



**Report on the individual review of the annual submission of New Zealand
submitted in 2014**

Note by the secretariat

The report on the individual review of the annual submission of New Zealand submitted in 2014 was published on 3 June 2015. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decisions 4/CMP.4 and 8/CMP.9), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2014/NZL, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.



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* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of New Zealand, coordinated by the UNFCCC secretariat, in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 8 to 13 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Tinus Pulles (Netherlands) and Ms. Kristina Saarinen (Finland); energy – Mr. Ricardo Fernandez (European Union), Mr. Akira Osako (Japan) and Mr. Moshe Yanai Axelrod (Israel); industrial processes and solvent and other product use – Mr. Joseph Amankwa Baffoe (Ghana) and Mr. Jacek Skoskiewicz (Poland); agriculture – Ms. Janka Szemesová (Slovakia) and Mr. Marcelo Theoto Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Ms. Maria Fernanda Alcobé (Argentina), Mr. Matt Searson (Australia) and Mr. Richard Volz (Switzerland); and waste – Mr. Eduardo Calvo (Peru) and Mr. Igor Ristovski (the former Yugoslav Republic of Macedonia). Ms. Saarinen and Mr. Theoto Rocha were the lead reviewers. The review was coordinated by Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of New Zealand, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team’s (ERT’s) assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised “Guidelines for the preparation of national communications by Parties include in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories” (hereinafter referred to as the UNFCCC Annex I inventory reporting guidelines) adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by New Zealand was carbon dioxide (CO₂), accounting for 45.0 per cent of total GHG emissions¹ expressed in CO₂ equivalent (CO₂ eq), followed by methane (CH₄) (38.2 per cent) and nitrous oxide (N₂O) (14.3 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 2.5 per cent of the overall GHG emissions in the country. The agriculture sector accounted for 46.1 per cent of total GHG emissions, followed by the energy sector (42.2 per cent), the industrial processes sector (6.9 per cent), the waste sector (4.7 per cent) and the solvent and other product use sector (0.04 per cent). Total GHG emissions amounted to 76,047.98 Gg CO₂ eq and increased by 25.4 per cent between the base year² and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

¹ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ 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 sources included in Annex A to the Kyoto Protocol only.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.
6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year^a to 2012

		<i>Gg CO₂ eq</i>								<i>Change (%)</i>	
		<i>Greenhouse gas</i>	<i>Base year</i>	<i>1990</i>	<i>1995</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>Base year–2012</i>
Annex A sources		CO ₂	24 915.89	24 915.89	27 306.61	36 473.35	33 513.18	33 450.61	33 258.52	34 258.20	37.5
		CH ₄	26 834.68	26 834.68	27 761.09	28 159.76	28 558.48	28 516.47	28 625.57	29 038.45	8.2
		N ₂ O	8 245.79	8 245.79	9 125.30	10 269.36	10 091.17	10 385.28	10 644.20	10 885.70	32.0
		HFCs	NA, NO	NA, NO	122.81	807.26	872.41	1 077.69	1 817.36	1 804.69	NA
		PFCs	629.87	629.87	131.16	38.84	46.14	40.81	30.18	40.75	-93.5
		SF ₆	15.20	15.20	17.88	15.13	19.79	20.46	17.62	20.20	32.8
KP-LULUCF	Article 3.3 ^b	CO ₂				-14 220.89	-12 257.81	-14 135.64	-15 226.55	-15 000.35	
		CH ₄				21.97	34.21	26.90	24.30	28.72	
		N ₂ O				2.34	3.58	2.84	2.57	3.02	
	Article 3.4 ^c	CO ₂	NA			NA	NA	NA	NA	NA	NA
		CH ₄	NA			NA	NA	NA	NA	NA	NA
		N ₂ O	NA			NA	NA	NA	NA	NA	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, 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, NO = not occurring.

