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Report of the individual review of the annual submission of New Zealand submitted in 2011*

* In the symbol for this document, 2011 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2011 annual submission of New Zealand, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 29 August to 3 September 2011 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Paul Duffy (Ireland) and Mr. Dario Gomez (Argentina); energy – Ms. Ana Carolina Avzaradel (Brazil) and Ms. Songli Zhu (China); industrial processes – Ms. Elsa Hatanaka (Japan) and Ms. Deborah Schaefer Ottinger (United States of America); agriculture – Mr. Daniel Bretscher (Switzerland) and Mr. Kohei Sakai (Japan); land use, land-use change and forestry (LULUCF) – Mr. Atsushi Sato (Japan) and Harry Vreuls (Netherlands); and waste – Mr. Keith Brown (United Kingdom of Great Britain and Northern Ireland) and Mr. Sabin Guendehou (Benin). Mr. Duffy and Mr. Gomez were the lead reviewers. The review was coordinated by Mr. Tomoyuki Aizawa (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), a draft version of this report was communicated to the Government of New Zealand, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Emission profiles and trends

3. In 2009, the main greenhouse gas (GHG) in New Zealand was carbon dioxide (CO_2), accounting for 47.4 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (37.0 per cent) and nitrous oxide (N_2O) (14.2 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.3 per cent of the overall GHG emissions in the country. The agriculture sector accounted for 46.5 per cent of total GHG emissions, followed by the energy sector (44.4 per cent), the industrial processes sector (6.2 per cent), the waste sector (2.9 per cent) and the solvent and other product use sector (0.04 per cent). Total GHG emissions amounted to 70,563.80 Gg CO_2 eq and increased by 19.4 per cent between the base year[2] and 2009.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, by gas, of the Kyoto Protocol, base year to 2009[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A sources		CO_2	25 000.18	25 000.18	27 260.00	31 125.16	35 805.83	34 999.52	35 686.30	33 444.62	33.8
		CH_4	25 303.50	25 303.50	25 834.05	27 307.43	27 553.06	26 790.71	26 005.25	26 136.19	3.3
		N_2O	8 163.35	8 163.35	8 964.93	9 671.66	10 874.53	10 423.15	10 295.23	10 037.87	23.0
		HFCs	0.00	0.00	122.35	260.51	737.00	934.62	804.64	879.23	NA
		PFCs	629.87	629.87	131.16	58.06	59.57	41.47	38.84	46.14	–92.7
		SF_6	15.20	15.20	17.88	10.59	19.50	15.07	14.89	19.75	29.9
KP-LULUCF	Article 3.3[b]	CO_2							–17 099.50	–17 270.01	
		CH_4							0.03	0.07	
		N_2O							0.00	0.00	
	Article 3.4[c]	CO_2	NA						NA	NA	NA
		CH_4	NA						NA	NA	NA
		N_2O	NA						NA	NA	NA

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation the base year and the inventory years of the commitment period must be reported.

Table 2
Greenhouse gas emissions by sector and activity, base year to 2009[a]

			Gg CO_2 eq								*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A		Energy	23 359.17	23 359.17	25 372.53	29 391.04	33 522.46	32 566.51	33 607.27	31 361.41	34.3
		Industrial processes	3 382.59	3 382.59	3 283.17	3 513.47	4 310.39	4 653.31	4 284.65	4 345.55	28.5
		Solvent and other product use	41.54	41.54	44.95	47.12	44.33	43.40	31.00	27.90	–32.8
		Agriculture	30 277.53	30 277.53	31 593.82	33 386.47	35 032.33	33 857.37	32 866.88	32 810.52	8.4
		Waste	2 051.28	2 051.28	2 035.89	2 095.32	2 139.98	2 083.96	2 055.36	2 018.43	–1.6
		LULUCF	NA	–23 451.07	–21 967.34	–26 714.87	–25 542.76	–21 460.00	–29 360.14	–26 682.75	NA
		Total (with LULUCF)	**NA**	**35 661.04**	**40 363.02**	**41 718.55**	**49 506.73**	**51 744.55**	**43 485.02**	**43 881.06**	**NA**
		Total (without LULUCF)	**59 112.11**	**59 112.11**	**62 330.37**	**68 433.42**	**75 049.49**	**73 204.55**	**72 845.16**	**70 563.80**	**19.4**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation & reforestation							–17 531.10	–17 624.29	
		Deforestation							432.43	355.87	
		Total (3.3)							**–17 098.67**	**–17 268.42**	
	Article 3.4[d]	Forest management							NA	NA	
		Cropland management	NA						NA	NA	NA
		Grazing land management	NA						NA	NA	NA
		Revegetation	NA						NA	NA	NA
		Total (3.4)	**NA**						NA	NA	NA

Abbreviations: LULUCF = land use, land-use change and forestry, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] Emissions/removals reported under sector 7 "other" are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation the base year and the inventory years of the commitment period must be reported.

5. Table 3 provides information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

Table 3
Information to be included in the compilation and accounting database in t CO_2 eq

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	278 608 260			278 608 260	
Annex A emissions for current inventory year					
CO_2	33 444 623			33 444 623	
CH_4	26 136 188			26 136 188	
N_2O	10 037 872			10 037 872	
HFCs	879 232			879 232	
PFCs	46 140			46 140	
SF_6	19 750			19 750	
Total Annex A sources	**70 563 804**			**70 563 804**	
Activities under Article 3, paragraph 3, for current inventory year					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–17 701 263			–17 701 263	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	76 970			76 970	
3.3 Deforestation for current year of commitment period as reported	355 874			355 874	
Activities under Article 3, paragraph 4, for current inventory year[d]					
3.4 Forest management for current year of commitment period					
3.4 Cropland management for current year of commitment period					
3.4 Cropland management for base year					
3.4 Grazing land management for current year of commitment period					
3.4 Grazing land management for base year					
3.4 Revegetation for current year of commitment period					
3.4 Revegetation in base year					

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2011 annual inventory submission was submitted on 15 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1990–2009 and a national inventory report (NIR). New Zealand also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraph 3, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were also submitted on 15 April 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

7. In addition, the expert review team (ERT) used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

8. During the review, New Zealand provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

9. The inventory covers all source and sink categories for the period 1990–2009 and is complete in terms of years and geographical coverage.

10. Under Article 3, paragraph 3, of the Kyoto Protocol, New Zealand reports for the first time CO_2 emissions from organic soils associated with reforestation and deforestation separately from CO_2 emissions from mineral soils. The ERT commends New Zealand for this improvement. In addition, CH_4 and N_2O emissions from biomass burning due to wildfires on reforested and deforested land and controlled burning on deforested land were not estimated. The ERT reiterates the recommendation from the previous review report that New Zealand provide estimates of these emissions in its next annual submission (see para. 109 below).

2. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Overview

11. The ERT concluded that the national system continued to perform its required functions. New Zealand provides information on changes to its national system in its NIR and these changes are discussed further in chapter II.G.3 of this report.

[3] The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), 6(c) and 6(k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

12. New Zealand reported that it has updated and elaborated the manual for the inventory compiler to include additional detail on the inventory preparation process. This manual was provided to the ERT during the week of the review. New Zealand also stated in its NIR that two government officials have passed their examinations for expert review under the Convention for the LULUCF sector. Four other officials passed their mandatory examinations for expert review under the Kyoto Protocol. The ERT commends New Zealand for these improvements in its national system, particularly the support for the review process.

Inventory planning

13. The NIR described the institutional arrangements for the preparation of the inventory. The Ministry for the Environment has overall responsibility for the national inventory. Other agencies and organizations are also involved in the preparation of the inventory. The Ministry of Economic Development collects and compiles data on all emissions for the energy sector and CO_2 emissions for the industrial processes sector. The Ministry of Agriculture and Forestry compiles data on emissions from the agriculture sector and provides data from the *National Exotic Forest Description* to estimate afforestation and reforestation during 2008 and 2009 where information was not available through the Ministry for the Environment's Land Use and Carbon Analysis System (LUCAS). New Zealand Statistics provides information on population and agriculture census data as well as data on lime application.

Inventory preparation

Key categories

14. New Zealand has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2011 submission. The key category analysis performed by the Party and that performed by the secretariat[4] produced similar results. New Zealand has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

15. In its submission, New Zealand has provided a more detailed breakdown in its key category analysis for two of the largest key categories, energy industries and transport, as well as additional detail under enteric fermentation with dairy cattle and sheep livestock now listed separately. The ERT commends New Zealand for its efforts in improving its key category analysis and encourages the Party to implement a tier 2 key category analysis for its next annual submission.

16. New Zealand has identified the following two key categories for activities under Article 3, paragraph 3, of the Kyoto Protocol: afforestation and reforestation CO_2 and deforestation CO_2.

[4] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

Uncertainties

17. New Zealand has reported a tier 1 uncertainty analysis 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" (hereinafter referred to as the UNFCCC reporting guidelines) and the IPCC good practice guidance. The uncertainty in total emissions in 2009 is ±11.8 per cent and ±10.2 per cent including emissions and removals from the LULUCF sector. The uncertainty in the trend of total emissions is ±2.8 per cent and ±4.5 per cent including emissions and removals from the LULUCF sector. The Party also reported an uncertainty analysis of the emissions and removals from afforestation, reforestation and deforestation.

18. Following a recommendation from the previous review report, New Zealand has reported that improvements to the uncertainty analysis were made for the energy, industrial processes and waste sectors in its 2011 submission. The uncertainties in the energy sector were updated based on the most recent New Zealand specific analysis. The ERT commends New Zealand for its efforts in improving its uncertainty analysis.

