

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.

Ministry for the Environment

1 September 2006

Summary

The *Initial Report* demonstrates that New Zealand has implemented the requirements for accounting under the Kyoto Protocol and its capacity to account for emissions trading of Kyoto Protocol units via the national registry. The report adheres to the requirements as specified in Decision 13 of the first Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP.1).

The report contains a number of technical definitions, calculations and definitions required to participate in the Kyoto Protocol. These are summarised as:

- a **complete inventory** of anthropogenic emissions by source and removals by sinks of greenhouse gases (not controlled by the Montreal Protocol) for 1990 – 2004
- the identification of **1990** as New Zealand's selected base year for hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride
- calculation of New Zealand's **assigned amount** as:

$$(61,365.064 \text{ Gg}^a + 527.932 \text{ Gg}^b) \times 1.00^c \times 5 = \mathbf{309,464,979 \text{ metric tonnes CO}_2 \text{ equivalent}}$$

^aAnnex A emissions (1990) excl LULUCF and HFCs, PFCs, SF₆

^bHFCs, PFCs, SF₆ (1990)

^cAnnex B percentage

- calculation of New Zealand's **commitment period reserve** as:

$$0.9 \times 309,464.979 \text{ Gg} = \mathbf{278,518,481 \text{ metric tonnes CO}_2 \text{ equivalent}}$$
- New Zealand's decision to **not account** for LULUCF activities under Article 3.4 during the first commitment period
- the identification of New Zealand's **selected single minimum values** for use in accounting for its activities under Article 3.3:
 - tree crown cover: **30 percent**
 - minimum land area: **1 hectare**
 - tree height: **5 metres**
- New Zealand's intention to use **entire commitment period accounting** for all activities under Article 3.3 during the first commitment period
- a description of New Zealand's **national system** in accordance with Article 5.1 and Decision 19/CMP.1 detailing the legal, institutional and procedural arrangements established for the continued compilation of New Zealand's greenhouse gas inventory
- a technical description of New Zealand's **national registry** in accordance with Article 7 and Decision 15/CMP.1.

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1. Introduction

At the first Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP.1), the Parties reconfirmed that Annex I Parties that have ratified the Kyoto Protocol are required to submit an *Initial Report* prior to 1 January 2007, or within one year of entry into force of the Kyoto Protocol for the Party, whichever is the later date (decision 13/CMP.1).

In accordance with decision 13/CMP.1 the *Initial Report* must contain the following information or references to such information where it has been previously submitted to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC):

Part One

- a) Complete inventories of anthropogenic emissions by source and removals by sinks of greenhouse gases not controlled by the Montreal Protocol for all years from 1990, or another approved base year or period under Article 3, paragraph 5, to the most recent year available. Inventories should be prepared in accordance with Article 5, paragraph 2, and relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP.1), taking into account any relevant decisions of the Conference of the Parties.
- b) Identification of the selected base year for hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) in accordance with Article 3, paragraph 8. Parties may choose 1990 or 1995 as the base year for HFCs, PFCs and SF₆.
- c) The agreement under Article 4, where the Party has reached such an agreement to fulfil its commitments under Article 3 jointly with other Parties.
- d) Calculation of the Party's assigned amount pursuant to Article 3, paragraphs 7 and 8, on the basis of its inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol.

Part Two

- a) Calculation of its commitment period reserve in accordance with decision 11/CMP.1. The commitment period reserve is 90 per cent of the assigned amount or 100 percent of five times its most recently reviewed inventory, whichever is the lowest.
- b) Identification of the single minimum values for tree crown cover, land area and tree height for use in accounting for activities under Article 3, paragraphs 3 and 4, together with a justification of the consistency of those values with the information that has been historically reported to the Food and Agriculture Organization of the United Nations or other international bodies, and in the case of difference, an explanation of why and how such values were chosen, in accordance with decision 16/CMP.1.
- c) Identification of its elected activities under Article 3, paragraph 4, for inclusion in its accounting for the first commitment period, together with information on how its national system under Article 5, paragraph 1, will identify land areas associated with the activities, in accordance with decision 16/CMP.1.
- d) The identification of whether, for each activity under Article 3, paragraph 3 and Article 3, paragraph 4, the Party intends to account annually or for the entire commitment period.
- e) A description of the Party's national system in accordance with Article 5, paragraph 1, reported in accordance with the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol.

- f)** A description of the Party's national registry, reported in accordance with the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol.

2. Calculation of New Zealand's assigned amount

2.1 New Zealand's greenhouse gas inventory

New Zealand's most recently completed greenhouse gas inventory comprising the national inventory report (NIR) and common reporting format (CRF) tables for the years 1990 – 2004 is attached to the *Initial Report*. The inventory reports anthropogenic emissions by sources and removals by sinks of the greenhouse gases not controlled by the Montreal Protocol.

2.2 Selected base year for hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride

New Zealand has selected **1990** as its chosen base year for the greenhouse gases hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

2.3 New Zealand's assigned amount

Taking into account the provisions of Article 3.7 and 3.8, New Zealand's assigned amount for the first commitment period (2008 – 2012) is equal to the percentage inscribed for it in Annex B of its aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases, listed in Annex A in the base year, multiplied by five.

The calculation of New Zealand's assigned amount is based on the inventory for 1990, part of the complete 1990 – 2004 inventory attached to the *Initial Report*.

New Zealand's assigned amount:

$$(61,365.064 \text{ Gg}^a + 527.932 \text{ Gg}^b) \times 1.00^c \times 5 = \mathbf{309,464.979 \text{ Gg CO}_2 \text{ equivalent (e)}}$$
$$= \mathbf{309,464,979 \text{ metric tonnes CO}_2 \text{ e}}$$

^aAnnex A emissions (1990) excl LULUCF and HFCs, PFCs, SF₆
^bHFCs, PFCs, SF₆ (1990)
^cAnnex B percentage

2.4 New Zealand's commitment period reserve

New Zealand will maintain, in its national registry, a commitment period reserve which will not fall short of 90 percent of New Zealand's assigned amount.

New Zealand's commitment period reserve:

$$0.9 \times 309,464.979 \text{ Gg} = \mathbf{278,518.481 \text{ Gg CO}_2 \text{ e}}$$
$$= \mathbf{278,518,481 \text{ metric tonnes CO}_2 \text{ e}}$$

2.5 Agreement under Article 4

New Zealand has not signed a joint agreement to meet its commitment with any other Party.

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

3.1 Identification of land areas associated with LULUCF activities

New Zealand has identified the following single minimum values for use in accounting for its activities under Article 3.3 and Article 3.4:

- tree crown cover: **30 percent**
- minimum land area: **1 hectare**
- tree height: **5 metres.**

3.1.1 Justification of consistency with historically reported values

These values are consistent with those reported to (and subsequently published by) the Food and Agriculture Organisation (FAO) of the United Nations. For both planted and natural forests, New Zealand has previously reported these values to the FAO (Forestry Department, Food and Agriculture Organization of the United Nations, 2005):

“Forests planted in exotic tree species predominately grown for wood or wood fibre greater than 1 ha in extent. All forest in this class will exceed 30 percent canopy cover and 5 metres in height before 10 years of age.”