^a The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

^c Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year^a to 2012

	Sector	Gg CO ₂ eq								Change (%)
		Base year	1990	1995	2008	2009	2010	2011	2012	
Annex A sources	Energy	23 560.40	23 560.40	25 629.98	34 581.79	31 740.77	31 624.48	31 221.77	32 121.28	36.3
	Industrial processes	3 262.08	3 262.08	3 176.73	4 138.66	4 158.31	4 549.29	5 284.12	5 276.80	61.8
	Solvent and other product use	41.54	41.54	44.95	31.00	27.90	31.00	27.90	34.10	-17.9
	Agriculture	30 470.97	30 470.97	32 027.16	33 155.67	33 367.77	33 559.83	34 213.49	35 020.13	14.9
	Waste	3 306.45	3 306.45	3 586.01	3 856.59	3 806.41	3 726.73	3 646.17	3 595.67	8.7
	LULUCF	NA	-37 250.36	-32 007.68	-34 489.57	-32 226.34	-31 750.80	-29 594.85	-26 598.32	NA
Total (with LULUCF)		NA	23 391.07	32 457.16	41 274.13	40 874.83	41 740.53	44 798.59	49 449.66	NA
Total (without LULUCF)		60 641.44	60 641.44	64 464.84	75 763.70	73 101.16	73 491.33	74 393.45	76 047.98	25.4
Other ^b		NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3 ^c									
	Afforestation and reforestation				-17 363.54	-17 836.03	-18 193.07	-18 575.68	-18 965.10	
	Deforestation				3 166.94	5 616.01	4 087.17	3 375.99	3 996.49	
	Total (3.3)				-14 196.60	-12 220.02	-14 105.90	-15 199.69	-14 968.61	
	Article 3.4 ^d									
	Forest management				NA	NA	NA	NA	NA	
	Cropland management	NA			NA	NA	NA	NA	NA	NA
Grazing land management	NA			NA	NA	NA	NA	NA	NA	
Revegetation	NA			NA	NA	NA	NA	NA	NA	
Total (3.4)	NA			NA	NA	NA	NA	NA	NA	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

^a The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b Emissions/removals reported in the sector other (sector 7) 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.

^d Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 14 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 (submitted on 11 April 2014) and an NIR. New Zealand also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 14 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. New Zealand submitted revised data on 11 September 2014 in response to questions raised by the ERT during the review. The values used in this report are those submitted by New Zealand on 11 September 2014.

9. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of New Zealand. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3

The expert review team's overall assessment of the annual submission

<i>Issue</i>	<i>Expert review team assessment</i>	<i>General findings and recommendations</i>
The ERT's findings on completeness		
Annex A sources ^a	Complete	Mandatory: none Non-mandatory: CH ₄ emissions from steel production, PFC emissions from aluminium production (except CF ₄ and C ₂ F ₆ , which were reported); CO ₂ emissions from paint application; CO ₂ emissions from degreasing and dry cleaning; CO ₂ emissions from chemical products, manufacturing and processing; CO ₂ emissions from other (solvent and product use); CH ₄ emissions from poultry (enteric fermentation); CH ₄ emissions from direct soil emissions; CH ₄ emissions from indirect soil emissions; CO ₂ emissions from solid waste disposal on land; N ₂ O emissions from sludge (industrial

Issue	Expert review team assessment	General findings and recommendations
Land use, land-use change and forestry ^a	Complete	<p>wastewater); and N₂O emissions from domestic and commercial wastewater</p> <p>The ERT encourages the Party to estimate and report emissions from all non-mandatory categories</p> <p>Mandatory: none</p>
KP-LULUCF	Complete	<p>Non-mandatory: Carbon stock change from: living biomass of wetland, settlements and other land remaining in these categories, and converted to other land uses; living biomass of annual cropland and grassland with no woody biomass remaining in these subcategories or converted to other subcategories or land uses; carbon stock change in dead organic matter for the categories cropland, grassland, wetlands, settlements and other land remaining in these categories as well as for conversions from these categories to other land uses except for grassland with woody biomass; all non-CO₂ emissions from drainage of soils and wetlands; CH₄ and N₂O emissions from biomass burning for wetlands remaining wetlands and for lands converted to wetlands; CO₂, CH₄ and N₂O emissions from biomass burning for settlements and other land</p> <p>The ERT encourages the Party to estimate and report emissions from all non-mandatory categories. In response to an earlier version of this report, New Zealand highlighted that no tier 1 methodology is provided for these categories in the IPCC good practice guidance for LULUCF</p>
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	<p>The ERT found the recalculations to be sufficiently transparent except for the industrial processes sector, and recommends that New Zealand improve the transparency of these recalculations. Please see paragraphs 34 and 35 below for category-specific findings</p>
Time-series consistency	Sufficiently consistent	
The ERT's findings on QA/QC procedures	Sufficient	<p>New Zealand has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures to key categories in accordance with that plan to key categories. For the agriculture sector, New Zealand has implemented both tier 1 and tier 2 quality checks. The ERT found the</p>

<i>Issue</i>	<i>Expert review team assessment</i>	<i>General findings and recommendations</i>
		Party's QA/QC procedures in general to be sufficient; however, there is some need to further develop the QA/QC procedures in the industrial processes sector. Please see paragraphs 35, 41 and 64 below for category-specific findings.
The ERT's findings on transparency	Sufficiently transparent	The ERT found lack of transparency in multiple sectors relating to assumptions and methodologies used that were not explained in sufficient detail to facilitate replication and assessment of the inventory. Please see below, for category-specific recommendations: the energy sector (paras. 27, 29, 30, 32), the industrial processes sector (paras. 38, 40, 42, 44), the agriculture sector (para. 53) the LULUCF sector (paras. 59, 62, 63) and the waste sector (paras. 68, 70, 71)

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, IPCC good practice guidance for LULUCF = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for 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, LULUCF = land use, land-use change and forestry, QA/QC = quality assurance/quality control.