Recalculations and time-series consistency

19. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that the recalculations reported by New Zealand of the time series 1990–2008 have been undertaken to take into account changes made in nearly all sectors: energy, industrial processes, agriculture, LULUCF and waste. The major changes and the magnitude of the impact excluding LULUCF are a decrease in estimated total GHG emissions in the base year (3.4 per cent) and a decrease in 2008 (3.0 per cent). The rationale for these recalculations is well documented in chapter 10 in the NIR and in CRF table 8(b).

20. The greatest influence for recalculations on total emissions were the improvements made in the agriculture sector. In its latest submission, New Zealand revised its emission factor (EF) for nitrogen (N) excreted from cattle, sheep and deer into separate fractions for urine and dung and this is well documented in chapter 6 of the NIR. Recalculations in the agriculture sector amounted to a decrease in emissions of 1,587.88 Gg CO_2 eq in 1990 (5.0 per cent) and a decrease in emissions of 1,959.41 Gg CO_2 eq in 2008 (5.6 per cent). Substantial recalculations also took place in the energy sector, resulting in an increase in emissions of 161.77 Gg CO_2 eq in 1990 (0.7 per cent) and a decrease in emissions in 2008 of 410.51 Gg CO_2 eq (1.2 per cent). These recalculations were mainly due to a new Annual Liquid Fuel Survey (ALFS) and reallocating some emissions from cogeneration plants from manufacturing industries and construction to public electricity and heat. The ERT commends New Zealand for improving inventory estimates and transparently documenting the rationale for the recalculations in its NIR.

Verification and quality assurance/quality control approaches

21. New Zealand provided information on quality assurance/quality control (QA/QC) procedures in section 1.6 in the NIR. Tier 1 QC checks and tier 2 QC checks, for some sectors, are carried out by the lead agency responsible for compiling the emission estimates. Tier 1 checks are based on the procedures in the IPCC good practice guidance. The national inventory compiler within the Ministry of the Environment is provided with XML files for all sectors that have passed all tier 1 checks.

22. All sectors' contributions to the NIR, the CRF tables and tier 1 QC checks are signed off by the relevant ministry before the end of January every year. New Zealand also provided in its annual submission additional information in Microsoft Excel worksheets for overall QA review and QC checks for the agriculture sector. The ERT commends New Zealand for providing this information and encourages the Party to continue this process

and to elaborate it for other sectors, with the information either included in future submissions or made available online.

23. New Zealand carries out sector-specific verification of its inventory, in particular for the energy, agriculture and LULUCF sectors. The Party is considering further verification of emission estimates with data obtained from the New Zealand emissions trading scheme (NZ ETS) as the scheme is implemented over the coming years. All sectors will have mandatory reporting by 1 January 2015. The ERT encourages New Zealand to begin verification for other sectors as the data become available through the NZ ETS.

Transparency

24. The ERT finds the NIR to be generally transparent and to provide much of the information needed to assess the inventory. The ERT also finds that New Zealand can further improve the methodological description and documentation in its NIR, in particular, relating to categories with confidential information. In this regard, the ERT considers that the transparency of the inventory could be further enhanced in the industrial processes sector (see paras. 51, 52 and 55 below). The ERT also recommends that the Party improve the transparency of the descriptions of several methodologies in the following sectors: energy (see paras. 34, 35, 36, 37, 40 and 42 below), industrial processes (see paras. 59 and 60 below), agriculture (see para. 68 below), LULUCF (see para. 87 below) and waste (see para. 97 below).

25. The ERT notes that New Zealand has improved its use of notation keys in its 2011 submission as recommended in the previous review report. The ERT commends the Party for its efforts in this regard.

Inventory management

26. The Ministry for the Environment is the entity responsible for compiling New Zealand's national inventory. The inventory agency does not centrally archive all information used in the national inventory submission. The Ministry of Economic Development is responsible for compiling the emission estimates in the energy and industrial processes sectors and any confidential information or data sets are archived within the ministry. In response to a question raised during the review, the inventory agency informed the ERT that the Ministry for the Environment archives a list of the confidential information that is used in the national inventory by the Ministry of Economic Development, and provided this list to the ERT. The ERT encourages New Zealand to continue to maintain a list of confidential information stored by other ministries and agencies.

3. Follow-up to previous reviews

27. New Zealand has implemented a number of improvements in its 2011 inventory, including:

(a) The allocation of fuel consumption split between civil aviation and international bunkers (aviation) (see para. 37 below);

(b) The correction of use of notation keys (see para. 41 below);

(c) The reporting of CO_2 and CH_4 emissions from natural gas at industrial plants and power stations, and natural gas in residential and commercial (see para. 45 below);

(d) The inclusion of the information on the annual sales of new refrigerants (see para. 59 below);

(e) The inclusion of potatoes as one of the crops to estimate N_2O emissions from crop residues returned to soils (see para. 73 below);

(f) The reporting of emissions from organic soils and the inclusion of new mapping of deforestation, incorporating emissions from the decay of historical harvesting residues (see para. 79 below);

(g) The application of site-specific information on CH_4 recovery in landfill sites (see para. 98 below);

(h) The use of new activity data (AD) on untreated wastewater treatment sludge disposed of in landfills (see para. 97 below);

(i) The reporting of CO_2 emissions from organic soils associated with reforestation and deforestation separately from CO_2 emissions from mineral soils (see para. 109 below).

4. Areas for further improvement

Identified by the Party

28. New Zealand in its NIR identifies several areas for improvement:

(a) To continue to examine the use of more country-specific solid fuel CO_2 EFs;

(b) The introduction of the NZ ETS for verification in future annual submissions;

(c) The development of a tier 2 methodology for non-CO_2 emissions from road transportation;

(d) The improvement of transparency in the calculation of equipment retirement emissions and investigation of non-electrical uses of SF_6;

(e) The investigation of improvements to the models of livestock population and live animal weights used in the tier 2 method;

(f) The improvement of knowledge on the distribution of the poultry and pork industries manure into each of the animal manure management systems (AWMS);

(g) The development of a country-specific EF for N_2O emissions from agricultural soils which includes an EF for sheep and cattle during hill country pastures;

(h) Several improvements are planned for the Soil Carbon Monitoring System (Soil CMS), including improved representations of land-use and soil-climate areas, additional data sets and better representation of the impacts of the changes in landscapes when land uses change;

(i) The method of estimating the carbon stock in pre-1990 planted forest under forest land will come into line with the post-1989 forest. The comparison of additional mapping of forest areas with other spatial forest data sets will continue to improve the quality of the forest areas;

(j) The continuation of data collection programmes, such as ground and aerial-based forest stock inventories;

(k) The improvement to the carbon assessment of planted forests and associated emissions relating to forest management practices; land-use mapping; and soil carbon assessment;

(l) The use of annual waste placement data in landfills for estimation of CH_4 emissions from solid waste disposal on land;

(m) The utilizing of rainfall and leachate management data to reduce the inconsistency in estimates of emissions from landfills through inconsistencies in the decay rate constants used for different types of site.

Identified by the expert review team

29. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 138 below.

30. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

B. Energy

1. Sector overview

31. The energy sector is the second largest sector in the GHG inventory of New Zealand. In 2009, emissions from the energy sector amounted to 31,361.4 CO_2 eq, or 44.4 per cent of total GHG emissions. Since 1990, emissions have increased by 34.3 per cent. The key drivers for the rise in emissions are road transportation and public electricity and heat production. Within the sector, 39.5 per cent of the emissions were from road transportation, followed by 19.0 per cent from public electricity and heat production, 5.3 per cent from food processing, beverages and tobacco and 3.2 per cent from other (manufacturing industries and construction). Civil aviation accounted for 3.0 per cent and petroleum refining accounted for 2.9 per cent. The remaining 9.9 per cent were from manufacture of solid fuels and other energy industries; iron and steel; non-ferrous metals; chemicals; pulp, paper and print; mechanical/electrical equipment; mining and construction; non-metallic minerals; textiles; railways; and navigation. The proportion of emissions from the energy sector in total emissions increased from 1990 to 2009. Energy was the largest contributing sector to total emissions in 2008 for the first time. The energy sector has experienced the greatest increase over the period 1990–2009 and has had the most influence on the trend in total emissions in that period.

32. QC procedures, including transcription checks, are carried out for all key categories. The latest external peer review of the energy sector was conducted in late 2006 to ensure that assumptions, methods and resulting estimates were reasonable. The Party has informed the ERT that data on all solid, gas and liquid fuel used within the sector are collected by the Ministry of Economic Development on a monthly basis through researches and compared with apparent consumption data before being used to construct the energy balance tables for the country. Significant statistical differences or changes in demand are investigated. New Zealand acknowledged the intention to build more checks into the QA/QC system through checking emissions intensity across the time series and international comparison. The ERT welcomes New Zealand's efforts to improve QA/QC procedures and encourages the Party to include in the NIR the specific information on QA/QC provided to the ERT and available on the Ministry of Environment's website. The ERT also encourages more frequent external peer reviews of the energy sector estimates.

33. According to the NIR, on 1 July 2010, the stationary combustion and industrial processes sector came into the NZ ETS. In March 2011, the NZ ETS companies were to fill in their returns stating the emissions they emitted from 1 July to 31 December 2010. The Party informed the previous ERT that more plant-specific data would become available along with the implementation of the NZ ETS. The ERT encourages New Zealand to implement the planned improvements and strengthen QA/QC procedures for data obtained through NZ ETS in order to ensure that these data are in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and relevant IPCC good practice guidance.