“Indigenous forest is defined as forest dominated by tall indigenous forest canopy species greater than 1 hectare in size. All forests mapped into this class exceed 30 percent canopy cover and 5 metres in height.”

3.2 Election of activities under Article 3.4

New Zealand has elected to **not account** for LULUCF activities under Article 3.4 during the first commitment period.

3.3 Accounting under Article 3.3 and 3.4

New Zealand's intention is to use **entire commitment period accounting** for all activities under Article 3.3 during the first commitment period.

4. New Zealand's national system

4.1 Introduction

Under Article 5.1 of the Kyoto Protocol, Annex I Parties must have a national system for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol by 1 January 2007.

According to Decision 19/CMP.1, the national system has to ensure the function of all the institutional, legal and procedural arrangements required to calculate emissions and removals of greenhouse gases.

This section describes how the national system for New Zealand has been designed. The description details the legal and organisational structure of the New Zealand national system, methods used to calculate greenhouse gas emissions and removals, and the quality control and assurance systems that have been established in order to meet the requirements of good practice (IPCC, 2001, 2003) and relevant decisions of the Conference of the Parties (COP).

The compilation and reporting for the annual inventory is driven by four main stages: planning, preparation, evaluation and improvement. The overarching principles of good practice are employed at each stage including transparency, consistency, comparability, completeness and accuracy. The principle of continuous improvement directly affects the national system in that any improvement will naturally affect the planning, preparation and evaluation stages for the following year. Figure 4.1 details the continuous management process employed by New Zealand for the production of its annual greenhouse gas inventory.

4.2 Inventory planning

4.2.1 History of New Zealand's institutional and legal arrangements

New Zealand's institutional and legal arrangements have evolved in line with the expectations and requirements required to meet international reporting obligations for climate change. The following section is a brief history of how the New Zealand Government has developed its national system and the initial institutional arrangements established to enable its implementation and continued development.

The Ministry for the Environment (MfE) was designated as the lead for New Zealand's national inventory, receiving information and data from the contributing Ministries. During the mid to late 1990s a national system was not formalised, however, a consistent, ever-improving strategy for the development and compilation of a national inventory was employed. Other agencies in the earlier institutional arrangements underwent name and function changes as a result of government sector reorganisation during the 1990s but the core functions involved with collecting and supplying inventory data were retained and maintained within the overall institutional structure.

On 31 July 2000, following reference from the Cabinet Policy Committee, Cabinet noted that emissions inventory monitoring and reporting requirements under the Kyoto Protocol would be more stringent than those under the Framework Convention and that existing governmental monitoring and reporting guidelines would be reviewed by officials who would produce a report on the monitoring and reporting requirements.

In rationalising the various climate change cabinet papers and reports, Cabinet decided that this report should go to the Ministerial Group on Climate Change, rather than to Cabinet. It was in this report that the institutional arrangements (and to a lesser degree the national system framework) would be highlighted for inclusion in the upcoming Climate Protection Bill (which would eventually become enacted as the Climate Change Response Act 2002).

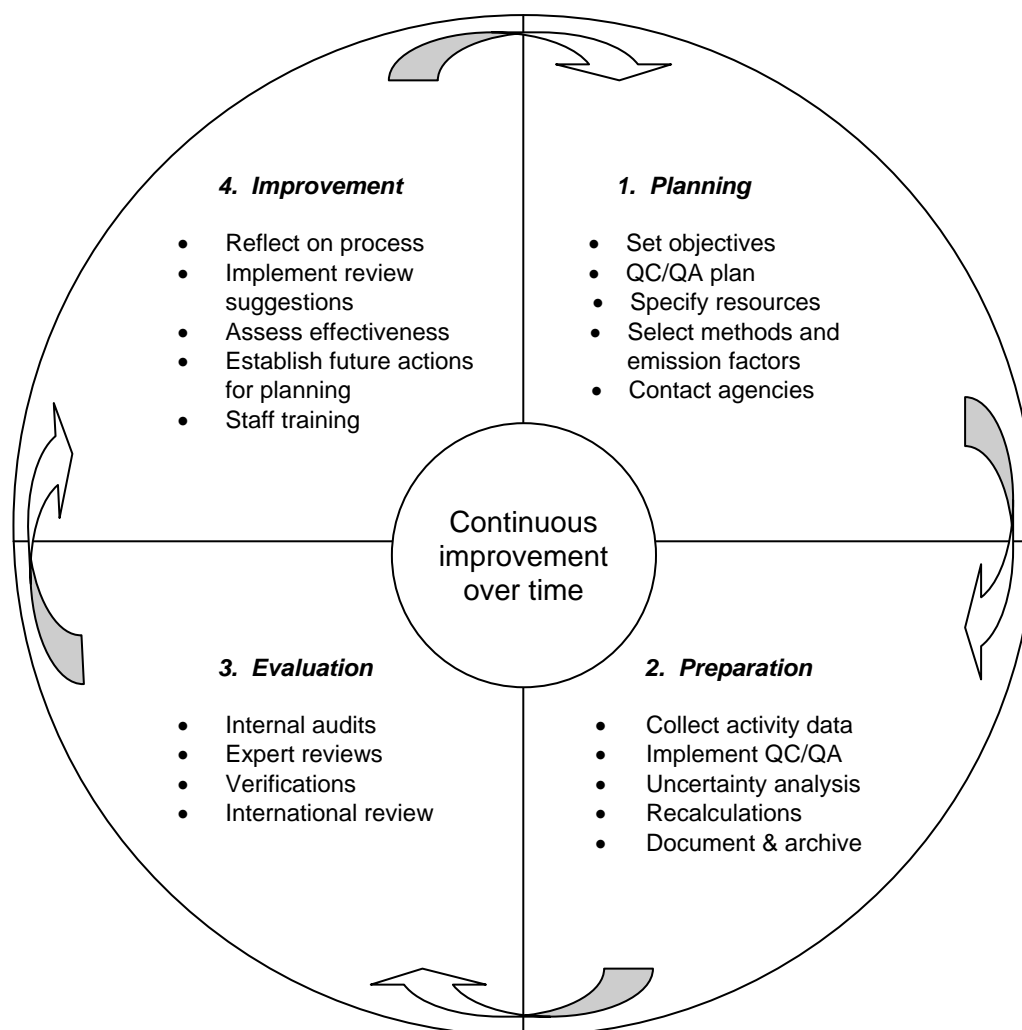


Figure 4.1: Continuous management process of New Zealand's greenhouse gas inventory.

On 23 March 2001 a report from the MfE (directed to the Ministerial Group on Climate Change) addressed (amongst many other related matters) the monitoring and reporting issues as required for the greenhouse gas inventory including the need to establish the institutional arrangements within which the greenhouse gas inventory data is collected, prepared and reported. It was noted in this report that this approach would offer certainty to the reporting process and reduces the risks relating to eligibility to trade under the Kyoto Protocol mechanisms.

