.84	22,451.55	24,331.47	23,807.52	24,021.98	24,148.71	25,246.65	27,235.89
1. Energy industries	5,981.77	5,981.77	6,096.66	7,586.17	6,646.83	5,537.18	4,812.29	5,563.87	7,178.47
2. Manufacturing industries and construction	4,693.51	4,693.51	5,175.11	5,028.62	5,297.14	5,612.75	5,713.21	6,060.14	6,145.01
3. Transport	8,576.26	8,576.26	8,570.30	8,938.03	9,402.11	10,066.47	10,735.02	10,878.99	11,117.80
4. Other sectors	2,787.30	2,787.30	2,609.48	2,778.65	2,461.44	2,805.59	2,888.19	2,743.65	2,794.61
5. Other									
B. Fugitive emissions from fuels	459.52	459.52	554.71	540.11	518.33	540.59	500.16	666.35	729.39
1. Solid fuels	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE
2. Oil and natural gas and other emissions from energy production	459.52	459.52	554.71	540.11	518.33	540.59	500.16	666.35	729.39
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial processes	2,494.28	2,494.28	2,637.06	2,727.50	2,820.33	2,693.26	2,784.80	2,796.60	2,697.17
A. Mineral industry	561.85	561.85	572.40	648.53	646.69	625.38	674.79	646.32	695.24
B. Chemical industry	176.72	176.72	194.30	179.60	181.27	194.80	174.98	194.22	188.97
C. Metal industry	1,755.71	1,755.71	1,870.36	1,899.37	1,992.36	1,873.08	1,935.03	1,956.06	1,812.97
D. Non-energy products from fuels and solvent use	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
E. Electronic industry									
F. Product uses as ODS substitutes									
G. Other product manufacture and use	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
H. Other									
3. Agriculture	399.26	399.26	440.54	468.46	522.45	588.09	677.93	627.06	662.41
A. Enteric fermentation									

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
B. Manure management									
C. Rice cultivation									
D. Agricultural soils									
E. Prescribed burning of savannas									
F. Field burning of agricultural residues									
G. Liming	360.06	360.06	388.70	417.33	451.95	496.55	541.15	485.22	534.62
H. Urea application	39.19	39.19	51.84	51.13	70.49	91.54	136.78	141.84	127.79
I. Other carbon-containing fertilizers	NE	NE	NE	NE	NE	NE	NE	NE	NE
J. Other									
4. Land Use, Land-Use Change and Forestry	–28,920.06	–28,920.06	–30,723.37	–29,737.31	–29,870.26	–29,350.30	–27,946.78	–27,187.58	–28,346.96
A. Forest land	–28,397.55	–28,397.55	–29,072.54	–28,290.50	–28,361.80	–27,447.53	–25,774.92	–25,227.08	–26,158.34
B. Cropland	471.75	471.75	474.13	476.52	478.90	481.28	483.67	486.05	490.16
C. Grassland	986.84	986.84	890.43	1,026.25	1,313.85	1,440.29	1,508.87	1,685.22	1,915.62
D. Wetlands	–21.84	–21.84	–20.59	–19.34	–18.09	–16.84	–15.60	–14.35	–13.09
E. Settlements	2.30	2.30	3.15	4.00	5.14	6.96	9.47	11.04	12.75
F. Other land	7.66	7.66	8.45	9.24	10.03	10.82	11.60	12.39	17.33
G. Harvested wood products	–1,969.23	–1,969.23	–3,006.41	–2,943.47	–3,298.28	–3,825.27	–4,169.88	–4,140.85	–4,611.40
H. Other									
5. Waste	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.37	0.38
A. Solid waste disposal	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
B. Biological treatment of solid waste									
C. Incineration and open burning of waste	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.37	0.38
D. Waste water treatment and discharge									
E. Other									

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
6. Other (as specified in the summary table in CRF)									
Memo items:									
International bunkers	2,364.07	2,364.07	2,222.17	2,134.61	2,210.24	2,660.07	2,748.56	2,718.80	2,744.30
Aviation	1,321.65	1,321.65	1,282.16	1,258.35	1,284.21	1,281.41	1,601.89	1,627.38	1,613.81
Navigation	1,042.42	1,042.42	940.01	876.27	926.03	1,378.66	1,146.66	1,091.43	1,130.49
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 emissions from biomass	4,170.91	4,170.91	4,272.00	4,274.71	4,499.04	4,722.08	4,862.89	4,662.02	4,872.75
CO_2 captured	10.40	10.40	8.85	8.27	8.08	8.09	8.10	8.16	8.17
Long-term storage of C in waste disposal sites	3,725.86	3,725.86	3,926.42	4,126.97	4,358.04	4,594.29	4,830.55	5,073.45	5,307.41
Indirect N_2O									
Indirect CO_2	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
Total CO_2 equivalent emissions without land use, land-use change and forestry	25,392.26	25,392.26	26,084.21	28,067.90	27,668.99	27,844.29	28,111.96	29,337.04	31,325.24
Total CO_2 equivalent emissions with land use, land-use change and forestry	–3,527.80	–3,527.80	–4,639.16	–1,669.40	–2,201.27	–1,506.00	165.18	2,149.46	2,978.27
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	66,720.16	66,720.16	67,709.80	69,060.34	68,680.73	69,830.71	70,675.53	72,878.89	75,502.56
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	38,065.71	38,065.71	37,234.41	39,577.68	39,088.95	40,771.27	43,011.12	45,997.04	47,458.34

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1. Energy	26,384.03	27,720.54	28,518.64	30,559.67	30,606.72	32,215.88	31,802.72	33,238.34	33,290.13	32,308.59
A. Fuel combustion (sectoral approach)	25,676.54	27,104.62	27,925.61	29,938.37	30,012.80	31,604.83	30,939.59	32,323.28	32,329.91	31,287.35
1. Energy industries	5,600.11	6,818.88	6,488.36	7,984.65	7,212.07	8,551.72	8,165.78	10,231.01	10,125.13	8,719.92
2. Manufacturing industries and construction	5,884.48	5,740.93	6,264.12	6,639.00	6,899.74	6,348.33	5,820.92	5,004.83	5,050.47	5,423.37
3. Transport	11,315.74	11,610.17	12,151.14	12,229.87	12,688.77	13,228.88	13,534.53	13,619.36	13,760.10	13,877.18
4. Other sectors	2,876.21	2,934.64	3,021.98	3,084.84	3,212.22	3,475.91	3,418.36	3,468.09	3,394.21	3,266.88
5. Other										
B. Fugitive emissions from fuels	707.49	615.92	593.04	621.30	593.93	611.05	863.13	915.06	960.22	1,021.25
1. Solid fuels	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE
2. Oil and natural gas and other emissions from energy production	707.49	615.92	593.04	621.30	593.93	611.05	863.13	915.06	960.22	1,021.25
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial processes	2,756.57	2,907.72	2,884.51	2,948.64	2,947.07	3,112.06	3,087.67	3,166.73	3,134.25	3,334.39
A. Mineral industry	651.10	728.34	718.53	716.88	706.95	697.25	666.67	756.17	719.13	861.49
B. Chemical industry	194.00	195.28	196.83	204.88	213.37	199.93	190.71	227.69	243.80	248.66
C. Metal industry	1,911.47	1,984.09	1,969.15	2,026.89	2,026.75	2,214.87	2,230.29	2,182.86	2,171.31	2,224.25
D. Non-energy products from fuels and solvent use	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
E. Electronic industry										
F. Product uses as ODS substitutes										
G. Other product manufacture and use	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
H. Other										
3. Agriculture	747.90	855.03	911.35	1,031.04	1,171.91	1,123.45	1,125.25	1,194.38	1,038.67	1,111.52
A. Enteric fermentation										
B. Manure management										
C. Rice cultivation										