^a The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the IPCC *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC good practice guidance for LULUCF.

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

12. The NIR describes the national system for the preparation of the inventory. The ERT noted that the NIR does not provide a clear statement on whether any changes have or have not occurred in the national system since the last annual submission, and recommends that the Party include such a statement in its NIR. As indicated by the Party during the review there were no changes to the inventory planning process. The description of the inventory planning process, as contained in the report of the individual review of the annual submission of New Zealand submitted in 2013,³ remains relevant.

Inventory preparation

13. Table 4 contains the ERT's assessment of New Zealand's inventory preparation process.

Table 4

Assessment of inventory preparation by New Zealand

<i>Issue</i>	<i>Expert review team assessment</i>	<i>ERT findings and recommendations</i>
<i>Key category analysis</i>		
Was the key category analysis	Yes	Level and trend analysis

³ FCCC/ARR/2013/NZL, paragraphs 10–14.

<i>Issue</i>	<i>Expert review team assessment</i>	<i>ERT findings and recommendations</i>
performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?		performed, including and excluding LULUCF
Approach followed?	Tier 1	The ERT encourages New Zealand to implement a tier 2 key category analysis (para. 16)
Were additional key categories identified using a qualitative approach?	No	The NIR does not specify whether additional key categories were identified using a qualitative approach .
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
<i>Assessment of uncertainty analysis</i>		
Approach followed?	Tier 1	In addition, tier 2 was used for N ₂ O emissions from agricultural soils
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = 17.8% Trend = 9.0%	
Quantitative uncertainty (excluding LULUCF)	Level = 13.3% Trend = 11.1%	

Abbreviations: ERT = expert review team, IPCC good practice guidance = the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

14. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by the Party in response to questions

raised by the ERT during the review. The ERT noted that New Zealand has included information on archiving in its NIR in response to the recommendation made in the previous review report. The ERT also concludes that the description of the inventory management process, as contained in the report of the individual review of the annual submission of New Zealand submitted in 2013,⁴ remains relevant.

5. Follow-up to previous reviews

15. The ERT notes that New Zealand has implemented the following improvements since the 2013 annual submission: further improvement of the transparency of the NIR by including information on archiving and by specifying the date when emission reduction units (ERUs) are issued, in the publicly available information, more information on recalculations and methodologies (in the energy and agriculture sectors), the correction of inconsistencies between the CRF tables and disaggregating emission estimates (in the energy sector); and the improvement of data quality (in the waste sector).

16. The ERT notes that, according to the UNFCCC Annex I reporting guidelines, applying a tier 2 approach to the key category analysis is not mandatory, but it encourages New Zealand to move to a tier 2 key category analysis. The ERT also noted the ongoing need to further improve the transparency of the inventory in most of the sectors, and to improve the quality assurance/quality control (QA/QC) procedures for the industrial processes sector as already recommended in previous review reports.

17. Recommendations made in previous review reports on sector-specific issues that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

18. In 2012, emissions from the energy sector amounted to 32,121.28 Gg CO₂ eq, or 42.2 per cent of total GHG emissions. Since 1990, emissions have increased by 36.3 per cent. The key drivers for the rise in emissions are the increase in emissions from road transportation and the increase in electricity and heat production. Within the sector, 42.8 per cent of the emissions were from transport, followed by 23.7 per cent from energy industries, 16.4 per cent from manufacturing industries and construction and 10.3 per cent from other sectors. Fugitive emissions from oil and natural gas accounted for 5.9 per cent and fugitive emissions from solid fuels accounted for 0.9 per cent. New Zealand reports emissions from other (energy) as not applicable (“NA”).

19. New Zealand has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations were in the following category: manufacturing industries and construction, with an increase of 92.47 Gg CO₂ eq for the year 2011. This increase was partly offset by recalculations in the category energy industries, where emissions were 53.37 Gg CO₂ eq lower in the year 2011. The most significant contribution to the overall net increase in emissions was a review of CO₂ emission factors (EFs) from solid fuels across the whole time series from 1990 to 2012 in response to recommendations made in the previous review report. Compared with the 2013 annual submission, the recalculations increased emissions in the energy sector by 168.11 Gg CO₂ eq (0.5 per cent), and increased total national emissions by 0.2 per cent. The

⁴ FCCC/ARR/2013/NZL, paragraphs 16–18.

recalculations were adequately explained, and the NIR (table 10.1.1) provides transparent information on the recalculations including the justification in the energy sector.