34. The ERT noted improvements in methodologies, such as disaggregating emissions between international bunker aviation and domestic civil aviation and also in terms of disaggregation of activity data (AD) and emission estimates such as solid and liquid fuels in manufacturing industries and construction with respect to non-ferrous metals, chemicals

and pulp, paper and print, which were reported aggregately under the subcategory other (manufacturing industries and construction) in the previous submission. However, the ERT notes that there is still room for improvement in methodology in several areas of the inventory, such as disaggregating emissions from flaring and venting, which are reported together in CRF table 1.B.2 under flaring (combined). Biomass fuels in manufacturing industries and construction for all subcategories are still reported aggregately under the subcategory other (manufacturing industries and construction) and solid and liquid fuels from sub-category iron and steel. The ERT recommends that the Party continue its efforts in order to make the inventory more accurate in terms of data disaggregation.

35. Category-specific recalculations were performed for AD for residential use of biomass following a revision by Statistics New Zealand of household numbers, which, according to the NIR, feed into the calculation of the AD for residential use of biomass. Since the previous submission, residential biomass data have been gathered from the results of the New Zealand census, to which some errata have been issued. One of the errata published stated that an error had been found regarding the number of usual residents in households for 1996. During the review, the Party informed the ERT that the years 1996 and 2008 were affected by the revision. The magnitude of the effect of the recalculation was an increase of 16.07 Gg CO_2 eq (1.8 per cent) in emissions from residential combustion of biomass in 1996, falling to a decrease of 96.02 Gg CO_2 eq (12.5 per cent) in 2008. The ERT recommends that the Party continue to include this information in the NIR and also in CRF table 8(b) in order to improve transparency.

2. Reference and sectoral approaches

Comparison of the reference approach with the sectoral approach and international statistics

36. The difference between the reference approach and the sectoral approach was 3.5 per cent for 2009. Fluctuations of the difference between the two approaches are considerable over the years and, according to the NIR, this is owing to differences between observed and calculated energy AD and also because of the difference between the two approaches in the allocation of refinery gas. The greatest differences and fluctuations between observed AD and calculated AD are from solid fuels in the 1990s. In recent years, liquid fuels have shown the greatest difference, owing to the difference between the EF for crude oil used in the reference approach and the lower EFs used for derivative liquid fuels in the sectoral approach, with the reference approach being 8.3 per cent higher than the sectoral approach in 2009. New Zealand has provided the ERT with detailed information for AD and emissions for solid, liquid and gaseous fuels. The table in the Excel file provided by the Party shows a difference in AD between the reference and the sectoral approaches of 8.3 per cent for liquid fuels and 0.6 per cent for gaseous fuels. The ERT recommends that the Party include in the NIR of its next annual submission a table containing the information provided to the ERT during the review week regarding the differences between the reference and the sectoral approaches in AD and emissions. The ERT also recommends that New Zealand include this information in the documentation box of CRF table 1.A(c) in order to improve transparency of the information presented in the CRF tables.

International bunker fuels

37. The allocation of fuel consumption between the domestic and international components of fuels used for international flights was not provided by the Party in previous submissions. The NIR submitted in 2011 states that data on fuel consumption of international transportation derive from the New Zealand Energy Data File, which compiles information provided by oil companies through a monthly survey conducted by the Ministry of Economic Development. Data of fuel consumption of domestic transport are supplied by the quarterly Delivery of Petroleum Fuels by Industry survey conducted by the

Ministry of Economic Development. The ERT commends New Zealand for the improvements made in the methodology used to split fuel consumption between civil aviation and international bunkers (aviation). Information on fuel allocation between civil aviation and international bunkers (aviation) is provided in section 3.3.3 of the NIR, Fuel combustion: transport, but not in section 3.2.2, International bunker fuels. The ERT considered that information in these two sections should be cross-referenced to ensure transparency. The ERT recommends that New Zealand improve the description provided in section 3.2.2 of the NIR, in view of the information provided in section 3.3.3.

Feedstocks and non-energy use of fuels

38. Following the recommendations in the previous review report, New Zealand continued to include energy flow diagrams for coal, oil and natural gas fuels to avoid a potential double counting or omission of emissions from fuel combustion. The ERT commends the Party for having provided this information in a transparent manner.

Country-specific issues

39. Following recommendations in the previous review report, in its NIR New Zealand has presented the methodology used for CO_2 and CH_4 geothermal emission estimates in greater detail, including a schematic diagram of the use of geothermal fluid for electricity generation. Fugitive geothermal emission estimates are directly provided by the 12 geothermal power companies of New Zealand and the methodology used is described in the NIR. The ERT commends the Party for having included more information regarding the methodology to estimate emissions from geothermal power, which was identified as a key category in the 2009 trend assessment.

3. Key categories

Stationary combustion: gaseous fuels – CO_2

40. The CO_2 implied emission factors (IEFs) for natural gas under public electricity and heat production (56.2–58.9 t/TJ) were higher than the IPCC default (56.1 t/TJ) in the previous annual submission. Additional information was provided to the previous ERT, indicating how the natural gas mix changed over time. The previous ERT agreed with this explanation and recommended including it in the NIR. The current ERT noted that the explanation of the fluctuations of natural gas EFs was included in the NIR. It is also stated in the NIR that the carbon content in the gas produced in New Zealand's fields is higher than the carbon content in that produced in most international gas fields. During the review week, the Party provided the ERT with detailed information on EFs and carbon content per gas field. The ERT noted that the explanation provided by New Zealand increases the transparency of reporting; it encourages the Party to include this information in the next NIR.

Stationary combustion: solid fuels – CO_2, CH_4 and N_2O

41. The previous ERT noted the incorrect use of notation keys in the reporting of AD and emissions from fuel combustion of manufacturing industries and construction. In particular, notation key "NO" (not occurring) has been used by mistake for some manufacturing industries, which conflicted with the information contained in the energy balance table provided by New Zealand. In the 2011 submission, the notation key "NO" was no longer used for solid fuel combustion in the following subcategories: non-ferrous metals, food processing, beverages and tobacco and biomass use for pulp, paper and print. AD were provided for these specific subcategories and emissions were estimated and reported in CRF table 1.A(a). The ERT commends the Party for the improvements made in AD and emission estimates reporting and the correct use of notation keys.

Transport: liquid fuels – CO_2

42. The ERT notes that in previous inventory submissions New Zealand overstated emissions from transport due to the inclusion of liquid fuels sold by resellers, which included fuel sold on to other businesses, farms and used by off-road machinery. The new ALFS provided data from 19 independent fuel distribution companies. Based on this new information, some liquid fuel demand that was previously allocated to domestic transport has now been allocated to other categories, resulting in a decrease of approximately 20 per cent in emissions attributed to transport. The resulting increase in emissions in categories such as agriculture, forestry and fisheries is mentioned in the NIR. However, it is not clear which other categories and subcategories have AD that have been affected by this recalculation. During the review, New Zealand provided the ERT with information regarding the impact on emissions from the residential, commercial and manufacturing industries and construction categories. The ERT recommends that the Party include this information in the NIR in order to improve transparency of the impacts of the recalculation.

Oil and natural gas – CO_2 and CH_4

43. Fugitive emissions from oil and gas flaring and venting have been reported together under flaring (combined). According to the NIR, individual gas field operators provide information on the amount of gas extracted, vented, flared and own use at each gas field. The ERT requested the Party during the review to explain the reason for not using this information to disaggregate emissions between flaring and venting. New Zealand has informed the ERT that only partial data on emissions from venting are currently reported and that this will become more complete with the implementation of a database for national energy statistics by the end of 2011. Currently, the New Zealand Energy Data File does not consider venting separately because the volume of gas is considered to be small. The new reporting system will enable separation between venting and flaring from 2012 onwards, according to information provided during the review. The ERT recommends that the Party investigate and guarantee that venting emissions are reported and accounted for in the next annual submission. The ERT also recommends that the Party implement the disaggregation between venting and flaring and report them separately in the next annual submission in order to improve accuracy.

44. The previous review identified the incorrect use of notation key "NE" (not estimated) for the CO_2 and CH_4 emission estimates of several subcategories of oil and natural gas. New Zealand had then acknowledged that some emissions reported as "NE" were in fact "NO" or "IE" (included elsewhere). The ERT noted that in the present submission notation key "NE" was no longer reported for CO_2 and CH_4 emissions from oil and natural gas. Notation key "NE" is reported only for indirect GHGs under natural gas fugitive emissions, venting and flaring. New Zealand has informed the ERT that the possibility of providing estimates for indirect GHGs under these subcategories will be considered for future submissions. The ERT commends the Party for the improvement made in the correct use of notation keys and encourages the Party to implement the improvements.

45. During the previous review, New Zealand clarified that CO_2 emissions from oil transport and CH_4 emissions from natural gas at industrial plants and power stations as well as natural gas in residential and commercial subcategories could be estimated and reported. Estimates were provided during the review for the entire time series. The ERT noted that in the present submission, CO_2 and CH_4 fugitive emissions under these specific subcategories were estimated and reported correctly. The ERT commends the Party for the improvements in terms of completeness of the inventory.