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
D. Agricultural soils										
E. Prescribed burning of savannas										
F. Field burning of agricultural residues										
G. Liming	584.01	633.41	682.80	732.20	781.59	689.34	670.21	737.78	616.41	655.22
H. Urea application	163.89	221.62	228.54	298.84	390.32	434.11	455.04	456.60	422.26	456.29
I. Other carbon-containing fertilizers	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
J. Other										
4. Land Use, Land-Use Change and Forestry	–28,347.83	–30,732.05	–30,626.83	–30,352.91	–28,441.23	–29,891.26	–30,229.88	–28,918.82	–27,516.32	–25,816.56
A. Forest land	–28,024.33	–28,787.11	–29,886.07	–29,099.90	–26,001.24	–29,253.70	–33,026.48	–36,682.90	–37,146.58	–40,061.87
B. Cropland	492.67	495.19	511.17	513.14	511.57	527.85	554.15	602.09	626.43	671.91
C. Grassland	2,488.33	2,214.24	3,784.14	3,846.45	3,512.78	5,113.87	7,472.80	12,172.48	14,385.31	19,084.19
D. Wetlands	–11.84	–10.59	–8.43	–7.22	–6.13	–3.86	–0.96	3.48	6.22	10.54
E. Settlements	14.25	14.85	26.69	26.46	24.90	37.73	58.24	97.81	117.21	154.95
F. Other land	18.27	19.20	35.54	36.19	31.56	43.46	62.48	92.86	110.79	145.83
G. Harvested wood products	–3,325.18	–4,677.84	–5,089.86	–5,668.02	–6,514.67	–6,356.61	–5,350.11	–5,204.63	–5,615.68	–5,822.11
H. Other										
5. Waste	0.38	0.39	0.62	0.62	0.67	0.72	0.75	0.87	1.12	1.84
A. Solid waste disposal	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
B. Biological treatment of solid waste										
C. Incineration and open burning of waste	0.38	0.39	0.62	0.62	0.67	0.72	0.75	0.87	1.12	1.84
D. Waste water treatment and discharge										
E. Other										

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
6. Other (as specified in the summary table in CRF)										
Memo items:										
International bunkers	2,857.03	2,762.58	2,555.31	2,762.57	2,832.51	2,865.86	2,964.04	3,200.74	3,146.78	3,276.34
Aviation	1,770.22	1,836.55	1,800.08	1,943.22	1,933.98	2,002.37	2,228.09	2,210.89	2,180.08	2,287.52
Navigation	1,086.82	926.03	755.24	819.35	898.53	863.49	735.95	989.85	966.70	988.82
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 emissions from biomass	5,150.82	5,684.30	6,179.65	6,101.35	6,573.48	6,650.02	7,152.91	7,120.45	7,099.70	6,806.21
CO_2 captured	8.19	8.09	8.00	7.76	7.65	7.77	7.80	7.79	7.69	7.59
Long-term storage of C in waste disposal sites	5,527.91	5,748.42	5,968.92	6,209.48	6,449.47	6,677.22	6,911.93	7,175.29	7,498.05	7,800.28
Indirect N_2O										
Indirect CO_2	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
Total CO_2 equivalent emissions without land use, land-use change and forestry	29,888.87	31,483.68	32,315.11	34,539.97	34,726.37	36,452.11	36,016.40	37,600.31	37,464.16	36,756.34
Total CO_2 equivalent emissions with land use, land-use change and forestry	1,541.04	751.62	1,688.29	4,187.06	6,285.15	6,560.85	5,786.52	8,681.49	9,947.85	10,939.78
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	73,257.07	75,229.55	77,342.38	80,076.10	80,639.52	83,052.02	82,375.06	84,637.62	84,502.04	82,318.59
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	45,242.80	44,782.28	46,996.85	50,002.98	52,475.50	53,440.53	52,416.47	56,039.07	57,312.88	56,881.76

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
1. Energy	33,471.77	30,555.69	30,307.19	29,903.30	31,156.51	30,249.23	34.45
A. Fuel combustion (sectoral approach)	32,229.67	29,187.56	28,801.66	28,418.16	29,890.23	29,123.51	32.15
1. Energy industries	9,672.71	7,463.78	6,793.10	6,319.85	7,690.98	6,272.33	4.86
2. Manufacturing industries and construction	5,503.61	5,108.45	5,242.90	5,157.77	5,255.19	5,856.37	24.78
3. Transport	13,911.87	13,738.28	13,907.82	13,915.43	13,685.44	13,903.09	62.11
4. Other sectors	3,141.47	2,877.04	2,857.85	3,025.10	3,258.61	3,091.73	10.92
5. Other							
B. Fugitive emissions from fuels	1,242.11	1,368.13	1,505.53	1,485.14	1,266.28	1,125.72	144.98
1. Solid fuels	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	
2. Oil and natural gas and other emissions from energy production	1,242.11	1,368.13	1,505.53	1,485.14	1,266.28	1,125.72	144.98
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	
2. Industrial processes	3,118.32	3,029.35	3,225.80	3,301.78	3,269.50	3,329.68	33.49
A. Mineral industry	807.02	752.15	740.21	713.25	751.87	771.52	37.32
B. Chemical industry	266.43	260.22	263.70	281.10	277.66	276.83	56.65
C. Metal industry	2,044.87	2,016.97	2,221.89	2,307.44	2,239.96	2,281.32	29.94
D. Non-energy products from fuels and solvent use	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
E. Electronic industry							
F. Product uses as ODS substitutes							
G. Other product manufacture and use	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	
H. Other							
3. Agriculture	1,051.17	1,093.61	1,069.83	1,131.49	1,176.95	1,030.08	158.00
A. Enteric fermentation							
B. Manure management							
C. Rice cultivation							

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
D. Agricultural soils							
E. Prescribed burning of savannas							
F. Field burning of agricultural residues							
G. Liming	610.84	719.70	620.47	634.49	682.71	540.07	49.99
H. Urea application	440.33	373.91	449.36	497.00	494.24	490.01	1,150.20
I. Other carbon-containing fertilizers	NE	NE	NE	NE	NE	NE	
J. Other							
4. Land Use, Land-Use Change and Forestry	–33,808.48	–30,590.18	–32,312.67	–30,103.57	–28,069.70	–26,962.48	–6.77
A. Forest land	–33,053.21	–33,190.45	–31,136.30	–27,943.93	–25,774.30	–23,527.15	–17.15
B. Cropland	491.96	474.02	474.04	462.37	442.78	431.68	–8.49
C. Grassland	4,457.39	7,914.00	6,578.75	5,131.15	6,170.72	6,399.85	548.52
D. Wetlands	8.41	18.98	8.12	7.05	7.17	4.73	–121.64
E. Settlements	–1.59	17.27	6.73	1.74	0.32	–4.62	–300.62
F. Other land	45.42	106.54	119.87	171.28	36.55	28.65	273.85
G. Harvested wood products	–5,756.85	–5,930.53	–8,363.89	–7,933.22	–8,952.94	–10,295.61	422.82
H. Other							
5. Waste	1.87	1.87	1.87	1.87	1.87	1.87	417.02
A. Solid waste disposal	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	
B. Biological treatment of solid waste							
C. Incineration and open burning of waste	1.87	1.87	1.87	1.87	1.87	1.87	417.02
D. Waste water treatment and discharge							
E. Other							