This recommendation was accordingly agreed and the requirement for a national system was incorporated into New Zealand's Climate Change Response Act 2002 (CCRA) which took effect on 18 November 2002.

4.2.2 Legal arrangements of New Zealand's national system

The CCRA was established to enable New Zealand to meet its international obligations under the UNFCCC and the Kyoto Protocol. The CCRA sets in law the requirements to achieve New Zealand's national system and therefore ensures agencies involved in implementing the system have the power and means to do so.

The CCRA names the *person "who is for the time being the chief executive of the Ministry for the Environment"* as New Zealand's inventory agency. The section 'Part 2 Institutional arrangements Subpart 3 – Inventory agency' of the CCRA specifies the primary functions of the inventory agency, including to:

- *estimate annually New Zealand's human-induced emissions by sources and removals by sinks of greenhouse gases (32.1(a))*
- *prepare New Zealand's annual inventory report under Article 7.1 of the Protocol and New Zealand's national communication (or periodic report) under Article 7.2 of the Protocol and Article 12 of the Convention (32.1(b)(i) and (ii))*
- *prepare New Zealand's report for the calculation of its initial assigned amount under Article 7.4 of the Protocol, including its method of calculation (32.1 (b)(iii)).*

The CCRA specifies that in carrying out its functions the inventory agency must (32.2 (a – f)):

- *identify source categories*
- *collect data by means of:*
 - *voluntary collection*
 - *collection from government agencies and other agencies that hold relevant information*
 - *collection in accordance with regulations made under this act (if any)*
- *estimate the emissions and removals by sinks for each source category*
- *undertake assessments on uncertainties*
- *undertake procedures to verify the data*
- *retain information and documents to show how the estimates were determined.*

The CCRA also states that the inventory agency must keep a record of changes that occur from year to year in (34 (a, b)):

- *the collection of data and*
- *the use of methodologies and emission factors.*

And, with respect to publication, the inventory agency must publish New Zealand's annual inventory report and its national communication (35 (a, b)):

- *in hardcopy and*
- *if it has a website, in electronic form by placing the report on a publicly accessible portion of its website.*

4.2.3 Institutional and procedural arrangements of New Zealand's national system

4.2.3.1 Ministry for the Environment and supporting ministries

The CCRA established the Ministry for the Environment (MfE) as the lead institution for the overall development, compilation and submission of the annual inventory. It designated the **MfE as the single national entity** for the greenhouse gas inventory.

The MfE coordinates all of the government agencies and contractors involved with the inventory. The national inventory compiler is based at the MfE. Arrangements with other government agencies have evolved over time as resources and capacity have allowed and as a greater understanding of the reporting requirements has been attained.

The MfE has informal arrangements with two key ministries for assistance in the compilation of the national inventory, the Ministry of Agriculture and Forestry (MAF) and the Ministry of Economic Development (MED). One official Memorandum of Understanding (MOU) exists between the MfE and the MAF detailing the working relationship for the planted forest workstream of the New Zealand Carbon Accounting System (NZCAS). Both the MAF and the MED have cabinet directives to undertake inventory work and possess the knowledge and experience necessary to compile the best possible inventory data for New Zealand.

The specific responsibilities for various sectors of the greenhouse gas inventory are currently assigned to the following agencies.

4.2.3.1.1 Ministry for the Environment (MfE)

The MfE has the responsibility for overall compilation and coordination for the greenhouse gas inventory. However it also has responsibility for specific sectors. The MfE produces estimates of non-CO₂ emissions for the industrial processes sector and compiles the final estimates for the solvent and other product use, agriculture, waste and Land use, land-use change and forestry (LULUCF) sectors. Data for the non-CO₂ emissions for the industrial processes sector and waste sector are obtained from industry consultants contracted to the MfE.

4.2.3.1.2 Ministry of Economic Development (MED)

The MED is responsible for sourcing and compiling all data and emissions for the energy sector and CO₂ emissions from the industrial processes sector. The MED enters these data into the inventory common reporting format (CRF) software and provide the final CRF data to the MfE.

4.2.3.1.3 Ministry of Agriculture and Forestry (MAF)

The MAF provides the majority of the statistics for the agriculture sector and removals data from planted forests in the LULUCF sector for New Zealand's annual greenhouse gas inventory to the UNFCCC Secretariat. The MAF oversees the consultants work programmes relating to the agriculture and LULUCF sectors. The MfE is currently implementing the New Zealand Carbon Accounting System (NZCAS) for the LULUCF sector. When operational the NZCAS will provide data from which removals and emissions from the LULUCF sectors are calculated. The development of the NZCAS is described in section 4.5.2.1.

4.2.3.1.4 Statistics New Zealand

New Zealand's national statistical agency, Statistics New Zealand provides many of the official statistics for the agriculture sector through a regular agricultural census and provides statistics on oil consumption for the energy sector through the Deliveries of Petroleum Fuels by Industry survey. The agricultural statistics are further disaggregated by the MAF. The waste sector uses human population data from the national census together with official population estimates.

Further information on the roles and responsibilities of each organisation within the New Zealand Government is provided in Annex 6.1 – 6.4.

4.2.3.2 Industry consultants

Consultants are used in the industrial processes / solvents, waste, agriculture and LULUCF sectors of the inventory and provide essential data and information. Figure 4.2 summarises the institutional and procedural arrangements explained above for the compilation of New Zealand's annual greenhouse gas inventory.

4.2.3.2.1 Contracts with consultants

Where an expert in a relevant sector is identified outside the MfE or any of the other key contributing government departments, a contract is established to ensure the inventory can be completed in an accurate, timely manner and to a standard that meets the satisfaction of