4. Non-key categories

Civil aviation: liquid fuels – CH_4 and N_2O

46. New Zealand has estimated emissions of N_2O from civil aviation using an EF of 1.90 kg N_2O/TJ for jet kerosene and aviation gasoline as presented in table A.2.3 in annex 2 to the NIR. According to table A.2.3 of the NIR, the reference for this EF is table 1-8 (IPCC tier 1) of the Revised 1996 IPCC Guidelines (Volume 3). The ERT, however, noted that table 1-8 presents an EF of 2 kg/TJ for N_2O. The ERT considered that New Zealand had underestimated emissions of N_2O in civil aviation for all years from 1990 to 2009 and raised this issue as a potential problem during the review week. In the response, New Zealand informed the ERT that it uses AD based on gross calorific values, and the IPCC default is converted from a net calorific value basis to a gross calorific value basis (2.0 kg N_2O/TJ x 0.95 = 1.90 kg N_2O/TJ). The ERT agreed with this explanation.

47. New Zealand has estimated emissions of CH_4 from civil aviation using the EF provided in annex 2 to the NIR (table A.2.2) of 1.90 kg CH_4/TJ for both jet kerosene and aviation gasoline. According to table A.2.2, table 1-48 of the Revised 1996 IPCC Guidelines has been used as a reference for this CH_4 EF (0.007 g CH_4/MJ). The ERT notes that table 1-48 of the Revised 1996 IPCC Guidelines presents default EFs which are not applicable to estimating emissions from civil aviation. The use of the incorrect CH_4 EF resulted in an overestimation of emissions for civil aviation. During the review, New Zealand provided recalculations for the entire inventory period and stated that recalculated figures would be included in the next annual submission. The ERT recommends that New Zealand adopt an appropriate CH_4 EF for civil aviation and recalculate CH_4 emissions from civil aviation in the next annual submission.

Road transportation: liquid fuels – CH_4, and N_2O

48. As indicated in previous review reports, New Zealand has used a tier 1 approach and the IPCC default EFs for non-CO_2 emissions from road transportation. The previous ERT noted that the tier 1 approach does not accurately represent the characteristics of New Zealand's road transportation fleet. During the review, New Zealand informed the ERT that the Ministry of Transport has developed a new tier 2 methodology for non-CO_2 emissions from road transportation for which there are sufficient data from 2000 to 2010. Fleet data are collected by the Ministry of Transport annually. According to the Party, the high proportion of used Japanese imports in the New Zealand fleet, the removal of catalytic converters by some users and the lack of data before 2000 can compromise time-series consistency. New Zealand has stated that this new methodology will be implemented in the next annual submission. The ERT welcomes New Zealand's efforts and reiterates the recommendation by the previous ERT for the Party to adopt the tier 2 approach for non-CO_2 emissions from road transportation in the next annual submission.

C. Industrial processes and solvent and other product use

1. Sector overview

49. In 2009, emissions from the industrial processes sector amounted to 4,345.55 Gg CO_2 eq, or 6.2 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 27.90 Gg CO_2 eq, or 0.04 per cent of total GHG emissions. Since the base year, emissions have increased by 28.5 per cent in the industrial processes sector and decreased by 32.8 per cent in the solvent and other product use sector. The key driver for the rise in emissions in the industrial processes sector is an increase in the emissions of HFCs from refrigeration and air-conditioning equipment since the mid-1990s when chlorofluorocarbons and hydrochlorofluorocarbons began to be phased out under the Montreal Protocol on Substances that Deplete the Ozone Layer. Within the industrial

processes sector, 47.4 per cent of the emissions were from metal production, followed by 20.7 per cent from consumption of halocarbons and SF_6, 17.5 per cent from mineral products and 14.4 per cent from chemical industry.

50. It was noted that 0 per cent uncertainties were reported for the AD of six subcategories (cement production, glass production, ammonia production, methanol production, iron and steel production and aluminium production) in the previous review report. The previous ERT reiterated the recommendation in the previous review report that New Zealand should: reassess the uncertainty estimates for AD; report uncertainty estimates for each EF; and provide a more detailed description of the uncertainty estimates at least for every key category. The ERT commends New Zealand for addressing these issues, mainly through the application of IPCC default uncertainty values for AD and recommends that New Zealand reassess the uncertainty estimates in response to any future additions to key categories.

51. The ERT noted that the explanation of emission estimate methodologies provided in the NIR is not sufficiently transparent for some subcategories in the industrial processes sector. This is partly owing to confidential information since New Zealand has a limited number of plants for each industry, but partly because the explanation provided is insufficient. The ERT encourages New Zealand to continue increasing transparency for all categories by adding information on the methodology, data sources and EFs used, and recommends that the Party enhance transparency on some issues as described below under each subcategory, to the extent possible while maintaining confidentiality.

2. Key categories

Iron and steel production – CO_2

52. CO_2 emissions from iron and steel production amounted to 1,563.07 Gg in 2009, accounting for 75.9 per cent of emissions from metal production, and 36.0 per cent of total emissions from the industrial processes sector. New Zealand explained in its NIR that of the two steel producers in operation, one company's emissions were estimated by using the IPCC tier 2 method for the entire time series 1990–2009, and for the other the IPCC tier 2 method was applied only for 2000–2009, with the time series 1990–1999 being estimated by using the average of IEFs for 2000–2008. The previous ERT strongly recommended that New Zealand include in the NIR information on the method and data, such as plant-specific EFs for reducing agents, carbon content of raw materials and steel products, and carbon content of additives, necessary to apply the IPCC tier 2 method. In addition to the new information provided in the 2011 NIR, information on carbon content of steel produced and additives used in the steel-making process was provided by New Zealand during the review. The ERT reiterates the recommendation in the previous review report that New Zealand explain more transparently in its next annual submission the method and data used by companies, and recommends that New Zealand include the above-mentioned information provided during the review, to the extent possible and while maintaining confidentiality if needed.

53. The ERT welcomed the recalculations implemented in accordance with the recommendations in the previous review report with regard to one company's EF for 1990–1999 that needed to be updated to equal the average of IEFs for 2000–2008. It noted that the time-series consistency in emission estimates is better ensured by the use of the updated average of IEFs for 2000–2008, in line with the improvement made in the accuracy of the emission estimates for 2000–2008 in the 2010 submission.

Aluminium production – CO_2 and PFCs

54. CO_2 emissions from aluminium production amounted to 451.51 Gg in 2009, accounting for 91.0 per cent of emissions from aluminium production, and 21.9 per cent of

metal production emissions. These process CO_2 emission estimates were made by using the tier 3 method set out in the Aluminium Sector Greenhouse Gas Protocol of the International Aluminium Institute,[5] which is equivalent to the tier 3 method in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). The ERT notes that the explanation of equivalence to the IPCC methodology is incorrectly described in the NIR, and recommends that New Zealand correct this in its next annual submission.

55. The previous ERT noted that CO_2 emissions from soda ash use in aluminium production are included under this subcategory, and recommended that in the next annual submission, New Zealand report these CO_2 emissions under soda ash production and use, in accordance with the Revised 1996 IPCC Guidelines. New Zealand explained in the 2011 NIR that the issue of confidentiality for glass production emissions does not allow for CO_2 emissions from soda ash use to be reported under soda ash production. However, during the review week, the Party acknowledged that it could improve the transparency of these data in its next annual submission, while maintaining confidentiality. The ERT reiterates the recommendation of the previous ERT to separate the reporting for these emissions.

56. PFC emissions from aluminium production amounted to 44.82 Gg CO_2 eq in 2009, accounting for 97.1 per cent of the PFC emissions in New Zealand. PFC emissions have decreased by 92.9 per cent since the base year (629.87 Gg CO_2 eq), mainly due to improvements made in the aluminium smelting process.

57. New Zealand estimated PFC emissions from aluminium production by using the International Aluminium Institute tier 2 method, which is equivalent to the tier 2 method in the IPCC good practice guidance. The ERT noted that the IEF for carbon tetrafluoride (CF_4) emissions in 2009 (0.0218 kg/t aluminium produced) is low when compared with that of other Parties that reported these emissions, and this is also the case for the IEF for hexafluoroethane (C_2F_6) emissions in 2009 (0.00262 kg/t aluminium produced). The range of IEFs for other Parties is 0.0160–1.00 kg/t aluminium produced for CF_4 and 0.0016–0.100 kg/t aluminium produced for C_2F_6. New Zealand's IEFs are lower than the IPCC tier 1 default values provided in the IPCC good practice guidance (0.31 kg/t aluminium produced for CF_4 and 0.04 kg/t aluminium produced for C_2F_6), although they are within the uncertainty range for the IPCC tier 1 default values (0.0003–1.3 kg/t aluminium produced for CF_4 and 0.00004–0.2 kg/t aluminium produced for C_2F_6). New Zealand implied in the NIR that these low IEFs are due to the operation software introduced in 1998 which prevents the anode effect from occurring.

58. The previous ERT recommended that New Zealand make further analysis of why the IEFs are lower than other countries as well as IPCC default values, and that the Party provide further explanation, including on the anode effect minutes per pot day, in the next annual submission of the NIR. However, New Zealand did not include this information in the 2011 submission, and indicated during the review that it could not provide these data in the next NIR because of commercial sensitivity. This ERT strongly encourages New Zealand to keep up its efforts in providing information demonstrating the low occurrence of anode effects, while maintaining confidentiality, and also recommends that New Zealand clearly document in the next NIR what tier 2 QC checks have been conducted for this subcategory, in accordance with the IPCC good practice guidance.