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
6. Other (as specified in the summary table in CRF)							
Memo items:							
International bunkers	3,418.70	3,325.51	3,384.94	3,435.60	3,474.44	3,461.36	46.42
Aviation	2,304.12	2,308.01	2,317.90	2,417.85	2,504.37	2,500.95	89.23
Navigation	1,114.58	1,017.50	1,067.03	1,017.75	970.07	960.40	–7.87
Multilateral operations	NO	NO	NO	NO	NO	NO	
CO_2 emissions from biomass	6,338.42	5,886.96	6,586.70	6,680.64	6,637.40	6,355.58	52.38
CO_2 captured	7.38	7.59	7.34	7.35	7.08	6.99	32.82
Long-term storage of C in waste disposal sites	8,093.91	8,381.14	8,681.67	8,991.99	9,312.09	9,642.35	158.80
Indirect N_2O							
Indirect CO_2	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
Total CO_2 equivalent emissions without land use, land-use change and forestry	37,643.14	34,680.52	34,604.69	34,338.44	35,604.83	34,610.86	36.30
Total CO_2 equivalent emissions with land use, land-use change and forestry	3,834.65	4,090.34	2,292.02	4,234.87	7,535.13	7,648.38	–316.80
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	81,818.18	79,388.27	79,667.73	80,079.87	82,077.89	80,961.64	21.35
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	48,255.46	49,066.89	47,611.16	50,196.82	54,229.13	54,200.53	42.39

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] 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 Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Fill in net emissions/removals as reported in CRF table Summary 1.A of the latest reported inventory year. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

CTF Table 1(b): Emission trends (CH_4)

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
1. Energy	52.58	52.58	49.02	50.52	49.29	48.72	49.60	59.53	56.01
A. Fuel combustion (sectoral approach)	8.30	8.30	7.92	7.52	7.27	7.08	6.83	6.57	6.47
1. Energy industries	0.22	0.22	0.24	0.27	0.25	0.21	0.18	0.22	0.29
2. Manufacturing industries and construction	0.52	0.52	0.54	0.55	0.57	0.60	0.63	0.62	0.64
3. Transport	4.00	4.00	3.93	3.79	3.64	3.39	3.17	2.89	2.69
4. Other sectors	3.56	3.56	3.21	2.91	2.81	2.88	2.86	2.85	2.85
5. Other									
B. Fugitive emissions from fuels	44.28	44.28	41.10	43.01	42.02	41.64	42.77	52.96	49.53
1. Solid fuels	14.56	14.56	10.58	11.01	10.86	12.28	15.20	21.39	15.45
2. Oil and natural gas and other emissions from energy production	29.72	29.72	30.52	32.00	31.16	29.36	27.57	31.57	34.08
C. CO_2 transport and storage									
2. Industrial processes	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE
A. Mineral industry									
B. Chemical industry	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE
C. Metal industry	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE
D. Non-energy products from fuels and solvent use	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE
E. Electronic industry									
F. Product uses as ODS substitutes									
G. Other product manufacture and use	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
H. Other									
3. Agriculture	1,080.73	1,080.73	1,090.83	1,074.03	1,076.51	1,107.07	1,117.85	1,133.56	1,163.68
A. Enteric fermentation	1,052.41	1,052.41	1,061.98	1,045.04	1,046.85	1,076.05	1,085.91	1,100.43	1,129.38

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
B. Manure management	27.42	27.42	28.05	28.24	28.78	30.10	31.14	32.20	33.25
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural soils	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Prescribed burning of savannas	IE	IE	IE	IE	IE	IE	IE	IE	IE
F. Field burning of agricultural residues	0.90	0.90	0.80	0.76	0.87	0.92	0.80	0.92	1.05
G. Liming									
H. Urea application									
I. Other carbon-containing fertilizers									
J. Other									
4. Land use, land-use change and forestry	3.58	3.58	2.96	3.13	3.81	3.93	3.50	4.11	3.90
A. Forest land	0.74	0.74	0.60	0.74	0.81	1.13	1.06	1.25	1.43
B. Cropland	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE
C. Grassland	2.84	2.84	2.37	2.39	3.00	2.80	2.44	2.86	2.47
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other land	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Harvested wood products									
H. Other									
5. Waste	198.34	198.34	201.18	203.84	206.54	203.06	204.77	206.34	207.66
A. Solid waste disposal	187.94	187.94	190.48	193.11	195.55	191.93	193.24	194.72	195.87
B. Biological treatment of solid waste	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste water treatment and discharge	10.40	10.40	10.71	10.73	10.99	11.13	11.53	11.62	11.79
E. Other									

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
6. Other (as specified in the summary table in CRF)									
Total CH_4 emissions without CH_4 from LULUCF	1,331.65	1,331.65	1,341.04	1,328.39	1,332.34	1,358.86	1,372.22	1,399.43	1,427.34
Total CH_4 emissions with CH_4 from LULUCF	1,335.24	1,335.24	1,344.00	1,331.52	1,336.15	1,362.79	1,375.72	1,403.54	1,431.24
Memo items:									
International bunkers	0.09	0.09	0.08	0.08	0.08	0.12	0.10	0.10	0.10
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Navigation	0.08	0.08	0.07	0.07	0.07	0.11	0.09	0.09	0.09
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 emissions from biomass									
CO_2 captured									
Long-term storage of C in waste disposal sites									
Indirect N_2O									
Indirect CO_2									

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1. Energy	54.88	60.85	62.06	63.71	62.02	53.14	49.30	48.51	53.45	49.55
A. Fuel combustion (sectoral approach)	6.25	6.09	5.95	5.86	5.80	5.78	5.71	5.64	5.46	5.33
1. Energy industries	0.23	0.28	0.27	0.33	0.28	0.28	0.22	0.28	0.28	0.31
2. Manufacturing industries and construction	0.68	0.75	0.83	0.83	0.89	0.88	0.94	0.92	0.92	0.88
3. Transport	2.49	2.26	2.08	2.05	2.00	1.94	1.86	1.75	1.63	1.55
4. Other sectors	2.86	2.80	2.76	2.65	2.62	2.68	2.68	2.68	2.63	2.59
5. Other										
B. Fugitive emissions from fuels	48.63	54.76	56.11	57.85	56.23	47.36	43.59	42.87	47.99	44.22
1. Solid fuels	17.50	19.23	19.03	19.48	19.84	19.49	18.56	19.50	23.94	16.32
2. Oil and natural gas and other emissions from energy production	31.13	35.53	37.08	38.37	36.39	27.87	25.03	23.37	24.05	27.90
C. CO_2 transport and storage										
2. Industrial processes	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE
A. Mineral industry										
B. Chemical industry	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE
C. Metal industry	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE
D. Non-energy products from fuels and solvent use	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE
E. Electronic industry										
F. Product uses as ODS substitutes										
G. Other product manufacture and use	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
H. Other										

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
3. Agriculture	1,132.14	1,141.91	1,176.71	1,180.86	1,179.22	1,199.32	1,201.19	1,213.86	1,216.48	1,169.06
A. Enteric fermentation	1,098.45	1,108.23	1,141.15	1,143.81	1,141.40	1,160.21	1,161.83	1,174.23	1,176.36	1,129.16
B. Manure management	32.74	32.75	34.62	36.00	36.79	38.13	38.63	38.75	39.29	38.88
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Prescribed burning of savannas	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
F. Field burning of agricultural residues	0.94	0.94	0.94	1.04	1.03	0.98	0.73	0.88	0.82	1.02
G. Liming										
H. Urea application										
I. Other carbon-containing fertilizers										
J. Other										
4. Land use, land-use change and forestry	5.03	3.32	3.21	3.27	3.37	3.69	3.68	5.77	6.21	8.27
A. Forest land	1.00	0.73	0.79	0.72	0.77	0.65	0.59	0.55	0.58	0.88
B. Cropland	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE
C. Grassland	4.03	2.59	2.42	2.55	2.60	3.04	3.08	5.22	5.64	7.39
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other land	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Harvested wood products										
H. Other										
5. Waste	207.96	208.72	210.21	211.53	212.63	210.06	210.21	210.69	207.68	206.42
A. Solid waste disposal	196.43	197.49	198.93	200.32	201.55	198.81	199.07	199.74	196.81	195.54
B. Biological treatment of solid waste	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste water treatment and discharge	11.53	11.23	11.28	11.21	11.08	11.25	11.14	10.95	10.87	10.88