2. Reference and sectoral approaches

20. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 21–27 below.

Table 5

Review of reference and sectoral approaches

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross-reference</i>
Difference between the reference approach and the sectoral approach	Energy consumption: 75.40 PJ, 16.70% CO ₂ emissions: 2,632.48 Gg CO ₂ , 8.91%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Generally	See paragraphs 21–24 below
Are differences with international statistics adequately explained?	Yes	
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	See paragraph 25 below
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Generally	See paragraphs 26–27 below

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”.

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

21. The ERT notes that the difference between the reference and the sectoral approaches is very large in terms of CO₂ emissions (i.e. 8.9 per cent) and even larger in terms of energy consumption (i.e. 16.7 per cent). The ERT considers that part of this difference is due to non-energy use of fuels which has not been subtracted in CRF table 1.A(c). In response to the question raised by the ERT during the review, regarding a possible underestimation in the bottom-up approach which may not have reconciled differences between supply and demand, New Zealand replied that the differences between the sectoral and reference approaches is small when considering the justifications provided in table 3.3.3 of the NIR. For example, the difference in total CO₂ emissions reported in CRF table 1.A(c) of 8.9 per cent decreases to 2.3 per cent as reported in table 3.3.3 of the NIR. The Party also provided evidence that the statistical difference in the 2012 energy balance was about 2 per cent. The ERT considers that the bulk of the difference between both approaches is accounted for by the incorrect reporting of non-energy use of fuel and recommends that the Party subtract the values for non-energy use of fuel in CRF table 1.A(c) before performing the comparison between the reference and the sectoral approaches. The ERT notes that this would reduce the 2012 difference to around 3 per cent instead of the 16.7 per cent reported and would facilitate the review of this information in future annual submissions.

22. In the NIR it is stated that flared gas is included in the reference approach but excluded from the sectoral approach. The ERT noted that emissions from combined venting and flaring are reported in CRF table 1.B.2, and asked the Party to clarify whether having a commercial activity linked to flaring gas and included in the energy balance as part of primary consumption would justify its inclusion in the reference approach. The Party responded that gas production in the reference approach is calculated as gross production minus gas re-injected minus liquefied petroleum gas (LPG) extracted, and that any gas flared is therefore included in the reference approach. The ERT understands that the main objective of this calculation is to have a better overview of the differences between the reference and sectoral approaches that are not due to differences in reporting. However, indigenous production (as defined in energy statistics), is measured after purification and extraction of natural gas liquids and sulphur, excludes extraction losses and quantities re-injected, vented or flared, therefore additional subtractions or corrections by the Party may not be justified. The ERT recommends that New Zealand review its approach for justifying differences between the reference and sectoral approaches by taking into account the definitions applied in energy statistics and report on this review in its NIR.

23. New Zealand reports that the remaining difference between the reference and sectoral approaches in 2012 is within the accepted tolerance threshold of 5 per cent between the two approaches. During the review, in response to a question raised by the ERT, the Party clarified that this 5 per cent threshold is the nominal uncertainty range for CO₂ emissions estimates from fuel combustion, as reported in table A7.1.1 of the NIR. The Party also noted that a significant difference (greater than 5 per cent) indicates a likely issue, while a difference of less than 5 per cent would be within the uncertainty range. The ERT notes that 5 per cent may be too high a threshold given the size and importance of emissions from the energy sector and recommends that the Party use the threshold of 2 per cent as referenced in 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) instead of 5 per cent as an indication of a discrepancy between emissions from the top-down reference approach and the bottom-up sectoral approach requiring additional explanations in the NIR. The ERT recommends that non-energy use of fuels be excluded from CRF table 1.A(c) before this verification is carried out.

24. The ERT noted that New Zealand combines in the reference approach the reporting of LPG, a secondary fuel, with natural gas liquids, a primary fuel. During the review, in response to a question raised by the ERT, the Party clarified that LPG in New Zealand is not produced at petroleum refineries, but separated at gas processing facilities and therefore is essentially a primary fuel and not a secondary fuel. The ERT also noted that New Zealand reports naphtha together with crude oil, and lubricants and petroleum coke together with bitumen. During the review, the Party informed the ERT that work is in progress to correct this and is dependent on a system upgrade (e.g. the commissioning of a new energy database) before it can disaggregate the fuels. The ERT recommends that New Zealand endeavour to separate these fuels with a view to improving the transparency of the reference approach and the accuracy of the reporting of non-energy use of fuels and feedstocks, focusing resources, as appropriate, on improvements in line with the principles of IPCC good practice.