Consumption of halocarbons and SF_6 – HFCs and PFCs

59. Emissions from refrigeration and air-conditioning equipment account for 88.5 per cent of total emissions from consumption of halocarbons and SF_6 in 2009. Emissions from stationary refrigeration and air-conditioning equipment were estimated based on a tier 2b

[5] International Aluminium Institute. 2006. The Aluminium Sector Greenhouse Gas Protocol. London: International Aluminium Institute. Available at <http://www.world-aluminium.org/cache/fl0000127.pdf>.

mass-balance approach in the 2006 IPCC Guidelines, which is equivalent to the IPCC good practice guidance tier 2 top-down approach. Emissions from mobile air-conditioning equipment were estimated based on the IPCC good practice guidance tier 2 approach. The recommendation in the previous review report was that data such as the annual sales of new refrigerants be included in the NIR to improve the transparency of the methods used. The ERT commends New Zealand for including this information in the 2011 submission, and encourages the Party to continue improving the transparency of estimation methods and data used for this subcategory, through allocating the explanation of assumptions, changes in methods, AD and EFs in the relevant subcategory section of the NIR, rather than in the section for recalculations.

60. The ERT also welcomes New Zealand's actions taken to further improve the models used to estimate emissions from consumption of halocarbons and SF_6, especially with regard to the mobile air conditioning HFC phase-in periods and refrigerant charges, where more realistic assumptions were set for new, used, assembled and retrofitted vehicles in the separate car, bus and light and heavy truck classes. The ERT encourages New Zealand to keep up its efforts in improving the models used for estimations and recommends that it provide information more transparently in the NIR by including the input data, key assumptions, and information on the type of model used and the parameters used therein, and through allocating the explanation of assumptions, changes in methods, AD and EFs in the relevant subcategory section, rather than in the section for recalculations.

61. New Zealand states in its NIR that, although other improvements have been prioritized, it has considered separately reporting estimates for refrigeration and air-conditioning equipment for domestic, commercial, transport and industrial refrigeration, currently aggregated under domestic refrigeration, in future annual submissions. The ERT welcomes this intention, and encourages New Zealand to keep up its efforts in increasing transparency for this subcategory.

D. Agriculture

1. Sector overview

62. In 2009, emissions from the agriculture sector amounted to 32,810.52 Gg CO_2 eq, or 46.5 per cent of total GHG emissions. Since the base year, agriculture emissions have increased by 8.4 per cent. The key drivers for the rise in emissions are a 22.4 per cent (1,736.0 Gg CO_2 eq) increase in N_2O emissions from agricultural soils and a 2.9 per cent (641.6 Gg CO_2 eq) increase from enteric fermentation. The increase in emissions from agricultural soils since 1990 is largely due to a 372 per cent increase in the amount of synthetic N-fertilizer applied to soils between 1990 and 2009. The increase in emissions from enteric fermentation is largely due to a 70 per cent increase in the dairy cattle population over the time series. Within the sector, 68.6 per cent of the emissions were from enteric fermentation and 28.9 per cent from agricultural soils, followed by 2.4 per cent from manure management. Less than 1 per cent of emissions came from field burning of agricultural residues.

63. The ERT commends New Zealand for its improvements in transparency. However, the ERT noted that some explanations of country-specific EFs and parameters are still missing and therefore, recommends that New Zealand describe in more detail the use of country-specific EFs and parameters, including a comparison between country-specific EFs (or other parameters) and the IPCC default values or the values used by other countries whose circumstances are similar to the Party, particularly for values which significantly differ from the default values.

64. In accordance with the recommendation in the previous review report, New Zealand corrected the allocation for manure from goats to pasture, range and paddock (PRP) in CRF

table 4.B(a) as 100 per cent and the notation key for rye in CRF table 4.F as "NO" in the 2011 submission. The ERT commends New Zealand for these improvements.

65. Recalculations were made as follows:

(a) Update of EF_{3PRP} (see paras. 71–75 below);

(b) Changes in the AD (recalculations of the three-year average) of livestock population and crop;

(c) Inclusion of AD data for the time series of potato production;

(d) Update of AD for the time series of alpaca;

(e) Enhancements to New Zealand's tier 2 inventory model for dairy cattle, non-dairy cattle and deer.

66. The improvements made in the agriculture sector have resulted in a 5.0 per cent (1,587.9 Gg CO_2 eq) decrease in agriculture emissions in 1990, and a 5.6 per cent (1,959.4 Gg CO_2 eq) decrease in agriculture emissions in 2008.

2. Key categories

Enteric fermentation – CH_4

67. In 2009, this category emitted 22,506.23 Gg CO_2 eq (31.9 per cent of national total emissions). New Zealand uses tier 2 methods with country-specific EFs to estimate the emissions of dairy cattle, non-dairy cattle, sheep and deer. Other livestock (goats, horses, alpaca and swine) were estimated using the tier 1 method with IPCC default EFs for horses, alpaca and swine and a country-specific EF for goats. This is in line with the IPCC good practice guidance.

68. The ERT noted that New Zealand uses country-specific EFs for cattle, 77 kg CH_4/head/year for dairy cattle, which are low in comparison with other reporting Parties (65–134 kg CH_4/head/year). During the review week, in response to a question raised by the ERT, New Zealand explained as described in the NIR that digestibility of feed is higher than the IPCC good practice guidance case (New Zealand: 78 per cent for dairy cattle and 71 per cent for non-dairy cattle; the IPCC good practice guidance: 60–75 per cent for good pastures, good preserved forages, and grain supplemented forage-based diets). The ERT recommends that New Zealand include more detailed information for digestibility in future NIRs (e.g. feed situations such as use of high-nutrient feed or the dominant grass in pasture) to improve transparency.

Manure management – CH_4 and N_2O

69. In 2009, this category emitted 783.37 Gg CO_2 eq (1.1 per cent of the national total emissions). For CH_4 estimation, New Zealand uses a tier 2 approach, with a country-specific method to estimate N excretion for cattle, sheep and deer. For other minor livestock, New Zealand applies a tier 1 method with default EFs for goats, swine, horses and poultry and assumed EFs for sheep and alpaca. This approach is consistent with the IPCC good practice guidance.

70. New Zealand estimates emissions from manure management for cattle, sheep, goats, horses, swine, poultry, alpaca and deer. The ERT noted that ostriches and emus are also reported in the 2007 Agricultural Production Census published by Statistics New Zealand, but these livestock and emissions are not included in the inventory. During the review, New Zealand explained that the population of ostriches and emus is so small that inclusion in the inventory would not improve the accuracy and time-series consistency of the inventory. The ERT agrees that the population of ostriches and emus is small in New Zealand; however, the IPCC good practice guidance describes characterization for animals

without emission estimation methods, and the manure CH_4 EF for ostriches could be estimated using the tier 1 EF for chickens (see page 4.21 of the IPCC good practice guidance). The ERT encourages New Zealand to estimate emissions from ostriches and emus even though such emissions are very small.

71. The ERT noted that all N excreted by non-dairy cattle, sheep and goats is reported under PRP in the CRF tables, and nothing is reported for other livestock under AWMS. During the review week in response to a question raised by the ERT, New Zealand explained that all cattle, sheep, deer and goats are grazed in PRP across the whole of New Zealand throughout the entire year. The ERT concluded that it is reasonable to report that all non-dairy cattle, sheep and goats graze in PRP in New Zealand.

Agricultural soils – N_2O

72. In 2009, this category emitted 9,498.39 Gg CO_2 eq (13.5 per cent of the national total emissions). New Zealand uses tier 1a method with the following country-specific EFs and parameters: EF_1, $EF_{3(PRP\ DUNG)}$, $EF_{3(PRP)}$, $Frac_{LEACH}$, $Frac_{GASM}$ and $Frac_{GASF}$ and default EFs and parameters for others.

73. In the follow-up to the previous review's recommendation, New Zealand has now included potatoes in estimating N_2O emissions from crop residues returned to soils. The ERT commends this improvement.

74. In the 2011 annual submission, New Zealand applied a new EF of PRP (EF_{3PRP}) for cattle and sheep dung (see the 2011 NIR, p.131), which is the lowest among Parties included in Annex I to the Convention and lower than the previous EF (EF_{3PRP} in 2010: 0.01, EF_{3PRP} in 2011: 0.0025 kg N_2O-N/kg N). During the review week, New Zealand provided further information on the underlying reasons for this low value of EF_{3PRP} in New Zealand and information on the paper of Luo et al (2009),[6] which is the source of the new EF_{3PRP}. In addition, New Zealand explained that extensive research on the country's pastoral conditions has shown that N_2O emissions from urine are much higher than N_2O emissions from dung; therefore, EF_{3PRP} for urine had been kept at 0.01. As a result, the average IEF for total excreta in New Zealand works out at 0.0076–0.0077 kg N_2O-N/kg N, which is higher than the United States (range 0.0038–0.0041 kg N_2O-N/kg N) and New Zealand's closest regional neighbour Australia at 0.0043 kg N_2O-N/kg N.

75. The ERT noted that AD described in nitrogen leaching and run-off in CRF table 4.D for all years are reported incorrectly. In this cell of the CRF tables, New Zealand reported total N amount from fertilizers, animal manure and other and not the amount of N that is lost through leaching and run-off. During the review week in response to a question raised by the ERT, New Zealand confirmed this mistake and reported that the correct value is 126,198,890 kg N/year (7 per cent of 1,802,841,288) for 2009; however, the reported emissions from leaching and run-off (4.95 Gg N_2O for 2009) are correct. The ERT recommends that New Zealand correct these values of AD for nitrogen leaching and run-off in the CRF tables in the next annual submission.