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
E. Other										
6. Other (as specified in the summary table in CRF)										
Total CH_4 emissions without CH_4 from LULUCF	1,394.98	1,411.48	1,448.98	1,456.09	1,453.87	1,462.52	1,460.70	1,473.05	1,477.60	1,425.04
Total CH_4 emissions with CH_4 from LULUCF	1,400.01	1,414.79	1,452.19	1,459.36	1,457.23	1,466.21	1,464.38	1,478.82	1,483.81	1,433.31
Memo items:										
International bunkers	0.10	0.09	0.08	0.08	0.09	0.09	0.08	0.10	0.10	0.10
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Navigation	0.09	0.08	0.06	0.07	0.08	0.07	0.06	0.09	0.08	0.09
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 emissions from biomass										
CO_2 captured										
Long-term storage of C in waste disposal sites										
Indirect N_2O										
Indirect CO_2										

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
1. Energy	53.61	57.59	64.30	55.33	50.68	45.78	–12.93
A. Fuel combustion (sectoral approach)	5.06	4.98	4.91	4.86	4.73	4.63	–44.21
1. Energy industries	0.28	0.24	0.26	0.22	0.24	0.22	1.59
2. Manufacturing industries and construction	0.82	0.76	0.85	0.86	0.86	0.83	59.50
3. Transport	1.44	1.38	1.32	1.25	1.20	1.21	–69.81
4. Other sectors	2.51	2.60	2.48	2.53	2.43	2.37	–33.41
5. Other							
B. Fugitive emissions from fuels	48.55	52.60	59.39	50.46	45.95	41.15	–7.07
1. Solid fuels	19.56	23.97	29.63	21.98	16.56	12.45	–14.46
2. Oil and natural gas and other emissions from energy production	29.00	28.63	29.76	28.49	29.39	28.70	–3.45
C. CO_2 transport and storage							
2. Industrial processes	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	
A. Mineral industry							
B. Chemical industry	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	NO, NA, IE	
C. Metal industry	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	NO, NA, NE, IE	
D. Non-energy products from fuels and solvent use	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	
E. Electronic industry							
F. Product uses as ODS substitutes							
G. Other product manufacture and use	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	
H. Other							
3. Agriculture	1,124.72	1,142.84	1,138.29	1,157.36	1,184.56	1,183.95	9.55
A. Enteric fermentation	1,084.90	1,101.46	1,095.74	1,113.43	1,138.98	1,137.64	8.10
B. Manure management	38.92	40.46	41.53	43.17	44.47	45.18	64.78

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
C. Rice cultivation	NO	NO	NO	NO	NO	NO	
D. Agricultural soils	NE	NE	NE	NE	NE	NE	
E. Prescribed burning of savannas	IE	IE	IE	IE	IE	IE	
F. Field burning of agricultural residues	0.90	0.92	1.01	0.75	1.12	1.12	23.74
G. Liming							
H. Urea application							
I. Other carbon-containing fertilizers							
J. Other							
4. Land use, land-use change and forestry	3.52	4.62	4.22	2.93	3.21	2.87	-19.83
A. Forest land	0.67	0.90	0.76	0.72	0.70	0.60	-18.53
B. Cropland	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	NE, IE	
C. Grassland	2.85	3.71	3.46	2.21	2.51	2.27	-20.17
D. Wetlands	NE	NE	NE	NE	NE	NE	
E. Settlements	NE	NE	NE	NE	NE	NE	
F. Other land	NE	NE	NE	NE	NE	NE	
G. Harvested wood products							
H. Other							
5. Waste	204.03	202.56	199.50	196.71	196.02	194.91	–1.73
A. Solid waste disposal	192.97	191.93	188.84	186.05	184.75	184.01	–2.09
B. Biological treatment of solid waste	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	–44.40
D. Waste water treatment and discharge	11.06	10.63	10.65	10.66	11.26	10.90	4.79
E. Other							

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
6. Other (as specified in the summary table in CRF)							
Total CH_4 emissions without CH_4 from LULUCF	1,382.36	1,402.99	1,402.09	1,409.40	1,431.26	1,424.64	6.98
Total CH_4 emissions with CH_4 from LULUCF	1,385.88	1,407.60	1,406.31	1,412.33	1,434.47	1,427.51	6.91
Memo items:							
International bunkers	0.11	0.10	0.11	0.11	0.10	0.10	12.79
Aviation	0.02	0.02	0.02	0.02	0.02	0.02	88.01
Navigation	0.10	0.09	0.09	0.09	0.08	0.08	4.09
Multilateral operations	NO	NO	NO	NO	NO	NO	
CO_2 emissions from biomass							
CO_2 captured							
Long-term storage of C in waste disposal sites							
Indirect N_2O							
Indirect CO_2							

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] 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 Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

CTF Table 1(c): Emission trends (N_2O)

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
1. Energy	0.61	0.61	0.61	0.65	0.68	0.72	0.75	0.75	0.79
A. Fuel combustion (sectoral approach)	0.61	0.61	0.61	0.65	0.68	0.72	0.75	0.75	0.79
1. Energy industries	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03
2. Manufacturing industries and construction	0.17	0.17	0.18	0.18	0.19	0.20	0.20	0.20	0.20
3. Transport	0.33	0.33	0.34	0.36	0.38	0.40	0.43	0.44	0.46
4. Other sectors	0.09	0.09	0.08	0.09	0.09	0.09	0.10	0.09	0.10
5. Other									
B. Fugitive emissions from fuels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1. Solid fuels	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
2. Oil and natural gas and other emissions from energy production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. CO_2 transport and storage									
2. Industrial processes	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15
A. Mineral industry									
B. Chemical industry	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
C. Metal industry									
D. Non-energy products from fuels and solvent use	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE
E. Electronic industry									
F. Product uses as ODS substitutes									
G. Other product manufacture and use	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15
H. Other									
3. Agriculture	23.26	23.26	23.47	23.26	23.79	24.66	25.30	25.58	26.09
A. Enteric fermentation									

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
B. Manure management	0.18	0.18	0.19	0.19	0.19	0.20	0.22	0.22	0.23
C. Rice cultivation									
D. Agricultural soils	23.07	23.07	23.27	23.06	23.58	24.44	25.06	25.34	25.84
E. Prescribed burning of savannas	IE	IE	IE	IE	IE	IE	IE	IE	IE
F. Field burning of agricultural residues	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02
G. Liming									
H. Urea application									
I. Other carbon containing fertlizers									
J. Other									
4. Land use, land-use change and forestry	0.59	0.59	0.58	0.59	0.61	0.65	0.65	0.68	0.69
A. Forest land	0.41	0.41	0.42	0.45	0.48	0.52	0.54	0.56	0.57
B. Cropland	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04
C. Grassland	0.16	0.16	0.14	0.12	0.11	0.09	0.08	0.08	0.08
D. Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. Settlements	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. Other land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. Harvested wood products									
H. Other									
5. Waste	0.47	0.47	0.48	0.49	0.50	0.50	0.52	0.53	0.53
A. Solid waste disposal									
B. Biological treatment of solid waste	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
C. Incineration and open burning of waste	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
D. Waste water treatment and discharge	0.46	0.46	0.48	0.48	0.49	0.50	0.52	0.52	0.53
E. Other									