International bunker fuels

25. The ERT found that discrepancies occur between CRF table 1.C and CRF table 1.A(b) for jet kerosene (international aviation bunkers), gas/diesel oil (international marine bunkers) and residual fuel oil (international marine bunkers) for all years. In response to a question raised by the ERT, the Party explained that CRF table 1.A(b) draws on data from supply-side returns while CRF table 1.C includes data from demand-side returns for

consistency with the sectoral approach. New Zealand explained that the remaining discrepancies are being investigated and are related to the use of the monthly oil supply (MOS) survey, for the reference approach, compared to the delivery of petroleum fuels by industry (DPFI) survey for the sectoral approach. The Party considers that the DPFI survey is of higher quality, more accurate and provides a more detailed breakdown of sales. The MOS survey is a calculated oil supply balance based on stock changes and physical stock movements. To ensure consistency with the sectoral approach the DPFI survey is also used to report CRF table 1.C. The ERT notes that these discrepancies are small and do not affect the quality of New Zealand's inventory, but recommends that the Party endeavour to reconcile the differences between both surveys and/or to consider using the DPFI survey to report fuel consumption in the reference approach to ensure greater consistency.

Feedstocks and non-energy use of fuels

26. The ERT found that the sum of total carbon stored reported by New Zealand in CRF table 1.A(b) of 2,475.91 Gg CO₂ eq (i.e. 675.25 Gg C multiplied by 44/12) does not equal the sum of CO₂ not emitted as reported in CRF table 1.A(d) (i.e. 2,479.33 Gg CO₂ eq). This very small difference seems to be due to the inclusion of carbon stored from coal used in iron and steel in CRF table 1.A(d). Also, the difference between apparent consumption and apparent consumption excluding non-energy use of fuels and feedstocks in CRF table 1.A(c) is zero, and not equal to the sum of all fuel quantities reported in CRF table 1.A(d) (i.e. 61,116.53 TJ). In addition to these findings, regarding the consistency of the reported information, the ERT considers that the reporting of non-energy use of fuels and feedstocks could be improved in relation to transparency. For example, the relevant information in the last three columns of CRF table 1.A(d) (i.e. subtracted from the energy sector, associated CO₂ emissions and allocated under) has not been reported. The ERT recommends that New Zealand improve its reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d) as well as the consistency between CRF tables 1.A(b), 1.A(c) and 1.A(d) in its annual submission.

27. New Zealand reports on four main sources of stored carbon in the country: natural gas used in methanol production, natural gas used in urea production, bitumen for road asphalt, and coal used in the iron and steel industry. The ERT notes that the fraction of carbon stored in natural gas consumption in CRF table 1.A(d) of 0.98 is significantly larger than the IPCC default of 0.33. During the review, the ERT asked the Party to: (a) justify the fraction of carbon stored of 0.98 for natural gas; (b) indicate how the fuel quantity for natural gas used as feedstock reported in column 1 of CRF table 1.A(d) is allocated to methanol production and urea production in the industrial processes sector; and (c) provide evidence that emissions are not underestimated in the energy sector by an amount equal to the fuel quantity reported times the difference between the reported fraction (0.98) and the default IPCC value (0.33). New Zealand responded that the fraction of carbon stored for natural gas can be broken down into four industries: methanol, 1.00; urea, 0.86; hydrogen, 0.00; steel, 0.00. Regarding methanol, the Party noted that the available data on gas supplied to the methanol plants does not allow feedstock to be clearly distinguished from gas for combustion. The quantity of feedstock gas is therefore calculated using a carbon balance based on the quantity of methanol produced. Gas used for energy generation is then calculated as total gas consumed minus feedstock gas. Regarding urea, the split of feedstock gas and fuel gas is provided by the company. Although most of the carbon in feedstock gas used for urea production is stored in the product, this carbon is later emitted when the urea is used on farms as fertilizer. These emissions are reported in the industrial processes sector under ammonia production (all ammonia produced in New Zealand is processed into urea). The ERT notes that New Zealand has provided transparent explanations during the review and recommends that the Party improve the transparency of the reporting of feedstocks and non-energy use of fuel in both CRF table 1.A(d) and the NIR in its annual submission.