76. In the previous review report, the ERT recommended that New Zealand include several other N inputs to the soil. These inputs would include other organic matter (e.g. tankage/slaughterhouse waste, blood and bonemeal, compost and brewery waste). During the review week, New Zealand explained the status of progress for this issue. The Party has begun to identify any activities or sources of N application from organic waste and has commissioned an initial research study. The ERT welcomes such progress; however, it recommends that New Zealand provide an update of the results for several other N inputs to the soil in the next annual submission or at least indicate what progress has been made.

[6] Luo J, van der Weerden T, Hoogendoorn C and de Klein C. 2009. *Determination of the N_2O Emission Factor for Animal Dung applied in Spring in Three Regions of New Zealand*. Report for the Ministry of Agriculture and Forestry, New Zealand. Wellington: Ministry of Agriculture and Forestry.

E. Land use, land-use change and forestry

1. Sector overview

77. In 2009, net removals from the LULUCF sector amounted to 26,682.75 Gg CO_2 eq. Since the base year, net removals have increased by 13.8 per cent. The key driver for the rise in net removals is the new forest establishment and the growth of existing plantation forests. Within the sector, removals from forest land accounted for 25,559.45 Gg CO_2 eq and grassland accounted for emissions of 2,529.44 Gg CO_2 eq. For the remaining categories, 337.53 Gg CO_2 eq net emissions are from cropland, 2.49 Gg CO_2 eq net emissions from settlements and 7.24 Gg CO_2 eq net emissions from other land.

78. The 2011 annual submission includes a number of improvements in the LULUCF sector resulting in a major recalculation of the sector through the introduction of historical land-use data to model land-use change since 1962 (back-casting). This new information has enabled improved accuracy in the identification of land in a conversion state at 1990, and the inclusion of lagged emissions and removals from land-use changes before 1990, which continue to have a carbon effect in the inventory period. This back-casting reduced net removals in 1990 by 5,084 Gg CO_2 eq and reduced net removals in 2008 by 24 Gg CO_2 eq compared with the previous submission. All recalculations together resulted in a reduction of net removals in 1990 of 7,615.23 Gg CO_2 eq and reduced net removals in 2008 by 3,183.36 CO_2 eq. The ERT acknowledges these improvements, noting that they have been made to meet the requirements of reporting land in transition in the IPCC good practice guidance for LULUCF and have improved the completeness and consistency of estimates in the LULUCF sector.

79. In addition, in its 2011 submission, New Zealand for the first time reports emissions from organic soils and includes new mapping of deforestation, incorporating emissions from the decay of historical harvesting residues. Further improvements and recalculations are expected to be introduced into the reporting in the LULUCF sector in the coming years. One of these is the re-measurement of the national plot network for the forest inventory, which is ongoing and will result in updated national carbon estimates for the 2012 inventory (to be submitted in 2014). The ERT welcomes these improvements and commends New Zealand for the continuous efforts to improve the reporting.

80. New Zealand chose a transition period of 28 years for disaggregating land-use categories into land remaining subcategories and land conversion subcategories. With the implementation of back-casting, this method is now applied for all land-use conversion subcategories. During the review New Zealand informed the ERT that, where there is a methodology to estimate biomass following conversion, the estimates will be calculated over 28 years and that the IPCC default period of 20 years will be used only for estimates for soil carbon.

81. New Zealand updated the tier 1 uncertainty analysis for the LULUCF sector and it is now completed at a more disaggregated level: uncertainty of the change in carbon with land-use change between every subcategory is calculated and then combined to give overall uncertainty. During the review New Zealand informed the ERT that owing to the priority setting it is unlikely that a tier 2 uncertainty analysis will be completed in the next few years. The ERT acknowledges this update of the tier 1 analysis and took note of the priority setting for the tier 2 analysis.

82. New Zealand improved the documentation in the NIR of the LUCAS system by incorporating information on CMS in an annex to the NIR. The ERT welcomes this improved documentation.

83. New Zealand reports in its submission an increased total land area and includes for the first time remote uninhabited sub-Antarctic islands that are protected for conservation

purposes. Their predominant land cover is grassland, and they are not subject to cultivation or land-use change and so do not influence the reporting in the LULUCF sector.

84. The Party improved the transparency through the introduction in the NIR, for each land-use category under methodological issues, specific sections dealing with information on the background tables for the non-CO_2 emissions. The ERT welcomes this improvement in transparency.

85. New Zealand reports in the NIR, chapter 7, four key categories in the LULUCF sector for 2009; for cropland it reported that "cropland categories were not identified as key categories for 2009" (2011 NIR, p.206). However, in CRF table 7, cropland is indicated under key categories including LULUCF. The ERT recommends that New Zealand check this information and ensure consistency in the next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

86. New Zealand reports for the first time the areas of organic soils for natural forest and for pre-1990 planted forest. For natural forest no carbon stock changes from organic soils are reported (notation key "NO" is used in the CRF Reporter) as these natural forest soils are not drained. For the pre-1990 planted forest, carbon stock changes from organic soils are reported using a tier 1 default method. The ERT acknowledges this improvement in reporting.

87. As a result of the implementation of the back-casting method New Zealand included in CRF table 5.A a new subcategory, natural forest (conversion) to pre-1990 planted forest. This category covers natural forest which has been cleared since 1990 and replanted with exotic planted forest. The area and the carbon stocks and changes for each of these subcategories (as used in the previous submission) have been adjusted to reflect this change. However, this new subcategory is not further elaborated in the NIR; for example, in sections 7.2.1 and 7.3.1 where New Zealand explains the land-use category definitions or section 7.3.2 dealing with methodological issues. The ERT recommends that New Zealand improve the transparency and present in its next annual submission more information on the subcategory natural forest (conversion) to pre-1990 planted forest and on the methods applied to estimate carbon stock changes.

88. New Zealand improved the reporting on carbon stock changes related to harvesting by correcting the area of pre-1990 forest harvested and conducting a pool allocation change from the below-ground biomass pool to the dead organic matter pool. The ERT welcomes these improvements.

89. New Zealand reports all non-CO_2 emissions from wildfires in forest land remaining forest land, and, when these occur, in land converted to forest land. The country-specific EF used in the tier 2 method as well as the AD since 1991 have been updated. Methods of separating the wildfire emissions are being explored and during the review New Zealand informed the ERT that it expects to implement this in its 2012 annual submission. The ERT welcomes these improvements.

Land converted to forest land – CO_2

90. Almost all land converted to forest land is grassland (about 5 per cent is a change from other land). In this category New Zealand reports the land conversion of the last 28 years; in 2009 this amounts to 983.41 kha and removals of 31,594.35 Gg CO_2. In this estimation the carbon stock changes for soil are based on a period of 20 years, which is the IPCC default value. It is reported in the NIR that it is estimated that 25 per cent of the grassland converted to forest land is cleared using controlled burning. In such a case 30 per cent of above-ground biomass and all biomass on un-burned sites are assumed to decay

over 20 years. During the review New Zealand informed the ERT that the carbon pools in living biomass following conversion should be calculated over 28 years. The ERT recommends that New Zealand ensure the period of 28 years is used in the calculations in the next annual submission.

Grassland remaining grassland – CO_2

91. Grassland remaining grassland is about 53.6 per cent of New Zealand's total land area and this area decreased between 1990 and 2009 by 186 kha (–1.3 per cent) while the emissions increased in the same period by 1,350.2 Gg CO_2 eq (+159.9 per cent). In the NIR New Zealand explained that this increase is due to multiple factors, including increased agricultural liming, and the influence of land-use changes between grassland subcategories on soil and biomass carbon accumulation over time. The ERT welcomes these explanations and recommends that New Zealand provide this in its NIR in the next annual submission.

Land converted to grassland – CO_2

92. Owing to the implementation of the back-casting method, the area and the emission estimates are recalculated for the whole time series. The carbon stock change for this land-use category for 2008 in the 2011 submission is 383.40 Gg CO_2, and in the 2010 submission 2,849.61 Gg CO_2. Mineral soil carbon stocks in land converted to grassland are estimated using the Soil CMS, a tier 2 method and a tier 1 default for organic soils. The soil carbon stock factors in the tier 2 method have been improved. As a result the difference in stock values between low-producing grassland and high-producing grassland changed from –2.73 t C/ha in the previous submission to –0.81 t C/ha. The ERT commends New Zealand for these improvements.

3. Non-key categories

Cropland remaining cropland – CO_2

93. New Zealand used the IPCC tier 1 method to estimate CO_2 removals due to conversion from annual crop to perennial crop. To estimate growth after conversion to perennial cropland a new country-specific value was used with a biomass accumulation rate of 0.67 t C/ha/year. This value is based on the New Zealand specific value of 18.76 t C/ha, sequestered over 28 years, which is the maturity period New Zealand uses for its lands to reach steady state. The ERT commends New Zealand for this improvement.

F. Waste

1. Sector overview

94. In 2009, emissions from the waste sector amounted to 2,018.43 Gg CO_2 eq, or 2.9 per cent of total GHG emissions. Total emissions from solid waste disposal on land decreased by 115.83 Gg CO_2 eq between 1990 and 2009, a reduction of 7.6 per cent. There was also a decrease in emissions from waste incineration of 12.36 Gg CO_2 eq (equivalent to a reduction of 84.9 per cent). However, these decreases were partly offset by a rise in emissions from wastewater handling (domestic and industrial), which increased by 95.34 Gg CO_2 eq or 18.3 per cent over the same period. Within the sector, 69.3 per cent of the emissions were from emissions from solid waste disposal on land and 30.6 per cent from wastewater handling, followed by 0.1 per cent from waste incineration.