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
6. Other (as specified in the summary table in CRF)									
Total direct N_2O emissions without N_2O from LULUCF	24.48	24.48	24.71	24.53	25.11	26.03	26.71	27.00	27.56
Total direct N_2O emissions with N_2O from LULUCF	25.07	25.07	25.29	25.13	25.72	26.67	27.36	27.69	28.25
Memo items:									
International bunkers	0.08	0.08	0.07	0.07	0.07	0.08	0.09	0.08	0.08
Aviation	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05
Navigation	0.04	0.04	0.04	0.03	0.03	0.05	0.04	0.04	0.04
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 emissions from biomass									
CO_2 captured									
Long-term storage of C in waste disposal sites									
Indirect N_2O	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO
Indirect CO_2									

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1. Energy	0.80	0.85	0.89	0.91	0.97	1.04	1.09	1.11	1.09	1.03
A. Fuel combustion (sectoral approach)	0.80	0.85	0.89	0.91	0.97	1.04	1.09	1.11	1.09	1.03
1. Energy industries	0.02	0.03	0.03	0.04	0.03	0.06	0.08	0.09	0.09	0.05
2. Manufacturing industries and construction	0.21	0.22	0.25	0.25	0.27	0.28	0.29	0.29	0.29	0.28
3. Transport	0.47	0.49	0.51	0.52	0.55	0.58	0.61	0.61	0.59	0.58
4. Other sectors	0.10	0.10	0.10	0.10	0.11	0.12	0.12	0.12	0.12	0.12
5. Other										
B. Fugitive emissions from fuels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1. Solid fuels	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
2. Oil and natural gas and other emissions from energy production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. CO_2 transport and storage										
2. Industrial processes	0.15	0.15	0.15	0.15	0.18	0.18	0.16	0.15	0.14	0.15
A. Mineral industry										
B. Chemical industry	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
C. Metal industry										
D. Non-energy products from fuels and solvent use	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE
E. Electronic industry										
F. Product uses as ODS substitutes										
G. Other product manufacture and use	0.15	0.15	0.15	0.15	0.18	0.18	0.16	0.15	0.14	0.15
H. Other										
3. Agriculture	25.52	25.62	26.77	27.51	28.15	28.83	28.93	29.28	29.07	27.72
A. Enteric fermentation										
B. Manure management	0.23	0.22	0.23	0.24	0.25	0.26	0.27	0.26	0.26	0.27
C. Rice cultivation										

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
D. Agricultural soils	25.28	25.38	26.52	27.25	27.89	28.55	28.65	29.01	28.80	27.43
E. Prescribed burning of savannas	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
F. Field burning of agricultural residues	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.02
G. Liming										
H. Urea application										
I. Other carbon containing fertlizers										
J. Other										
4. Land use, land-use change and forestry	0.70	0.68	0.67	0.66	0.65	0.63	0.60	0.59	0.58	0.58
A. Forest land	0.57	0.56	0.56	0.55	0.53	0.51	0.48	0.46	0.44	0.42
B. Cropland	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05
C. Grassland	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.10
D. Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. Settlements	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. Other land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. Harvested wood products										
H. Other										
5. Waste	0.53	0.53	0.54	0.54	0.55	0.57	0.58	0.59	0.59	0.59
A. Solid waste disposal										
B. Biological treatment of solid waste	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
C. Incineration and open burning of waste	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste water treatment and discharge	0.53	0.52	0.53	0.54	0.55	0.57	0.58	0.58	0.58	0.58
E. Other										
6. Other (as specified in the summary table in CRF)										
Total direct N_2O emissions without N_2O from LULUCF	27.01	27.14	28.34	29.12	29.85	30.62	30.76	31.13	30.88	29.48

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total direct N_2O emissions with N_2O from LULUCF	27.70	27.82	29.02	29.78	30.50	31.25	31.37	31.72	31.46	30.06
Memo items:										
International bunkers	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09
Aviation	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
Navigation	0.04	0.03	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 emissions from biomass										
CO_2 captured										
Long-term storage of C in waste disposal sites										
Indirect N_2O	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO
Indirect CO_2										

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
1. Energy	1.01	0.94	0.92	0.90	0.91	0.89	45.93
A. Fuel combustion (sectoral approach)	1.01	0.94	0.92	0.90	0.91	0.89	45.93
1. Energy industries	0.08	0.05	0.03	0.04	0.06	0.04	116.37
2. Manufacturing industries and construction	0.27	0.24	0.27	0.27	0.27	0.26	50.32
3. Transport	0.55	0.54	0.52	0.49	0.47	0.48	43.64
4. Other sectors	0.11	0.11	0.10	0.11	0.12	0.11	31.17
5. Other							
B. Fugitive emissions from fuels	0.00	0.00	0.00	0.00	0.00	0.00	54.11
1. Solid fuels	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	
2. Oil and natural gas and other emissions from energy production	0.00	0.00	0.00	0.00	0.00	0.00	54.11
C. CO_2 transport and storage							
2. Industrial processes	0.18	0.18	0.18	0.18	0.19	0.20	49.63
A. Mineral industry							
B. Chemical industry	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	
C. Metal industry							
D. Non-energy products from fuels and solvent use	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	
E. Electronic industry							
F. Product uses as ODS substitutes							
G. Other product manufacture and use	0.18	0.18	0.18	0.18	0.19	0.20	49.63
H. Other							
3. Agriculture	27.13	26.98	27.47	28.06	28.71	28.69	23.30
A. Enteric fermentation							
B. Manure management	0.27	0.27	0.28	0.29	0.30	0.30	67.12

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
C. Rice cultivation							
D. Agricultural soils	26.85	26.69	27.17	27.75	28.40	28.37	22.96
E. Prescribed burning of savannas	IE	IE	IE	IE	IE	IE	
F. Field burning of agricultural residues	0.02	0.02	0.02	0.01	0.02	0.02	21.21
G. Liming							
H. Urea application							
I. Other carbon containing fertlizers							
J. Other							
4. Land use, land-use change and forestry	0.53	0.51	0.51	0.49	0.47	0.43	–26.40
A. Forest land	0.41	0.40	0.40	0.40	0.38	0.34	–16.07
B. Cropland	0.05	0.05	0.05	0.04	0.04	0.04	62.22
C. Grassland	0.06	0.06	0.06	0.05	0.05	0.04	–72.24
D. Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	2,225.25
E. Settlements	0.00	0.00	0.00	0.00	0.00	0.00	1,300.00
F. Other land	0.01	0.01	0.01	0.01	0.01	0.01	3,443.31
G. Harvested wood products							
H. Other							
5. Waste	0.60	0.58	0.59	0.58	0.60	0.60	28.00
A. Solid waste disposal							
B. Biological treatment of solid waste	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	–21.77
D. Waste water treatment and discharge	0.59	0.58	0.58	0.58	0.59	0.60	28.56
E. Other							