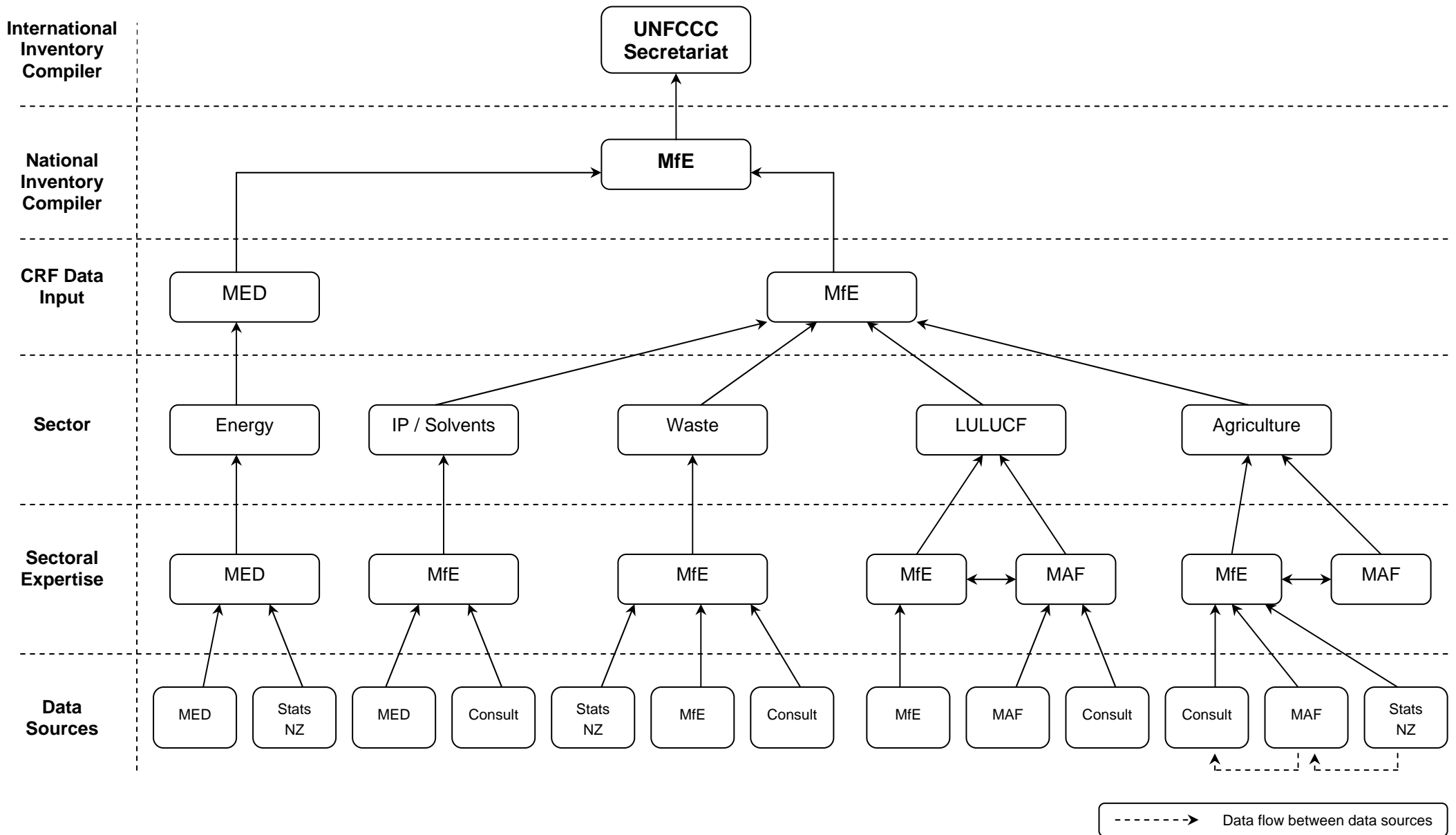


Figure 4.2: Institutional and procedural arrangements for the compilation of New Zealand's annual greenhouse gas inventory.

the Minister. The MfE contracts are legally binding and ensure transparency through the establishment of the contractor. Legislation relating to the Crown public sector accountability framework is extensive and includes:

- Public Finance Act 1989
- Public Audit Act 2001
- Official Information Act 1982
- Ombudsman Act 1975
- Public Records Act 2005
- Crown Entities Act 2004.

Contractors for the annual greenhouse gas inventory are selected as being experts in their fields. While it is preferable to use the same contractor each year, contractors are reviewed on an annual basis. Through this competitive process the best contractor is selected, ensuring inventory data is of the highest order in accordance with good practice guidance (IPCC, 2000, 2003).

4.3 Inventory preparation

4.3.1 Calculation of emissions and removals of greenhouse gases

New Zealand seeks to prepare an inventory consistent with the method described in the 'Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories' (IPCC, 1996) as elaborated by the 'Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories' (IPCC, 2000), Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC, 2003) and the UNFCCC reporting guidelines (FCCC/SBSTA/2004/8). The concepts contained in 'Good Practice Guidance' are being implemented in stages, according to key category priorities and national circumstances.

All relevant documentation relating to activity data, emission factors, methodologies and recalculations are recorded in the appropriate government agencies files. This documentation provides a historical reference for the MfE and fulfils part of the transparency requirement in accordance with good practice. It also assists with national and international audits and peer reviews.

4.3.2 Annual inventory and report

New Zealand submits its national inventory to the UNFCCC Secretariat by 15 April of each year. The inventory contains data from the base year (1990) to two years prior to the current calendar year. Generation of the data in the CRF software and production of the National Inventory Report (NIR) occurs at the MfE over the period February to April as activity data statistics and emission data become available from the various participating institutions.

The MfE officials undertake quality control checks on the data, calculate the inventory uncertainty and undertake the key category assessment. The inventory and all required data for the submission to the UNFCCC secretariat are stored on the Ministry's central computer network in a controlled file system. Following the initial quality checks by the UNFCCC Secretariat, the inventory is released to the public (both as hard copy and on the MfE's website). The remainder of this section explains this process in greater detail.

The content and format of the inventory is prescribed by the UNFCCC and relevant decisions of the COP to the UNFCCC, the most recent being FCCC/SBSTA/2004/8. A complete inventory submission requires two components: the NIR and the CRF software tables. Inventories are subjected to an annual three-stage international review process administered by the UNFCCC secretariat.

4.3.3 Methodologies used for inventory data

4.3.3.1 Energy

Greenhouse gas emissions from the energy sector are calculated using an IPCC Tier 1 approach. Activity data (fuel consumed) are multiplied by the emission factors of specific fuels. Activity data comes from industry-supplied information via the MED and Statistics New Zealand. Emission factors for CO₂ are usually New Zealand specific but applicable IPCC default factors are used for non-CO₂ emissions where New Zealand data are not available or are not well supported.

4.3.3.2 Industrial processes and use of fluorinated greenhouse gases

Carbon dioxide emissions and activity data for the industrial processes sector are supplied directly to the MED by industry sources. IPCC Tier 2 approaches are used and emission factors are country specific. Activity data for the non-CO₂ gases are collated via an industry survey through the MfE. Emissions of HFCs and PFCs are estimated using the IPCC Tier 2 (IPCC, 2000) approach and SF₆ emissions from large users are assessed via the Tier 3a approach (IPCC, 2000).

4.3.3.3 Solvent and other product use

Very small amounts of nitrous oxide are emitted during use in medical applications. Estimates of non-methane volatile organic compounds (NMVOC) emissions are calculated using a consumption-based approach. Activity data for solvents are obtained via a survey of industry.

4.3.3.4 Agriculture

Livestock population data are obtained from Statistics New Zealand, supplemented by estimates from the MAF. A Tier 2 (model) approach is used to estimate methane emissions from dairy cattle, beef cattle, sheep and farmed deer. The methodology uses detailed animal productivity data to estimate dry matter intake. Methane production is determined from this intake. The same dry matter intake data are used to calculate nitrous oxide emissions from animal excreta. A Tier 1 approach is used for non-significant animal species.

4.3.3.5 LULUCF

The LULUCF sector is completed using a combination of IPCC Tier 2 and Tier 1 approaches. A Tier 2 approach is used for the planted forest sub-category of forest land. Changes in planted forest stocks are assessed from national forest survey data and computer modelling of the planted forest estate. A Tier 1 approach is used for the categories cropland, grassland, wetland, settlements and other land. Changes in land area for these categories are based on modified national land cover databases reclassified to the UNFCCC categories. The land cover databases were mapped in 1997 and 2002. Data for all other years is extrapolated from the changes observed between 1997 and 2002. The New Zealand Carbon Accounting System (NZCAS) will eventually replace and improve LULUCF data (section 4.5.2.1).