3. Key categories

Stationary combustion: solid fuels – CO₂

28. In the NIR it is stated that “A review of New Zealand’s coal emission factors in preparation for the New Zealand emissions trading scheme (ETS) (CRL Energy Ltd, 2009) recommended re-weighting the current default emission factors to 2007 production rather than continue with those in the New Zealand Energy Information Handbook (Baines, 1993). However, following review of our 2013 submission, the ERT recommended interpolating the emission factors between 1990 and 2008. In response to a question raised by the ERT during the review, New Zealand responded that, in the 2013 annual review report, the previous ERT considered an EF derived from 2007 production data to be appropriate for calculating emissions for recent years and the EFs from the New Zealand Energy Information Handbook better suited to earlier years. The current ERT appreciates the efforts made by New Zealand to address recommendations made in previous review reports, but also considers that EFs based on data from the New Zealand ETS may be more appropriate and accurate. The ERT does not want New Zealand to change the EFs again, but recommends that New Zealand critically assess whether the ETS factors reviewed in 2009 are indeed more appropriate for the estimation of emissions from solid fuels and report on this assessment in its annual submission.

Road transportation: liquid fuels – CO₂

29. During the review, the ERT noted that the CO₂ EF for gasoline used in road transportation in New Zealand was comparatively low. For instance, the Party reports the value of 65.93 t/TJ in gross calorific value (GCV) in the CRF tables for the year 2012, which is 69.40 t/TJ when converted to net calorific values (NCVs). In response to the question raised by the ERT during the review regarding the properties of the gasoline from New Zealand Refinery Company, the Party stated that the UNFCCC secretariat uses a conversion factor of around 1.053 from GCV to NCV, whereas the actual ratio for gasoline should be closer to 1.071, and also stated that the carbon content and calorific values of all fuels are reported annually by New Zealand’s only refinery. The ERT encourages the Party to report in terms of NCVs in the future, and to include information on the conversion factors applied in the NIR. The ERT recommends that New Zealand include the calorific values provided by New Zealand Refinery Company in the NIR in order to improve transparency and to facilitate the work of future reviews. The ERT encourages the Party to use table A2.1 of annex 2 to the NIR to report the NCV and GCV for each fuel.

Oil and natural gas: liquid and gaseous fuels – CO₂, CH₄

30. The ERT notes that New Zealand does not report CO₂ and CH₄ emissions from oil exploration and production separately from emissions from natural gas exploration and production/processing. During the review, in response to questions raised by the ERT, New Zealand explained that exploration is conducted for both oil and gas simultaneously within a field/facility and that the activity cannot be separated into oil exploration and gas exploration. Emissions from oil exploration are reported together with emissions from gas exploration under oil exploration (1.B.2.b (i)). The Party also noted that all the petroleum fields in New Zealand produce both oil and gas combined and that therefore their associated emissions cannot be separated into oil production and gas production. The combined emissions from oil and natural gas production are reported under flaring combined (1.B.2.c (iii)). The ERT considers that although it may be more appropriate for New Zealand to report those emissions under oil and gas combined, this partly reduces the comparability of its emission estimates with other Parties included in Annex I to the Convention. The ERT recommends that New Zealand improve the reporting of this information by endeavouring to provide the required breakdown in the CRF tables and by improving the transparency of the information reported in the NIR regarding

methodological issues related to the categories oil exploration and production (1.B.2.a (i, ii)) and natural gas exploration and production/processing (1.B.2.b (i, ii)) in its annual submission.

4. Non-key categories

Stationary combustion: biomass – CH₄, N₂O

31. The ERT notes that the CH₄ and N₂O EFs for biomass input to public electricity and heat production reported by New Zealand in the CRF tables for the energy sector and the NIR are low (i.e. 1.08 kg/TJ and 2.07 kg/TJ, respectively). During the review, the ERT asked the Party to clarify whether wood combustion takes place in the category or whether biogas is the only biogenic fuel used in power plants. The ERT considers that the NIR provides information that can lead to confusion. For instance, the NIR says: (a) that 1 per cent of electricity generation comes from “biomass” (page 70); (b) that EFs from “wood” combustion are estimated using the default methodologies in the *IPCC Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) (page 64); and (c) that most solid biomass is used by the pulp/paper industry (page 75), but it is not clear if “most” refers to the category manufacturing industries and construction or to all combustion activities. New Zealand clarified, in response to questions raised by the ERT during the review, that the above-mentioned EFs are solely for biogas, as mentioned in the NIR annex 2, tables A2.3 and A2.4. The Party also notes that cogeneration (including cogeneration using solid biomass) is not included in the category public electricity and heat production, but in the appropriate industrial sector, which is usually manufacturing industries and construction. The ERT agrees with these explanations and recommends that the Party improve the transparency of this information by, for example, including a table with the consumption of biomass, emissions and EFs by gas and type of biomass, and allocate the emissions to the appropriate categories in the CRF tables in its annual submission.