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
6. Other (as specified in the summary table in CRF)							
Total direct N_2O emissions without N_2O from LULUCF	28.91	28.68	29.16	29.72	30.41	30.38	24.10
Total direct N_2O emissions with N_2O from LULUCF	29.44	29.19	29.66	30.22	30.88	30.81	22.91
Memo items:							
International bunkers	0.10	0.09	0.09	0.10	0.10	0.10	29.37
Aviation	0.06	0.06	0.06	0.07	0.07	0.07	88.01
Navigation	0.03	0.03	0.03	0.03	0.03	0.03	-27.09
Multilateral operations	NO	NO	NO	NO	NO	NO	
CO_2 emissions from biomass							
CO_2 captured							
Long-term storage of C in waste disposal sites							
Indirect N_2O	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	IE, NE, NO	
Indirect CO_2							

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] 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 Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

CTF Table 1(d): Emission trends (HFCs, PFCs and SF_6)

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
Emissions of HFCs and PFCs – (kt CO_2 equivalent)	734.56	734.56	728.91	463.31	213.01	250.87	289.47	500.21	271.01
Emissions of HFCs – (kt CO_2 equivalent)	NO, NA	NO, NA	NO, NA	1.43	2.86	64.69	136.20	221.23	69.91
HFC-23	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
HFC-32	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00
HFC-41	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-43-10mee	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-125	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00	0.01	0.00
HFC-134	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-134a	NO, NA	NO, NA	NO, NA	0.00	0.00	0.04	0.08	0.12	0.04
HFC-143	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-143a	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00	0.01	0.00
HFC-152	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-152a	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00	0.00	0.00
HFC-161	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-227ea	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00	0.00	0.00
HFC-236cb	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-236ea	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-236fa	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-245ca	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-245fa	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
HFC-365mfc	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
Unspecified mix of HFCs – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emissions of PFCs – (kt CO_2 equivalent)	734.56	734.56	728.91	461.88	210.16	186.18	153.28	278.98	201.11

Greenhouse gas source and sink categories	Base year[a] kt	1990	1991	1992	1993	1994	1995	1996	1997
CF_4	0.08	0.08	0.08	0.05	0.02	0.02	0.02	0.03	0.02
C_2F_6	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
C_3F_8	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	NO, NA, NE	0.00	0.00	0.00
C_4F_{10}	NA	NA	NA	NA	NA	NA	NA	NA	NA
c-C_4F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA
C_5F_{12}	NA	NA	NA	NA	NA	NA	NA	NA	NA
C_6F_{14}	NA	NA	NA	NA	NA	NA	NA	NA	NA
$C_{10}F_{18}$	NA	NA	NA	NA	NA	NA	NA	NA	NA
c-C_3F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Unspecified mix of PFCs – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emissions of SF_6 – (kt CO_2 equivalent)	7.25	7.25	7.65	8.17	8.45	8.65	9.01	8.58	8.84
Emissions of NF_3 – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Emissions of HFCs and PFCs – (kt CO_2 equivalent)	437.21	362.33	350.32	445.77	656.69	895.40	652.06	916.60	879.53	1,136.06
Emissions of HFCs – (kt CO_2 equivalent)	285.83	293.67	282.71	375.16	572.20	768.59	552.94	847.22	772.80	1,087.65
HFC-23	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00	NO, NA	NO, NA	0.00	NO, NA
HFC-32	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
HFC-41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-43-10mee	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-125	0.01	0.01	0.01	0.02	0.04	0.05	0.04	0.07	0.06	0.09
HFC-134	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-134a	0.16	0.14	0.15	0.15	0.19	0.22	0.15	0.20	0.22	0.25
HFC-143	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-143a	0.01	0.01	0.01	0.02	0.04	0.06	0.04	0.07	0.05	0.09
HFC-152	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-152a	0.00	0.00	NO, NA	0.00	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
HFC-161	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-227ea	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-236cb	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-236ea	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-236fa	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-245ca	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HFC-245fa	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00	0.00	0.00
HFC-365mfc	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	0.00	0.00	0.00	0.00
Unspecified mix of HFCs – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emissions of PFCs – (kt CO_2 equivalent)	151.38	68.67	67.61	70.61	84.48	126.81	99.12	69.38	106.73	48.41
CF_4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
C_2F_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Greenhouse gas source and sink categories	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
C_3F_8	0.01	NO, NA, NE	NO, NA, NE	NO, NA, NE	0.00	0.00	0.00	NO, NA, NE	0.00	0.00
C_4F_{10}	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
c-C_4F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C_5F_{12}	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C_6F_{14}	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
$C_{10}F_{18}$	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
c-C_3F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Unspecified mix of PFCs – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emissions of SF_6 – (kt CO_2 equivalent)	8.38	7.87	6.37	10.34	14.16	16.71	21.21	18.06	14.66	14.02
Emissions of NF_3 – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
Emissions of HFCs and PFCs – (kt CO_2 equivalent)	986.17	1,069.14	1,302.43	1,632.57	1,611.12	1,663.37	126.44
Emissions of HFCs – (kt CO_2 equivalent)	940.70	1,015.28	1,254.87	1,597.42	1,563.66	1,615.24	
HFC-23	NO, NA	NO, NA	0.00	NO, NA	NO, NA	NO, NA	
HFC-32	0.02	0.02	0.03	0.04	0.04	0.04	
HFC-41	NA	NA	NA	NA	NA	NA	
HFC-43-10mee	NA	NA	NA	NA	NA	NA	
HFC-125	0.09	0.09	0.12	0.14	0.14	0.14	
HFC-134	NA	NA	NA	NA	NA	NA	
HFC-134a	0.20	0.23	0.30	0.42	0.42	0.44	
HFC-143	NA	NA	NA	NA	NA	NA	
HFC-143a	0.07	0.08	0.09	0.11	0.10	0.10	
HFC-152	NA	NA	NA	NA	NA	NA	
HFC-152a	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	
HFC-161	NA	NA	NA	NA	NA	NA	
HFC-227ea	0.00	0.00	0.00	0.00	0.00	0.00	
HFC-236cb	NA	NA	NA	NA	NA	NA	
HFC-236ea	NA	NA	NA	NA	NA	NA	
HFC-236fa	NA	NA	NA	NA	NA	NA	
HFC-245ca	NA	NA	NA	NA	NA	NA	
HFC-245fa	0.00	0.00	0.00	0.00	0.00	0.00	
HFC-365mfc	0.00	0.00	0.00	0.00	0.00	0.00	
Unspecified mix of HFCs – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	
Emissions of PFCs – (kt CO_2 equivalent)	45.47	53.86	47.56	35.15	47.46	48.13	–93.45

Greenhouse gas source and sink categories	2008	2009	2010	2011	2012	2013	Change from base to latest reported year %
CF_4	0.00	0.01	0.01	0.00	0.01	0.01	–93.37
C_2F_6	0.00	0.00	0.00	0.00	0.00	0.00	–93.80
C_3F_8	0.00	0.00	NO, NA, NE	0.00	0.00	0.00	
C_4F_{10}	NA	NA	NA	NA	NA	NA	
c-C_4F_8	NA	NA	NA	NA	NA	NA	
C_5F_{12}	NA	NA	NA	NA	NA	NA	
C_6F_{14}	NA	NA	NA	NA	NA	NA	
$C_{10}F_{18}$	NA	NA	NA	NA	NA	NA	
c-C_3F_6	NA	NA	NA	NA	NA	NA	
Unspecified mix of PFCs – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	
Emissions of SF6 – (kt CO_2 equivalent)	14.04	18.46	19.16	16.38	19.39	18.69	157.74
Emissions of NF_3 – (kt CO_2 equivalent)	NA	NA	NA	NA	NA	NA	

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] 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 Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[c] Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO_2 equivalent emissions.

[d] In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (ie, mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is kt of CO_2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.

Appendix B: Further details on modelling of emissions projections

This appendix contains supplementary information to that presented in Chapter IV Projections.