4.3.3.6 Waste

Emissions from the waste sector are estimated using waste survey data combined with population data. The calculation of emissions from solid waste disposal uses an IPCC Tier 2 method with country-specific emission factors. Methane and nitrous oxide emissions from domestic and industrial wastewater handling are calculated using a refinement of the IPCC methodology (IPCC, 1996).

4.3.4 Key categories

The IPCC Good Practice Guidance (IPCC, 2000) identifies a key source category as “one that is prioritised within the national inventory system because its estimate has a significant influence on a country’s total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both”. Key categories are identified within the inventory so that the resources available for inventory preparation are prioritised.

The key categories in the New Zealand inventory have been assessed using the good practice Tier 1 level and trend methodologies (IPCC, 2000, 2003). The good practice methodologies identify sources of emissions and removals that sum to 95 percent of the total emissions or 95 percent of the trend of the inventory in absolute terms.

Following GPG-LULUCF (IPCC, 2003) the key category analysis is performed once for the inventory excluding LULUCF categories and then repeated for the full inventory including the LULUCF categories. Non-LULUCF categories that are identified as key in the first analysis but do not appear as key when the LULUCF categories are included are still considered as being key.

The major key categories when LULUCF is excluded are enteric fermentation in domestic livestock and mobile combustion of road vehicles. When LULUCF is included, forest land remaining forest land becomes the major key category for New Zealand. Further information on key categories identification can be obtained from New Zealand’s 2006 greenhouse gas inventory submission attached to this *Initial Report*.

4.3.5 Estimations of uncertainty

New Zealand has included a Tier 1 uncertainty analysis as required by the inventory guidelines (FCCC/SBSTA/2004/8) and good practice. Uncertainties in the categories are combined to provide uncertainty estimates for the entire inventory in any year and the uncertainty in the overall inventory trend over time.

The calculated uncertainty for New Zealand’s total inventory (emissions and removals) in 2004 is ± 17.0 percent. However the uncertainty in the overall trend from 1990 – 2004 is lower at only ± 4.3 percent. Considering only emissions, the uncertainty is ± 21.2 percent with ± 4.9 percent uncertainty in the trend of emissions. This is typical for New Zealand’s annual inventory which trends around the ± 20 percent with ± 5 percent uncertainty. The trend is critical to the UNFCCC and Kyoto Protocol reporting where New Zealand’s emissions are compared to the 1990 baseline.

The high uncertainty in a given year is dominated by emissions of CH₄ from enteric fermentation and N₂O emissions from agricultural soils. The apparent high uncertainty in these categories reflects the inherent variability when estimating emissions from natural systems. With the agricultural sector comprising approximately half of New Zealand’s emissions, high uncertainty in a given year is inevitable. Removals of CO₂ from forest land is also a major contribution to the uncertainty of New Zealand’s total emissions and removals.

Uncertainty in the trend is dominated by CO₂ emissions from the energy sector. This is largely due to the size of the sector and that the uncertainty in energy activity data is greater than the uncertainty in energy emission factors. The other major contributors to trend uncertainty are removals of CO₂ by forest land and CH₄ from enteric fermentation in domestic livestock. Contributing uncertainty values are determined by expert judgement, by analysis of emission factors or activity data, or by referring to uncertainty ranges quoted in the IPCC documentation.

4.3.6 Quality system

4.3.6.1 Quality principles of the national system

The national system has been designed to ensure that the inventory is transparent, consistent, comparable, complete and accurate. These principles are defined in the UNFCCC guidelines on annual inventories (FCCC/CP/2002/8) and guide the MfE, other government agencies and consultants during the compilation of the inventory and associated reporting.

4.3.6.2 Quality control and quality assurance plan to meet quality objectives

Quality control (QC) and quality assurance (QA) are an integral part of preparing New Zealand's inventory. The MfE developed a QC/QA plan in 2004 as required by the UNFCCC guidelines (FCCC/CP/2002/8) to formalise, document and archive the QC and QA procedures. The plan is regularly reviewed and updated in conjunction with New Zealand's inventory improvement plan.

New Zealand's greenhouse gas inventory QC and QA plan has been designed to improve the transparency, consistency, comparability, completeness and accuracy in New Zealand's annual greenhouse gas inventory in order to meet IPCC good practice. The plan closely follows the definitions, guidelines and processes presented in Chapter 8 "Quality Assurance and Quality Control" of the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" (IPCC, 2000). New Zealand's plan is an open document and is subject to modification and improvement when changes in processes are updated or on advice from independent reviewers.

New Zealand's QC and QA plan has three **objectives**:

1. New Zealand's greenhouse gas inventory will be in accordance with IPCC good practice guidance principles by September 2006.
2. One official submission of the inventory is made to the UNFCCC Secretariat by the 15 April annually.
3. No errors are identified in the initial checks of the inventory by the UNFCCC Secretariat.

The QC/QA plan is intended to ensure transparency and quality of New Zealand's inventory. The **principles** of the plan include:

- applying greater QC effort for key categories and for those categories where data and methodological changes have recently occurred
- periodically checking the validity of all information as changes in sample size, methods of collection, or frequency of data collection occur
- conducting the general procedures outlined in general QC procedures (Tier 1) on all parts of the inventory over a period of time
- balancing efforts between development and implementation of QC/QA procedures and continuous improvement of inventory estimates
- customising the QC procedures to the resources available and the particular characteristics of New Zealand's greenhouse gas inventory
- confirming that the national statistical agency and other agencies supplying data to the inventory have implemented QC/QA procedures.

The QC/QA coordinator is defined as being the person who is the national inventory complier for New Zealand. The **responsibilities** of the role include:

- keeping the QC/QA plan current by updating as necessary
- ensuring all planned Tier 1 and Tier 2 quality checks are carried out as planned (these may be undertaken in the agencies where the data is compiled)
- ensuring New Zealand's inventory improvement plan is implemented.

The QC/QA plan combined with annual inventory experience indicates areas for future improvements for the inventory which are then incorporated into the following and each subsequent inventory thereafter.

4.3.6.3 Quality control

The QC procedures comprise general (Tier 1) procedures and source category-specific procedures (Tier 2).

4.3.6.3.1 Tier 1 procedures

The focus of Tier 1 QC techniques is on the processing, handling, documenting, archiving and reporting procedures that are common to all the inventory source categories. Tier 1 QC checks are used routinely throughout the preparation of the annual inventory and usually involve cross-checks, recalculations and/or visual inspections.

4.3.6.3.2 Tier 2 procedures

Tier 2 QC procedures are directed at specific types of data used for individual source categories. The source category-specific measures are applied on a case-by-case basis focusing on key source categories and on source categories where significant methodological and data revisions have occurred. Source category-specific QC activities include QC of emissions data, activity data and uncertainty estimates.