Other (energy): liquid fuels – CO₂, CH₄, N₂O

32. There is no information regarding the reporting of emissions from military activity in New Zealand’s NIR. The previous review report⁵ stated that New Zealand does not collect data that would enable these emissions to be reported separately. During the review, the ERT asked the Party to explain where these emissions are reported in the inventory. New Zealand responded that emissions from military activities are collected and reported as part of the commercial sector and that it is not currently possible to separate out emissions from military use. The Party also explained that since it is not a key category it has been prioritized lower than other potential improvements. The ERT notes that the Party cannot know whether military emissions are a key category without being able to quantify them separately. The ERT recommends that New Zealand allocate mobile military emissions to the category other (energy) – military to the extent possible and improve the transparency in the NIR regarding these emissions.

C. Industrial processes and solvent and other product use

1. Sector overview

33. In 2012, emissions from the industrial processes sector amounted to 5,276.80 Gg CO₂ eq, or 6.9 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 34.10 Gg CO₂ eq, or 0.04 per cent of total GHG emissions.

⁵ FCCC/ARR/2013/NZL, paragraph 24.

Since 1990, emissions have increased by 61.8 per cent in the industrial processes sector and decreased by 17.9 per cent in the solvent and other product use sector. The key drivers for the rise in emissions in the industrial processes sector are increases in emissions from iron and steel production and refrigeration and air-conditioning equipment. Within the industrial processes sector, 43.2 per cent of the emissions were from metal production, followed by 34.6 per cent from consumption of halocarbons and SF₆ and 14.3 per cent from mineral products. Chemical industry accounted for 7.9 per cent. Emissions from other production and other (industrial processes) were reported as “NA” and emissions from production of halocarbons and SF₆ were reported as “NA” and “NO” (not occurring).

34. New Zealand has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The two most significant recalculations made by New Zealand between the 2013 and 2014 annual submissions were in the following categories: chemical industry and consumption of halocarbons and SF₆. The recalculations were made following changes in activity data (AD) for ammonia production and in order to rectify identified errors in the category electrical equipment. Compared with the 2013 annual submission, the recalculations decreased emissions in the industrial processes sector by 160.53 Gg CO₂ eq (2.9 per cent), and decreased total national emissions by 0.2 per cent. The ERT found that recalculations were not adequately explained. New Zealand provided in its NIR only a short description on what was recalculated without providing any background information and figures. Moreover, the recalculation of emissions from ammonia production was applied in parallel with relocating emissions from the industrial processes sector to the energy sector, which significantly lowered the transparency of the recalculations.

35. The justification provided by New Zealand in its NIR related to the recalculation of emissions from consumption of halocarbons and SF₆ for electrical equipment was: the correction of errors in data obtained from companies resulting in the revision of the capacity of the equipment. The ERT considers that this explanation is not sufficient to assess if the new values were estimated in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. New Zealand also does not provide information on how it is going to ensure it eliminates this type of error in future annual submissions. The ERT accepts the corrected data, and recommends that New Zealand improve the description of the recalculations and improve QA/QC activities to rectify the above-mentioned errors in the preparation of the inventory.

36. The ERT identified the following five categories in the industrial processes sector for which the AD are reported as “C” (confidential) owing to the limited number of producers/consumers: cement production, limestone and dolomite use, soda ash use, glass production and steel (steel slab production). For cement production, limestone and dolomite use, soda ash use and iron and steel production New Zealand has reported CO₂ emission estimates for each category. For glass production, CO₂ emissions have been reported as “IE” (included elsewhere) and they have been reported under limestone and dolomite use and soda ash use. In response to questions raised by the ERT during the review, the Party made the requested confidential data available to the ERT. The ERT commends New Zealand for providing confidential data to the ERT. The ERT reiterates the recommendation made in the previous review report that New Zealand continue its efforts to improve the transparency of its reporting regarding information from these processes by providing more detailed information in the NIR, while maintaining the confidentiality of the sensitive data.

37. As was noted in the 2013 annual review report, the use of plant-specific emission estimates reported under the New Zealand ETS is prevalent in the industrial processes sector (e.g. cement, glass and lime production). The ERT noted that New Zealand did not improve the transparency of the NIR related to information on the methodologies used by

the plants to estimate these emissions. The ERT also notes that background information on the methodology for estimating plant-specific emissions is not available and the ERT was thus not able to review the estimates and whether they are prepared in accordance with the IPCC good practice guidance. The ERT reiterates the recommendation made in the previous review report that New Zealand include in its NIR detailed information and methodological descriptions on how plant-specific data are estimated. Such information can include frequency of measurements, source streams considered and information on uncertainty tolerances for measurements of different parameters.