Energy

Detailed information on projected energy and transport emissions and CO_2 emissions from Industrial Processes and Product Use (IPPU) can be found in the technical guide *Energy Outlook Modelling*.[50]

The scenarios used are updated versions of those used in the *Sixth National Communication* (6NC) and *First Biennial Report* (BR1). The projections in this report are based on the 'base case' scenario from the draft *2015 Electricity Demand and Generation Scenarios (EDGS),* published by the Ministry of Business, Innovation and Employment.[51] However, the carbon price assumed for this report is a different trajectory to the EDGS 'base case' scenario for consistency with United Nations Framework Convention on Climate Change (UNFCCC) reporting requirements. In addition, the current New Zealand Emissions Trading Scheme (NZ ETS) measures for stationary energy participants are assumed to continue. The GDP growth, crude oil price, coal price, exchange rates, gas discoveries and population growth assumptions are, however, the same as those in the 'mixed renewables' scenario.

Agriculture

Forecasts of New Zealand's agricultural greenhouse emissions are derived from two models, the Pastoral Supply Response model (PSRM),[52] which projects agricultural activity data, and the Agricultural Greenhouse Gas Inventory model, which determines the emissions from those activities.[53]

Pastoral Supply Response model (PSRM)

Projected emissions are based on the activity data forecast by the PSRM for dairy cattle, beef cattle, sheep, deer and nitrogen fertiliser, and by assumptions made for the future population of other animal species[54] and crop and soil improvement activities.[55] The PSRM is an

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50 www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/technical-papers/pdf-library/technical-guide-energy-outlook-modelling-v2-Jan-2012.pdf.

51 Full details of the draft Electricity Demand and Generation Scenarios 2015 projections can be found at www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/modelling/electricity-demand-and-generation-scenarios/draft-edgs-2015.

52 Forbes R, Gardiner P. 2004. *Forecasting livestock numbers*. New Zealand Agricultural Association and Resource Economics Society, Blenheim, New Zealand. No. 97790. See ageconsearch.umn.edu/handle/97790.

53 See chapter 5 of the 2015 NIR submission.

54 For example, swine, broilers, layers and other poultry, horses, goats, alpaca, mules and asses.

55 For example, liming and pasture improvement.

econometric model that projects the national population characterisation and productivity for dairy cattle, beef cattle, sheep and deer. It was designed for medium-term outlooks (up to five years), but is adapted for longer-term forecasting here.

The forecasts of livestock populations are derived from a non-stationary Markov transition probability matrix of pastoral and forestry land use. This matrix is primed by utilising past percentages of land use as reported in the 2015 NIR under the LULUCF sector, and plantation forest land areas as reported in the annual National Exotic Forest Description (NEFD) report.[56] Land-use changes are assumed to be driven by annual returns and prices (farm returns and export log prices), and influenced by international markets (in 2014, agriculture comprised 64 per cent of the total value of merchandised exports[57]) and climate.

This modelling forecasts the change in land use between dairy cattle, beef cattle, sheep, deer and forestry activities. The PSRM methodology includes restrictions on land suitability for grazing to ensure that projected livestock numbers do not exceed New Zealand's realistic pastoral capability. The impact of forestry on available land is included, and the PSRM forest land projections have been verified against the projections for the LULUCF sector to ensure consistency.

Future gains in animal performance for lamb and milk solids production in the PSRM are modelled using a Box-Jenkins time-series methodology as a function of non-linear trends of increasing past performance, climate variables and, where statistically significant, farm-gate prices. Adjustments are made to the outputs of the PSRM, where appropriate, and are as follows:

- dairy cow milk yields, and milk butterfat and protein content, are assumed to be at levels consistent with those projected from the 6NC and BR1
- adult cattle carcass weights are difficult to forecast, and are assumed to remain static
- breeding ewe hogget numbers are adjusted to remain proportional to breeding ewe numbers, which in turn reduces total sheep population, lambs slaughtered and wool production
- projected lambing percentages and lamb carcass weights are assumed to be at levels consistent with those projected from the 6NC and BR1
- a strong downward trend in total deer population is perpetuated by the PSRM, however, deer numbers are assumed to remain at the June 2019 projected level as the industry reaches an expected steady state.

The Ministry for Primary Industries estimates future key farm-gate prices for input to these models based on long-term international price movements and the New Zealand Treasury's assumptions on the future exchange rate and inflation.[58]

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[56] National Exotic Forest Description, www.mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/.

[57] Ministry for Primary Industries. 2014. Primary Industries: Production and Trade-June Quarter. Wellington: Ministry for Primary Industries.

[58] www.mpi.govt.nz/news-resources/news/situation-amp-outlook-for-primary-industries.

Agricultural Greenhouse Gas Inventory model

The Agricultural Greenhouse Gas Inventory model uses the same methodology as the 2015 NIR submission. Emissions from New Zealand's four largest sources of livestock emissions (dairy cattle, beef cattle, sheep and deer) are calculated using a tier 2 methodology in line with the 2000 IPCC Good Practice Guidance[59] and the 2006 IPCC Guidelines. Greenhouse gas emissions are proportional to the dry matter intake of an animal (calculated on a monthly time-step through the life of each animal). Dry matter intake in turn is determined by the energy requirements of that animal to meet the needs of maintenance, and the extra energy required to meet the demands for growth, conception/gestation, milk production, and wool or deer velvet growth.

Estimates of nitrogen excretion rates are calculated from the difference between the crude protein intake of the animal from the feed and the nitrogen retained in the animal (milk, meat, wool, velvet, etc). From this estimate of excreted nitrogen, N_2O emissions from animal manure (stored, spread on pasture or deposited directly onto pasture during grazing) can be determined. Emissions from other animal species, and emissions from crop-related and soil cultivation and improvement activities, are estimated using a combination of New Zealand-specific emissions factors and default emission factors, in line with the 2006 IPCC guidelines.

Trends in underlying drivers

Activity data over the past decade confirms that synthetic nitrogen fertiliser application is stabilising, and that this trend will continue into the near future. A recent policy change in New Zealand, the introduction of the National Policy Statement for Freshwater Management (NPS-FM,)[60] is aimed at maintaining or improving water quality, and could have an impact on the projected increase in dairy cattle numbers and further stabilise nitrogen fertiliser use. This policy includes reducing losses of nitrogen through leaching of dairy excreta and fertiliser into waterways. The NPS-FM is required to be implemented by the end of 2025 and its progressive implementation may further increase the trend to reduce nitrogen losses. Research in this area is presently under way to quantify any impact this may have on reducing agriculture emissions, and may be considered for inclusion in future projections reporting.

Annual variability in emissions is caused by environmental factors, such as droughts. This results in decreased pasture production, and therefore lower livestock performance and reduced livestock numbers (due to higher than normal numbers of animals being sent to slaughter). Consequently this has led to a drop in greenhouse gas emissions in individual calendar years affected by droughts.

Land use, land-use change and forestry (LULUCF)

Projections model

The results from the 2015 NIR submission are used for the 'historic or actual' estimates from 1990 to 2013. Projections of net removals have been developed for forest land and grassland categories from 2014 to 2030. In New Zealand's 2015 NIR submission, the forestland and

[59] www.ipcc-nggip.iges.or.jp/public/gp/english/.