4.3.6.3.3 Implementation of quality control procedures

During the preparation of the 2004 inventory, the MfE continued to develop the Tier 1 QC check-sheet first used in the preparation of the 2002 inventory. The Tier 1 quality checks are based on the procedures suggested in the Good Practice Guidance (IPCC, 2000).

In addition to the formal QC checks, data in the underpinning worksheets and entered into the CRF software database are checked visually for anomalies, errors and omissions. In the preparation of the 2004 inventory, the MfE used the QC checking procedures included in the CRF software database to ensure that the data submitted was complete.

4.3.6.4 Quality assurance

The QA reviews of individual sectors and categories are commissioned by the MfE. As part of the QA procedures for the 2004 inventory, the QC and QA plan was updated incorporating a number of recommendations from a quality management review undertaken in 2004. In addition, the methodologies used in the agricultural and LULUCF sectors have undergone scientific peer review. A peer review of the energy sector activity data is to be undertaken in 2006 as part of the QA programme.

Significant parts of the data in the energy and agriculture sectors are compiled using data collected in national surveys. These surveys are conducted and administered by Statistics New Zealand. Statistics New Zealand conducts its own rigorous QC and QA procedures on

the data. Annex 6.5 explains the supporting legislation relating to data attained from Statistics New Zealand through the Statistics Act 1975.

4.3.6.5 Process for the recalculation of previously submitted inventory data

Methods and modelling techniques are refined upon each annual submission and as government agencies and consultants identify areas for improvements these are noted for actioning the following year. Prior to the annual inventory compilation, areas for data improvement are identified at a planning session. The QC/QA plan is reviewed annually during the inventory debrief and planning phase. Managers and in some cases Ministers are consulted when a planned improvement is anticipated for adoption. Once approval is given for the change in method these factors are incorporated into the project brief for the following year's inventory which the agency or consultant responsible for the work will undertake.

4.3.6.6 Documentation and archiving

All information required to produce the national inventory is documented and archived by the MfE on a networked document management system known as Silent one. This system is backed up every evening as part of the MfE's routine back-up procedures. All hard copy reports and files related to the inventory are filed at the MfE. Where data estimates are developed by outside agencies and consultants, a copy of the necessary documentation is held by the inventory agency. Documentation includes sufficient information to enable all activity data, emission factors, uncertainty calculations, expert judgements and QC/QA information to be recalled, reproduced and justified.

4.3.6.7 Inventory and national inventory report checking and reviewing

A review of the complete inventory check is performed to ensure all planned checks have been completed before the inventory is submitted. This check includes checking all the planned Tier 1 and 2 quality control checks have been completed and results filled out in the appropriate Excel tables, any QA exercises completed and the compulsory checks in the CRF software completed for all sectors.

Prior to the submission of the inventory to the UNFCCC internal review is undertaken by staff within the MfE who have not been involved with the process (in 2006 these were the UNFCCC national focal point, the responsible manager, and the general manager who is the designated management sign-off individual for the Chief Executive Officer at the MfE).

4.3.6.8 Inventory preparation schedule

New Zealand bases its inventory preparation schedule around the following framework (Table 4.1). This framework is reviewed annually to include any improvement or amendments that will increase the efficiency and accuracy of inventory preparation. The overlapping stages indicate how resources are allocated throughout the year and where pressure points are with respect to workload (March for example). The national inventory compiler (NIC) also works on inventory-related matters year-round such as planning improvements with other agencies, improvement of the QC/QA plan and administrative work including the sourcing and securing of consultants.

4.4 Inventory evaluation

Following the annual submission of the national inventory a post inventory review is undertaken. The review focuses on lessons learnt and how improvements can be incorporated into the inventory for the following year. Questions asked include: Was the timing of activities suitable? What activities went well? What activities could be improved? The review encompasses key contributors to the inventory.

Table 4.1: New Zealand's annual greenhouse gas inventory preparation schedule.

	Stage					Stage / Activities
	1	2	3	4	5	
Nov						1. Getting started <ul style="list-style-type: none"> - Distribute text and spreadsheet files to sector experts. - Distribute inventory plan for next submission to sector experts. - Initial meeting to discuss target dates and to meet these. 2. Methodology development and data collection <ul style="list-style-type: none"> - Sector experts collect input data & evaluate or develop the estimation methodology for individual source categories. 3. Estimate emissions and removals and prepare NIR <ul style="list-style-type: none"> - Spreadsheets with current methodologies used to calculate emissions and enter data into CRF software. - Quality checks completed within software for each sector - Relevant text in NIR updated. - Sector experts send completed inventory estimates (in CRF software) to the NIC. 4. Compile estimates in CRF software and summary sheets <ul style="list-style-type: none"> - The NIC imports all sectoral files, checks data and undertakes key category analysis and uncertainty analysis. - Review of complete inventory check is completed. Any actions as a result of checks implemented. - Inventory submitted to the UNFCCC on 15 April. - Following submission, all documents with data and methodological and emission factor information are archived ensuring no further changes may be made to the documents.
Dec						
Jan						
Feb						
Mar						
Apr						
May						
Jun						5. Inventory evaluation and publication <ul style="list-style-type: none"> - Reflection on inventory compilation with issues identified for incorporation into the inventory for the following year. - Official publication of inventory and website posting.

4.4.1 The review process

The UNFCCC secretariat facilitated a centralised review of New Zealand's 2003 inventory submission in October 2005 (UNFCCC, 2006). New Zealand has demonstrated that it responds to suggestions raised by international review teams and wherever possible, has incorporated their recommendations into subsequent inventories.

4.4.2 International review

New Zealand's greenhouse gas inventory was reviewed in 2001 and 2002 as part of a pilot study of the technical review process, where the inventory was subject to detailed in-country, centralised and desk review procedures (UNFCCC, 2001a, 2001b, 2001c, 2003, 2004, 2005, 2006). The inventories submitted for the years 2003 – 2005 were reviewed during centralised review processes. In all cases, the reviews were conducted by a review team comprised of experts nominated by Parties to the UNFCCC. Review reports are available from the UNFCCC website (www.unfccc.int).

4.5 Inventory improvement

4.5.1 Revision and continuous improvement of the inventory

New Zealand's 2006 submission can be described as complete with all IPCC source and sink categories that occur in New Zealand or that have emissions assessed to be above a negligible level reported. Improvements have been made with the inclusion of estimates for all LULUCF categories from the base year for all years (compared to 1997 – 2003 in the 2005 submission) and estimates of CO₂ from soda ash use in industrial processes. There are some small sources which remain "not estimated" (NE) eg, CH₄ emissions from waste incineration. Explanations on why these are reported as NE are found under the appropriate sector chapters in the national inventory report.

The New Zealand Carbon Accounting System (NZCAS) is being developed to enable New Zealand to meet its Kyoto Protocol obligations and to also improve the accuracy of the LULUCF data, and estimates using this system will be included when available. Development of the NZCAS will also reduce the uncertainty by using country-specific emissions and removal factors and utilise spatial data mapped specifically for UNFCCC reporting.