95. New Zealand recalculated emissions for the waste sector in its 2011 annual submission. As a result of the recalculations in the 2011 submission, waste sector emissions decreased in the base year from 2,708.84 Gg CO_2 eq in the 2010 submission to 2,051.28 Gg CO_2 eq in the 2011 submission or 24.3 per cent, remaining almost flat in subsequent years. During the review week, New Zealand clarified the reasons for the decrease in emissions

from those reported in 2010. These relate largely to improvements in the methodologies used for calculating emissions from solid waste disposal on land, including a better understanding of the management and design of landfills with operational CH_4 recovery systems and the application of nationally consistent assumptions on waste composition. The ERT agrees that the recalculated emissions are justified.

2. Key categories

Solid waste disposal on land – CH_4

96. The previous ERT commented on the improvement in estimates of AD which led to a revision of the quantity of solid waste going to solid waste disposal sites in 2006 (from 2.078 to 2.053 kg/person/day). This latter figure is used in the 2011 submission. The ERT encourages New Zealand to update this factor at appropriate intervals.

97. The ERT notes that New Zealand still uses data on municipal and industrial waste composition from the same data sources used in the previous submission and reiterates the encouragement to further improve accuracy and transparency in this respect. However, the ERT also commends New Zealand for its use of new AD on untreated wastewater treatment sludge disposed of in landfills.

98. The ERT also commends New Zealand for improving its estimates of the waste placement, decay parameters and collection efficiencies of landfill gas from surveys of landfills, and also the recalculation of waste placement into landfills without gas recovery systems. It also commends the Party for adopting a consistent approach to organic carbon values for all waste disposed to landfills. However, the ERT notes that New Zealand does not appear to have adopted recommendations in the previous review reports to clearly distinguish in the reporting of CH_4 flared or used for energy recovery under memo items in biomass combustion, and recommends that New Zealand do so in future annual submissions.

Wastewater handling – CH_4

99. AD for domestic and commercial wastewater handling have been based on the population served by wastewater treatment plants. The default EFs of the 2006 IPCC Guidelines of 0.25 kg CH_4/kg carbon oxygen demand (COD) or 0.6 kg CH_4/kg biological oxygen demand (BOD) have been employed. The Party uses a country-specific BOD production rate of 0.026 tonnes BOD/1000 persons/year, which is equivalent to the high-range default value for the Oceania region of 70 g/person/day shown in the Revised 1996 IPCC Guidelines, and has increased it appropriately to allow for commercial and industrial activity within the area. CH_4 is recovered at eight treatment plants which are deemed to have a default CH_4 EF of zero. The approach is consistent with the 2006 IPCC Guidelines and the choice of AD and EFs is reasonable.

100. Emissions from industrial wastewater handling are based on emissions from industries producing significant amounts of organic-rich wastewaters that are treated anaerobically. The industries are meat processing, pulp and paper, and dairy processing. Emissions from wine production and wool scouring are also included. AD for meat and pulp and paper were provided by official and industry sources, respectively. There are believed to be no emissions from the dairy industry because all but one wastewater treatment plant use aerobic systems and the remaining anaerobic system is said to recover all the CH_4 for use or flaring. A combination of IPCC default and site-specific factors are used to determine COD or BOD production per unit output of the meat and paper and pulp industries, and the ERT noted that the approach is appropriate, but details of AD were not provided for the wine and wool scouring industries. During the review week, New Zealand provided information on estimations from these industries, which are very low. The ERT recommends that New Zealand provide this information in its next annual submission.

101. During the previous review in 2010, New Zealand provided revised estimates that improved the completeness of its inventory of emissions from wastewater handling in response to the list of potential problems and further questions raised by the ERT during the review week. This included revised estimates of CH_4 emissions from sludge, and from wool scouring and wine production wastewater. A further minor recalculation has since used an improved population method for emissions from domestic wastewater handling, recalculated the 2008 emissions for industrial wastewater handling using revised figures for the meat industry and corrected an error in the 2010 submission on degradable material figures, which had been incorrectly entered as organic sludge figures. The ERT commends New Zealand for these improvements, and for reporting CH_4 emissions from sludge, as requested in the previous review report.

102. The ERT notes that although New Zealand has reported emissions from several industrial wastewater effluents, CRF table 6.B has been completed with notation key "NE", even for categories where emission estimates have been provided. The ERT recommends that New Zealand complete the table with data on wastewater output and degradable carbon (DC) content for those effluents for which it reports emissions.

103. The previous revised inventory submission of October 2010 showed an increase in emissions of CH_4 from wastewater treatment of 12 per cent between 1990 and 2008, from 20.95 Gg CH_4 to 23.39 Gg CH_4. The absolute emissions reported for these years (and for all years in-between) are higher than those now reported in the 2011 submission, which increased from 17.57 Gg CH_4 to 21.08 Gg CH_4. During this review, New Zealand has explained the basis for the recalculations and in addition reported the correction of an error between the October 2010 and 2011 submissions. The ERT is satisfied with New Zealand's explanation.

3. Non-key categories

Wastewater handling – N_2O

104. Emissions of N_2O from domestic wastewater/sludge handling and human sewage treatment are derived from the 2006 IPCC Guidelines tier 1 methodology, which uses average per capita protein consumption to determine N outputs to the treatment processes. Officially reported country-specific data on protein consumption were used, with the IPCC default values used for other parameters. The approach is considered appropriate by the ERT.

Waste incineration – CO_2 and N_2O

105. Incineration is a very small category in New Zealand. The country does not incinerate municipal waste and incineration is reserved for small quantities of clinical, hazardous and quarantine waste. During the 1990s, about 26 Gg/year of waste was incinerated, decreasing to 13.9 Gg in 2000 and then declining steadily to the 5.35 Gg incinerated in 2009. The decrease in AD has come about from stricter regulation and control of incineration, a new permitting regime and the availability of alternative sterilization techniques.

106. New Zealand has based its approach to calculating emissions from incineration on the 2006 IPCC Guidelines, and the default EFs for CO_2, N_2O and CH_4 therein. New Zealand's approach is considered appropriate, given the small contribution to GHG emissions made by incineration, and is sufficiently transparent for evaluation.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

107. New Zealand has estimated and reported GHG removals by sinks and emissions by sources from afforestation, reforestation and deforestation activities in the CRF tables for 2009. In addition, New Zealand provided in the NIR complete information with respect to the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1. New Zealand has chosen to account for its KP-LULUCF activities at the end of the first commitment period. New Zealand has not elected any activities under Article 3, paragraph 4.

108. Paragraph 8(a) of the annex to decision 15/CMP.1 requests complementary information on the size and geographical location of forest areas that have lost forest cover but which are not yet classified as deforested. On this issue, the Party has procedures in place (as described in the NIR) to distinguish deforestation from harvesting during and at the end of the commitment period. This is planned to be done using a number of available data sources as well as information on forest in the NZ ETS. However, New Zealand also reports that following mapping at the end of 2012, the area of deforestation will be confirmed, but that it may take up to four years. This approach is likely to cause some uncertainty for distinguishing deforestation from harvesting in the last reporting years of the commitment period. The ERT reiterates the recommendation in the previous review report that New Zealand further refine this procedure, allowing full confirmation of deforestation in the last reporting years, and report on this in it next annual submission.

109. New Zealand reports for the first time CO_2 emissions from organic soils associated with reforestation and deforestation separately from CO_2 emissions from mineral soils. The ERT commends New Zealand for this improvement. In addition, CH_4 and N_2O emissions from biomass burning due to wildfires on reforested and deforested lands and controlled burning on deforested land were reported as "NE". New Zealand is investigating attributing a proportion of wildfire activity to land converted to forest land and informed the ERT during the review week that this improvement will be implemented in the 2012 submission. The ERT reiterates the recommendation from the previous review report that New Zealand provide estimates of these emissions in its next annual submission. New Zealand is also gathering AD on controlled burning of residues following harvest and informed the ERT during the review that emissions from this activity will be included in the 2013 submission. The ERT welcomes these actions and looks forward to the results in future submissions.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

110. New Zealand used the same tier 2 method applied under the Convention for land converted to forest land, which is generally in line with the IPCC good practice guidance for LULUCF, except for CO_2 emissions from mineral soils. The Forest Carbon Predictor (FCP) model estimates the biomass reductions/emissions for all plantation species using yield tables derived from radiata pine models (which covers 92 per cent of species). New Zealand reports that research using the FCP v2.2 for all planted forest tree species produces an average carbon stock change per area little different to those used for the 2010 submission. New Zealand intends to use a correction factor for the growth trajectory of Douglas fir in the 300 index, to be implemented in the 2012 submission, and the Party is investigating reporting of the post-1989 forest and pre-1990 planted forest subcategories by

species. The ERT welcomes these actions and looks forward to the implementation in the next annual submission.

111. New Zealand reports carbon stock changes for litter and dead wood in CRF table 5(KP-1)A.1 that are rather different between 2008 and 2009. During the review week, New Zealand informed the ERT that this is the result of the age-class structure of the forest and management practices under the Kyoto Protocol in New Zealand. New Zealand actively manages its forests by undertaking thinning and pruning. Most of these activities are carried out before the trees reach the age of 13. Thus there is a gradual increase in the dead wood and litter pools from management practices and natural mortality followed by a decline from age 13 where pruning and thinning ceases and decay is greater than inputs. The ERT encourages New Zealand to include this information in its next annual submission.

112. New Zealand reports the loss of below-ground biomass in the dead organic matter pool and so corrected the misallocation in the previous submission. As these estimates were included in the total of the activity, this does not change the total. The ERT welcomes this correction.