[60] 2014 National Policy Statement for Freshwater Management, www.mfe.govt.nz/publications/fresh-water/national-policy-statement-freshwater-management-2014.

grassland categories accounted for the majority of net removals in the sector (figure 6.1.1 and 6.1.2 of the 2015 NIR submission). The modelling of LULUCF projections include:

- removals from natural forests
- growth simulation of new and existing planted forests
- emissions from harvesting and harvest wood products
- deforestation
- non-carbon dioxide emissions (ie, CH_4 and N_2O)

Carbon price assumptions

For projecting future LULUCF net removals, three different scenarios (low, mid-point and high scenarios) were modelled for the 6NC to capture sensitivity and address uncertainties relating to future rates of afforestation, deforestation and harvesting, rotation ages, and carbon prices. Consistent with the BR1 the midpoint scenario is used which assumes a carbon price between $12.50 and $25.00 per NZU in the near future.

Natural forest

Based on research completed in early 2015,[61] New Zealand's pre-1990 natural regenerating forests are predicted to continue to sequester carbon well into the future. The projections assume that the regenerating component of the pre-1990 natural forest estate will continue to sequester on average around 6 million tonnes CO_2 per year, whilst the tall forest component is assumed to be steady state overall.

Harvesting

The projections of planted production forestry net removals are particularly sensitive to harvest levels. During the late 1980s and early 1990s, rates of new planting in New Zealand were particularly high. This means harvesting of production forests is expected to increase leading into the 2020s, thereby increasing LULUCF emissions. The age at which these planted forests are harvested can change due to wood product returns, forest owner objectives, and potentially in response to the NZ ETS. Thus, landowners with forests planted after 1990 that are registered under the NZ ETS will not only consider log prices and harvesting costs, but also the carbon balance in the forest (eg, whether it is better to continue to accrue units, or harvest and meet liabilities), and also the price of surrender units, which could be a significant new factor that comes into harvesting decisions. Rotation ages of 28, 30 and 32 years were factored into the three projection scenarios provided in the 6NC to highlight the sensitivity of projections to harvest age and levels. Consistent with the BR1, the midpoint scenario is used for this report which assumes a rotation age of 30 years.

Harvested wood products

A significant change to the BR1 projections is the inclusion of the harvested wood products pool, which comprised approximately a third of the total net removals from LULUCF in 2013.

[61] Projections of carbon stock change in the regenerating component of the natural forest estate have an uncertainty of ± 670 kt C ha^{-1} based on a 95 per cent confidence interval (Holdaway et al, 2015).

Given the age class structure of New Zealand's planted forests, net removals from the harvested wood products pool are projected to increase in the near future as forests planted in the 1980s and 1990s are harvested for wood production. See Section 6.10 of New Zealand's 2015 NIR submission for details on the approach, emissions factors, half-lives and model used.

Deforestation

Deforestation projections include around 5000 hectares per year from 2014 onwards. These projections are based on annual surveys of planted forest owners' future land-use intentions, are consistent with historical trends, and assume the clearing of self-sown exotic tree weeds and small amounts of shrub-land clearance continues.

Afforestation

New planting projections are based on historical trends and consultation with industry. The midpoint new planting projections assume a gradual increase from around 3000 hectares in 2014 to around 15,000 hectares in the 2020s. New planting projections are particularly difficult to quantify, however, as there are numerous factors that influence both investors and commercial forestry objectives, such as:

- wood product returns
- differing rates of return between forestry and other land uses
- nursery capacity
- forest/land owners' future intentions
- future international and domestic carbon accounting rules
- land availability, health and safety issues related to topography
- government planting schemes and current private sector interest in participating in forestry schemes administered by the Government.

Waste

Emissions from the waste sector arise from solid waste disposal, waste water and incineration.

Emissions from solid waste disposal are projected by calculating solid waste disposal per capita from the 2015 NIR submission and applying this to national population projections produced by Statistics New Zealand.

The proportion of CH_4 recovered by landfills that operate CH_4 recovery systems have been determined up to 2014. The expected impacts of government policies are assumed to reduce the future levels of solid waste disposal per capita and increase the amounts of CH_4 recovered from landfills. The effects of the NZ ETS on CH_4 recovery are included in this modelling. The effects of the waste levy[62] have not been included, because there is still not sufficient empirical evidence to quantify them.

[62] A levy on all waste sent to landfill, paid by disposal facility operators, www.mfe.govt.nz/waste/waste-disposal-levy.

Projections of emissions from the treatment of commercial and domestic wastewater were also based on past trends and national population projections. Projections of emissions from industrial wastewater were based on past trends in industrial activity.

Appendix C: Response to the technical review of the *First Biennial Report*

New Zealand's First Biennial Report (2013)[63] (BR1) was reviewed by a UNFCCC expert review team in February 2014. This appendix summarises the recommendations of the review report FCCC/TRR.1/NZL,[64] and how they have been addressed in the *Second Biennial Report* (BR2).

Chapter I. Information on greenhouse gas emissions and trends

Chapter 1 of the BR1 was reviewed as "complete" and "transparent". No recommendations were made.

Chapter II. Quantified economy-wide emission reduction target

Chapter 2 of the BR1 was reviewed as "complete" and "transparent". No recommendations were made.

Chapter III. Progress in achievement of quantified economy-wide emission reduction targets

Chapter 3 of the BR1 was reviewed as "mostly complete" and "transparent".

Paragraph in FCCC/TRR.1/NZL	Recommendation	Comment
21	Report on the planned mitigation actions with respect to its conditional target under the Convention, along with the related information required in CTF table 3 in next Biennial Report.	Chapter III reports on the planned review of existing policies and measures.

Chapter IV. Projections

Chapter 4 of the BR1 was reviewed as "complete" and "partially transparent".

Paragraph in FCCC/TRR.1/NZL	Recommendation	Comment
29, 56(b)i	Improve the transparency of its reporting by including in the next BR a complete list of which individual policies and measures reported are included in the 'with measures' projections and by providing all factors and activities underlying the projections, especially for road transport and agriculture.	This information is now required in CTF Table 3 as part of Chapter III, and has been completed for all policies and measures. It is also summarised in a table in Chapter IV.
29, 56(b)ii	Include all factors and activities underlying the projections, especially for road transport and agriculture.	These assumptions are now documented in CTF Table 5.

[63] www.mfe.govt.nz/publications/climate-change/new-zealands-first-biennial-report-under-united-nations-framework.

[64] unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600008017.

Chapter V. Provision of financial, technological and capacity-building support to developing country Parties

Chapter 5 of the BR1 was reviewed as "complete" and "partially transparent".

Paragraph in FCCC/TRR.1/NZL	Recommendation	Comment
35, 56(b)iii	A further clarification on how it has determined the reported financial resources as being 'new and additional'.	New Zealand's approach to reporting 'new and additional' resources has not changed from the *First Biennial Report*. To provide greater transparency Chapter V contains some additional quantified information about the growth in overall climate-related expenditure as compared to the *First Biennial Report*.
43, 56(b)iv	A further elaboration on its national approach for tracking the provision of financial, technological and capacity-building support to non-Annex I Parties and a description of the methodology used for reporting information on finance.	The relevant section in Chapter V has been expanded to address this recommendation through the provision of greater detail on the methodology used, including the use of OECD DAC 'Rio' Markers. Reference is made to the New Zealand Submission to the Conference of the Parties – Information on the appropriate methodologies and systems used to measure and track climate finance (May 2014), which provides further detail on the methodology used.
45, 56(b)v	A textual description of measures taken to promote, facilitate and finance the transfer of, access to and deployment of climate-friendly technologies for the benefit of non-Annex I Parties; and for support of the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties.	This recommendation is addressed in Chapter V in the sections on technology transfer and capacity building. Greater detail has been provided on how New Zealand identifies the priorities and needs to non-Annex I Parties, particularly in regards to capacity building support.

Chapter VI. Other reporting matters

No recommendations were made for Chapter 6 of the *First Biennial Report*.