4.5.2 Planned improvements

For the 2006 submission the emphasis has been on ensuring completeness and transparency across all source categories in line with good practice. Priorities for inventory development are guided by analysis of key sources (level and trend) and uncertainty surrounding existing emissions estimates and recommendations received from previous international reviews of New Zealand's inventory.

4.5.2.1 The New Zealand Carbon Accounting System (NZCAS)

New Zealand is developing and implementing the New Zealand Carbon Accounting System (NZCAS) specifically to enable reporting and accounting of post-1990 afforestation, reforestation and deforestation activities under Article 3.3 of the Kyoto Protocol during the first commitment period.

The NZCAS has been designed to reflect New Zealand's national circumstances and to meet Good Practice Guidance (IPCC, 2003). In August 2005 the New Zealand Government (Cabinet) approved funding for the system through to 2014/2015 fiscal year. Construction of the system is complex because New Zealand has not, prior to ratifying the Kyoto Protocol, required a comprehensive information system for reporting on land use, land-use change and forestry activities.

Building the capability and capacity to handle the Kyoto Protocol reporting requirements has required collaboration across government agencies and research institutes as well as the integration of several information and work streams.

The main components of the NZCAS work programme are:

- methods and processes for establishing representative forest and soil plots to obtain measurements from which carbon estimates will be derived
- methods, processes and models to determine levels of carbon in New Zealand forest and soils
- methods and processes to map land use and land-use changes (from 1990) and acquisition of the required remotely-sensed imagery
- development and deployment of a database, application tools and related infrastructure to enable the storage, analysis and reporting of data related to land-use changes and carbon stocks in forest and soils for these areas
- processes for the design, review and refinement of statistical design, spatial analysis and land use mapping methods to ensure robustness, effectiveness and cost-efficiency

- processes for quality assurance and conformance with IPCC Good Practice Guidance, including the management of international expert reviews.

The work programme has been structured into individual workstreams to facilitate the management and review of the project and to ensure focused performance and budget management.

Plot and map data, and the carbon stock change analysis of these data, required for the LULUCF sector will be available from the NZCAS by December 2009, in time for the submission in April 2010 of the 2008 inventory.

4.5.3 Summary of inventory improvements

A summary of New Zealand's recent inventory improvements detailing annual inventory submissions can be found in the NIR attached to this *Initial Report*.

4.5.4 Inventory management

4.5.4.1 Training, awareness and skills

The New Zealand Government has proficient technical competence across all agencies who contribute to the inventory (MfE, MED, MAF). The MfE are actively increasing resources available for inventory compilation by spreading knowledge across the MfE and employing extra staff who will be directly or peripherally involved in the inventory work.

In 2005, the MfE organised a UNFCCC training course in New Zealand for expert reviewers of the LULUCF sector. A number of New Zealand experts involved in estimating emissions and removals from this sector took part which has helped to increase the level of understanding of good practice and its application to UNFCCC and Kyoto Protocol reporting in New Zealand.

New Zealand has increased the number of expert reviewers participating in expert review teams. In 2005, three staff from the MfE participated in the review process. Four individuals within MfE are qualified greenhouse gas inventory reviewers and are listed on the UNFCCC roster of experts. Three further reviewers outside MfE (although funded by MfE) within New Zealand serve as reviewers.

4.5.4.2 Risk management

Institutional knowledge regarding the national system and inventory has increased over the years. This is to ensure a complete, robust inventory can be annually produced irrespective of individuals involved in the development and compilation of the work. At least three other individuals within the MfE are involved with its production as sector leads. Along with the NZCAS there is a great deal of peripheral knowledge available to assist the inventory development.

Regular attendance at UNFCCC meetings ensures New Zealand has the very latest information, and staff "shadowing" for developmental purposes will take place throughout the international meetings in 2007.

4.6 National entity contact

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Website	http://www.mfe.govt.nz http://www.climatechange.govt.nz	http://www.mfe.govt.nz http://www.climatechange.govt.nz

5. New Zealand's national registry

The Ministry of Economic Development (MED) is responsible for the implementation and operation of New Zealand's national registry under the Kyoto Protocol. The Climate Change Response Act 2002 (CCRA) establishes the registry and a registrar. The registry will be wholly electronic and accessible via the internet.

Work on customisation of the software package needed to support operation of the New Zealand Emission Unit Register (NZEUR), excluding connections to the Independent Transaction Log (ITL), will be complete by September 2006 in order to meet New Zealand's international obligations as specified under the Kyoto Protocol. Implementation of the connections to the ITL will be completed in 2007.

The NZEUR will be accessed via www.nzeur.govt.nz. This website will be launched in September 2006 and will initially provide stakeholders with information on how the NZEUR will operate. Once the NZEUR has passed audit and review by the United Nations Framework Convention on Climate Change (UNFCCC) and has been initialised with the ITL, stakeholders will also be able to access registry services via this website.

5.1 Technical description

This technical description of the NZEUR is presented in accordance with the reporting requirements in Annex II under decision 15/CMP.1.

5.1.1 Consolidated registry systems

The NZEUR has been created as a stand alone, New Zealand registry and is not part of a consolidated registry with other countries.

5.1.2 Database design

The NZEUR is based on the Emissions and Allowance Tracking Systems (EATS) software application and had been customised to support operation of the NZEUR. EATS was developed for the Environmental Protection Agency (EPA) in the United States of America (USA). It is used by a number of States in the USA to support greenhouse gas, SO₂ and NO₂ programmes. EATS has also been adapted for the Secretariat of the UNFCCC to support the Clean Development Mechanism (CDM).

5.1.3 Compliance with the ITL data exchange standards

Development of the connections between the NZEUR and the ITL will start in September 2006 and work should be completed by early 2007. The development will be carried out in accordance with the Data Exchange Standards (DES) and will be based on functionality developed for the CDM.

5.1.4 Database management

The NZEUR uses a Microsoft SQL Server 2000 database. The vast majority of the system's business logic is contained in stored procedures, views and functions contained in the database instance. The NZEUR utilises a complex system of metadata used to control many aspects of the system's configuration.

The NZEUR is primarily accessed via a web application developed using ColdFusion MX7 and is installed on a Microsoft IIS web server which communicates with the ColdFusion MX7 application server. The ColdFusion application server runs as a service on the designated machine that hosts the IIS web server.

5.1.5 Disaster recovery

The NZEUR has not yet been initialised and there are no external users of the registry system. For this reason the MED has implemented a daily back-up system. As the NZEUR will not initially be used for undertaking transactions this is considered adequate.

Early in 2007, the NZEUR will be implemented into a high availability data centre that will enable failover from a production site to a disaster recovery site located in a geographically separate location. Therefore should a problem arise, failover to the other data centre may take place enabling continued access to the NZEUR. At the minimum there is a daily back-up of the production site which is then installed on the disaster recovery site. There is also real-time replication of data from the production site to the disaster recovery site. Should a major event occur, information and transactions undertaken in the NZEUR up until the event occurred will therefore be accessible.

5.1.6 Testing of the NZEUR

Robust testing of the NZEUR has been undertaken by the developers, the MED and external stakeholders to ensure that the registry system meets the requirements of the Kyoto Protocol and users. Testing procedures have followed accepted industry best practice.