Deforestation – CO_2

113. In its submission, New Zealand uses a new method for tracking deforestation. As a result the reported area for deforestation in CRF table NIR 2 "Other to Deforestation" decreased for 2008 AD from 3.93 kha in the 2010 submission to 1.09 kha in the 2011 submission. These are the deforested areas of natural forest and pre-1990 planted forest. The deforested area of post-1989 forest decreased from 0.89 kha to 0.39 kha. These values are reported as Article 3, paragraph 3, activities under afforestation and reforestation, and deforestation. Emissions from deforestation have been calculated based on mapped polygons of deforestation using satellite imagery and average carbon yield tables for each subcategory of forest (natural forest, pre-1990 planted forest and post-1989 forest). A future planned improvement is to use specific carbon stock estimates for emissions from deforestation based on the locality of the deforested area. The ERT commends New Zealand for these implemented improvements and planned further improvements.

114. New Zealand started to use a combination of references for the mapping of deforestation in the period 2008–2009. In this process areas of forest destocking which were unable to be confirmed as either harvesting or deforestation were flagged for tracking for four years from the date of clearing. The ERT recommends that New Zealand provide in its next annual submission data on these flagged areas.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

115. New Zealand has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and the SEF comparison report.[7] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

116. Information on the accounting of Kyoto units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log

[7] The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

(ITL) and the clean development mechanism registry and meets the requirements set out in paragraph 88 (a–j) of the annex to decision 22/CMP.1. The transactions of Kyoto units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

National registry

117. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

Calculation of the commitment period reserve

118. New Zealand has reported its commitment period reserve in its 2011 annual submission. New Zealand reported that its commitment period reserve has not changed since the initial report review (278,608,260 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

119. New Zealand reported that there are changes in its national system since the previous annual submission. New Zealand reported that it has updated and elaborated the manual for the inventory compiler to include additional detail on the inventory preparation process. This manual was provided to the ERT during the review week. New Zealand also stated in chapter 13 of its NIR that two government officials have passed their examinations for expert review under the Convention for the LULUCF sector. Four other officials passed their mandatory examinations for expert review under the Kyoto Protocol. The ERT commends New Zealand for its continuing support for the review process and concludes that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

120. New Zealand reported that there are changes in its national registry since the previous annual submission. New Zealand has reported that during the first half of 2010 it introduced functionality to enable the support of method 2 (two-man rule/additional authorized representative). This functionality was released into the national registry on 10 June 2010 and detailed information is provided in chapter 14 of the NIR.

121. New Zealand also reported a change in the list of publicly available information provided in accordance with paragraph 32(g) of the annex to decision 15/CMP.1. In response to security issues encountered by overseas registries, the New Zealand registrar invoked the powers under section 13 of the Climate Change Response Act 2002 to remove the publication of the e-mail addresses of primary representatives to ensure the security of the registry.

122. As recommended in the previous review report in order to improve transparency, New Zealand provided additional information on the NZ ETS and New Zealand Units in section 1.9 of the NIR. The ERT commends New Zealand for providing this information.

123. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

124. New Zealand did not provide information on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, in its annual submission. The ERT noted there are minor changes since the annual submission in 2010. The ERT concluded that, taking into account the noted changes in the reporting, the information provided is complete and transparent, except for changes since the last submission. The ERT recommends that the Party, in its next annual submission, report any change in its information provided under Article 3, paragraph 14, in accordance with chapter I.H of the annex to decision 15/CMP.1.

125. New Zealand has provided additional information not included in previous submissions outlining how, as a member of the Friends of Fossil Fuel Subsidy Reform, an informal group of non Group of Twenty (G-20) countries which encourages and supports G-20 countries to meet their commitments. This informal group is committed to supporting the reform of inefficient fossil fuel subsidies.

126. New Zealand identifies improving fossil fuel efficiencies in Pacific island countries as a government priority and provides an example of the successful completed refurbishment of the diesel-fired Aitutaki power plant in the Cook Islands, which was funded by the New Zealand Aid Programme. This refurbishment provides a reliable and continuous electricity supply for residential and commercial users with capacity to meet not only current demand but also future projected demand.

III. Conclusions and recommendations

127. New Zealand made its annual submission on 15 April 2011. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraph 3, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

128. The ERT concludes that the inventory submission of New Zealand has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and New Zealand has submitted a complete set of CRF tables for the years 1990–2009 and an NIR; these are complete in terms of geographical coverage, years and sectors, and complete in terms of categories and gases.

129. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1.

130. The Party's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, except for the issues raised in paragraph 138 below. The ERT commends New Zealand for the improvements made since its previous submission; however, the ERT noted that the inventory could be further improved by providing additional disaggregation of emissions in the energy and industrial processes sectors.

131. The Party has made recalculations for the inventory between the 2010 and 2011 submissions in order to improve the estimation method. The impact of these recalculations on the national totals is a decrease in emissions of 3.0 per cent for 2008. The main recalculations took place in the following sectors:

(a) Agriculture: a decrease of 5.6 per cent for 2008;

(b) Energy: a decrease of 1.2 per cent for 2008.

132. New Zealand has estimated and reported GHG removals by sinks and emissions by sources from afforestation, reforestation and deforestation activities in the CRF tables for 2009. In addition, New Zealand provided in the NIR complete information with respect to the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1. New Zealand has chosen to account for its KP-LULUCF activities at the end of the first commitment period. New Zealand has not elected any activities under Article 3, paragraph 4.

133. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions following revision of the estimation method. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows:

(a) Aforestation and reforestation: an increase in net removals of 1.2 per cent;

(b) Deforestation: a decrease in emissions of 85.1 per cent.

134. New Zealand has reported information on its accounting of Kyoto Protocol units in accordance with chapter I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

135. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

136. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

137. New Zealand has reported the information requested in chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14" as part of its 2011 annual submission. The information provided is complete and transparent. The information was provided on 15 April 2011. New Zealand included additional information in its 2011 submission which highlighted that improving fossil fuel efficiencies in the Pacific island countries is a government priority. The ERT commends New Zealand for providing this additional information in response to the previous review report.

138. In the course of the review, the ERT formulated a number of recommendations relating to the transparency of the information presented in New Zealand's annual submission. The key recommendations are that New Zealand:

(a) Provide information on default EF conversion in conjunction with the use of AD based on gross calorific values (see para. 46 above);

(b) Explain more transparently the method and data used by companies to estimate CO_2 emissions from iron and steel production (see para. 52 above);

(c) Report CO_2 emissions from soda ash use in aluminium production separately in category soda ash production and use from CO_2 emissions from aluminium production (see para. 55 above);

(d) Continue its efforts to provide information demonstrating the low occurrence of anode effects (see para. 58 above);

(e) Provide information on digestibility, such as the feed situation regarding the use of high-nutrient feed or the dominant grass in pasture (see para. 68 above);

(f) Provide a description of the unusual situation for grazing livestock (see para. 71 above);

(g) Enter the correct values of AD under nitrogen leaching and run-off in the CRF tables (see para. 75 above);

(h) Provide more information on the new subcategory natural forest (conversion) to pre-1990 planted forest and on the methods applied to estimate carbon stock changes (see para. 87 above);

(i) Ensure the consistent application of the period of 28 years (see para. 90 above);

(j) Provide information on emissions from wastewater handling of the wine and wool scouring industries (see para. 100 above);

(k) Complete CRF table 6.B with data on wastewater output and DC (see para. 102 above);

(l) Refine the procedure for allowing full confirmation of deforestation in the last reporting years of the commitment period (see para. 108 above).

IV. Questions of implementation

139. No questions of implementation were identified by the ERT during the review.

Annex I

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf# page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng /08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for New Zealand 2011. Available at <http://unfccc.int/resource/docs/2011/asr/nzl.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <http://unfccc.int/resource/webdocs/sai/2011.pdf>.

FCCC/ARR/2010/NZL. Report of the individual review of the greenhouse gas inventory of New Zealand submitted in 2010. Available at <http://unfccc.int/resource/docs/2010/arr/nzl.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Cherie Sweeney (Ministry for the Environment), including additional material on the methodology and assumptions used. The following documents[1] were also provided by New Zealand:

Wayne Hennessy and Murray McCurdy, 2010, *Inventory of HFC, SF_6 and Other Industrial Process Emissions for New Zealand 2009*, Wellington, Ministry for the Environment;

Jiafa Luo, Tony van der Weerden, Coby Hoogendoorn, Cecile de Klein , 2009, *Determination of the N_2O emission factor for animal dung applied in spring in three regions of New Zealand*, Wellington, Ministry of Agriculture & Forestry;

Andrea Pickering, 2011, *Detailed methodologies for agricultural greenhouse gas emission calculation Version 1.0*, Wellington, Ministry of Agriculture & Forestry;

Ministry for the Environment, 2011, *A GUIDE TO COMPILING NEW ZEALAND'S GREENHOUSE GAS INVENTORY REPORT TO THE UNFCCC*, Wellington, Ministry for the Environment.

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
BOD	biological oxygen demand
C_2F_6	hexafluoroethane
CH_4	methane
CMS	Carbon Monitoring System
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
COD	carbon oxygen demand
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
ETS	emissions trading scheme
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
KP-LULUCF	Land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
N	nitrogen
NA	not applicable
NE	not estimated
N_2O	nitrous oxide
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
PRP	pasture, range and paddock
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SO_2	sulphur dioxide
SWDS	solid waste disposal site
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change