Once development of the NZEUR's connection to the ITL is complete, initial testing will take place, potentially against a test harness. The NZEUR will then be tested against the ITL following a process agreed with the ITL administrator.

5.1.7 Security of the NZEUR

NZEUR security will be managed in three ways:

1. user management – individuals will need to logon on the NZEUR as a registered user to use services
2. database management – best practice systems are in place to manage internet and database security
3. a digital certificate and VPN will be utilised for connection to the ITL.

The MED will also be reviewing whether or not to implement digital certificates for account holders prior to initialisation of the NZEUR in 2007.

5.1.8 Strategies employed to minimise discrepancies

The NZEUR is being implemented in accordance with the DES and will meet the requirements set-out in this document to minimise discrepancies in issuance, transactions, cancellation and retirement of ERUs, CERs, tCERs, ICERs, AAUs and RMUs. Issuance of New Zealand's assigned amount will be confirmed via the ITL and all international transfers will be conducted via the ITL. There will also be a regular reconciliation of the NZEUR by the ITL. The registry administrator can undertake manual corrections if directed by the ITL administrator.

5.2 Registry administrator

Title	Manager registry policy	e-Business adviser
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6. Annex

6.1 The Ministry for the Environment (MfE)

The MfE is the government's principal adviser on the New Zealand environment and international matters that affect the environment. The MfE works with others in central and local government, industry and the community to achieve good environmental governance and decision-making at all levels. Sustainable development is the context for all its work programmes.

The role of the MfE is to:

- provide leadership across government and the community on environment
- work in partnership with key sectors and organisations to improve our environment
- fix problems that require central government intervention
- ensure that New Zealand has good environmental governance.

The MfE was established under the Environment Act (1986). It has specific functions under the Resource Management Act (1991), Hazardous Substances and New Organisms Act (1996), Ozone Layer Protection Act (1996) and Climate Change Response Act (2002).

The MfE head office is in Wellington and it also has offices in Christchurch and Auckland and a staff of approximately 290 people.

Enshrining New Zealand's ongoing commitment to Kyoto Protocol reporting requirements, Outcome 5 of the MfE's Statement of Intent 2006 – 2009 states that *"The Ministry fulfils international obligations and looks after New Zealand's interests in climate change and preparation for climate change impacts."* To achieve this, the MfE will *"develop and maintain New Zealand's greenhouse gas and carbon stocks accounting and reporting systems, and meet our international reporting requirements."*

6.2 The Ministry of Agriculture and Forestry (MAF)

The MAF informs, advises, regulates and delivers services relating to the agriculture, forestry, rural affairs, biosecurity and food safety portfolios. In doing so the MAF contributes to the economic, environmental and social / cultural wellbeing of New Zealand. It does this through the outcomes it seeks to achieve with respect to:

- the economic, environmental and social performance of the sectors
- maintaining and enhancing New Zealand's biosecurity status
- providing health assurances to foreign governments for animals, plants and their products
- protecting the health of consumers.

As the MAF pursues its outcomes – whether in respect to the performance of the sectors, food safety or biosecurity – it looks to develop and implement well-informed sustainable development policies maximising the shared benefits and minimising the trade-offs between economic growth, environmental management and social and cultural aspirations. For these reasons issues of sustainability are at the very core of the MAF's mandate and future direction.

6.3 The Ministry of Economic Development (MED)

The MED has the overarching goal of promoting economic development. However, it deals with policy in a wide range of areas such as energy, telecommunications, industry, regional development, tourism, international trade and the regulatory environment.

The government's goal is a dynamic and internationally competitive economy that increases the prosperity of all New Zealanders. To support that goal, the MED works to ensure that the business environment promotes productivity growth.

The MED undertakes a diverse range of activities to pursue this outcome. It prioritises its efforts by focusing expertise and resources on activities likely to impact most positively on the business environment and sustainable growth. Five strategic priorities have been developed to achieve this goal:

- **Leadership:** Leading a whole-of-government approach to economic development.
- **International linkages:** Improving the international linkages that allow firms to benefit from trade, knowledge transfer and investment.
- **Innovation:** Fostering entrepreneurship and innovation in New Zealand firms.
- **Regulatory environment:** Strengthening the growth focus in the regulatory environment for business.
- **Infrastructure:** Improving the quality and reliability of key infrastructure services.

6.4 Statistics New Zealand

Statistics New Zealand is New Zealand's national statistical office. It administers the Statistics Act 1975 and is the country's major source of official statistics. Its chief executive has the title of Government Statistician. Prior to December 1994, Statistics New Zealand was known as the Department of Statistics.

The Statistics Act 1975 sets out the Government Statistician's role in, and responsibilities for, all official statistics whether produced by Statistics New Zealand or by other government departments.

To meet its responsibilities under the Statistics Act 1975, Statistics New Zealand's main roles are to:

- provide leadership for New Zealand's official statistics
- be the key contributor to the collection, analysis and dissemination of official statistics relating to New Zealand's economy, environment and society
- build and maintain trust in official statistics
- ensure that official statistics are of high integrity and quality and are equally available to all.

The functions of Statistics New Zealand arise from the provisions of the Statistics Act 1975 and can be summarised as:

- to collect, compile, analyse, abstract, and publish with or without comment, statistics on New Zealand economic, financial, production, environmental, and social matters, making or constructing such estimates, forecasts, projections, and statistical models as the Government Statistician may consider necessary
- to advise the Minister of Statistics on statistical policy matters and to keep the Minister informed of the nature, scope, purpose, and usefulness of existing or proposed statistical projects of all government departments
- to define, lay down, and promote standard concepts, procedures, definitions, and classifications for use in official statistics, and to advise other government departments on the suitability of statistical projects initiated or carried on by them
- to examine proposals (other than those covered by ministerial waiver) by government departments to commence or commission any new statistical survey or to make a substantial alteration to an existing survey, then, in consultation with the department concerned, to prepare a submission to the Minister of Statistics seeking approval for the new or revised survey to be undertaken
- to review from time to time the collection, compilation, analysis, abstraction and publication of official statistics prepared by the department and other government departments

- to convene a meeting of users of statistics at least once every five years in order to review user needs
- to carry out investigations and provide certificates as may be required by any other Act
- to maintain general liaison with international organisations such as the various United Nations agencies on statistical matters and to provide, where appropriate, technical advice and assistance and statistical training facilities to developing nations, particularly in the Pacific area.

6.5 Other supporting legislation – Statistics Act 1975

Three key provisions of the Statistics Act 1975 relevant to the inventory's data are:

- official statistics shall be collected to provide information required by the Executive Government of New Zealand, government departments, local authorities, and businesses for the purpose of making policy decisions and to facilitate the appreciation of economic social, demographic, and other matters of interest to the said government, government departments, local authorities, businesses and to the general public (Section 3(1))
- Minister of Statistics to approve all statistical surveys undertaken by government departments (Section 6(1))
- Census of Population and Dwellings to be taken in 1976 and in every fifth year thereafter (Section 23(1)).

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