2. Key categories

Consumption of halocarbons and SE₆ – HFCs and PFCs

38. The ERT noted that the description provided in the NIR is not sufficient for it to understand the methodology and assumptions used for the reported estimates. Necessary information, such as average fluorinated gases filled into new manufactured products and the expected lifetime of equipment, is provided in a report by external consultants (Hennessy and Gazo, 2014) which are confidential. New Zealand, in response to a question raised by the ERT during the review, provided the required information and explained how its methodology is in line with the IPCC good practice guidance. The ERT recommends that New Zealand include background information in its NIR to ensure that all subcategories are reported in line with the IPCC methodology, while maintaining confidentiality of sensitive data.

39. New Zealand reported the amount of fluid in operating systems and in products at decommissioning as “NE” (not estimated) from domestic refrigeration for perfluoropropane, HFC-152a and HFC-23 in 2012. At the same time, emissions from stocks for those gases were reported as “NA” and disposal emissions as “NE”. The background reference material provided in response to questions raised by the ERT during the review (mentioned in paragraph 39 above) states that emissions for these gases are not occurring from manufacturing, operating and decommissioning of the products. The ERT recommends that New Zealand change the notation keys to “NO” for domestic refrigeration.

40. New Zealand reported disposal emissions from the use of HFC-134a and HFC-227ea in foam blowing as “NE”. The same notation key was used in disposal emissions of HFC-227ea in fire extinguishers. In both cases the Party reported emission figures for operation systems. In response to questions raised by the ERT during the review, the Party explained that it used the tier 1a approach, which does not require the estimation of emissions after decommissioning and disposal of equipment containing foam, and that, in fact, the use of the notation key “NE” in this case was an error. The Party considers that it should change this notation key to “NA”. The ERT considers this information to be misleading, because the tier 1a approach requires estimates of disposal emissions for closed-cell foams. However, the Party assumed a lifetime of 20 years, with the first use identified in the year 2000. For open-cell foam all HFCs are assumed to be released immediately. During the review week, New Zealand submitted tables with notation keys revised to “NA”. The ERT recommends that New Zealand improve the transparency of its reporting by providing a clear and detailed description of the emission estimation process in the NIR.

41. Additionally, the Party explained that the inclusion of foam blowing in the list of key categories (in the NIR table 1.5.1 and table 4.1.1) was also an error. As indicated in the Party’s key category analysis (table A1.3.3 in the NIR) foam blowing is not a key category. The ERT recommends that New Zealand apply more specific QA/QC procedures that ensure that this kind of an error is avoided at the inventory preparation stage.

42. New Zealand reported the notation key “NE” for disposal emissions of HFC-227ea in fire extinguishers. In response to a question raised by the ERT during the review, the Party explained that this is the same situation as with foam blowing, where the applied methodology does not require estimates for that activity. The provided reference material (Hennessy and Gazo, 2014) showed that, in fact, the main reason for not estimating disposal emissions is the long lifetime of the equipment, assumed to be 15–35 years. The ERT accepts this assumption; however, the same reference material also provides the assumption that all HFCs from retired units are later reused in other equipment, which seems not to be realistic. During the review week New Zealand submitted tables with notation keys revised to “NA”. The ERT recommends that New Zealand improve the description of the methodology used for estimating HFC emissions from fire extinguishers and further investigate if decommissioning is not occurring in New Zealand.

3. Non-key categories

Soda ash production and use – CO₂

43. The ERT noted that, following the recommendation made in the previous review report, the NIR states that, for soda ash use, the default CO₂ EF is used (415 kg/tonne). AD are reported as “C” but the ERT noted that because emissions are reported, the AD can be calculated simply by dividing emissions by the default CO₂ EF. The ERT reiterates the recommendation made in the previous review report that New Zealand report AD for soda ash use.

Other (mineral products) – CO₂

44. New Zealand reported in its NIR that CO₂ emissions from glass production were reported in the categories limestone and dolomite use, and soda ash use for reasons of confidentiality. The ERT noted that AD for both of those categories were also marked as “C”, although CO₂ emissions were reported. Due to parallel reallocation of emissions, together with maintaining confidentiality for AD and implied emission factors (IEFs), the ERT was not able to assess if the estimates are in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The Party provided clarifications during the review week which were deemed satisfactory and therefore the ERT recommends that New Zealand improve the transparency of its reporting by limiting the number of emission reallocations and the use of confidential data.

D. Agriculture

1. Sector overview

45. The agriculture sector is the main sector in the GHG inventory of New Zealand. In 2012, emissions from the agriculture sector amounted to 35,020.13 Gg CO₂ eq, or 46.1 per cent of total GHG emissions. Since 1990, emissions have increased by 14.9 per cent. The key drivers for the rise in emissions are an increase in the dairy cattle population (because of higher relative returns achieved by the dairy sector) and the amount of nitrogen applied as fertilizer. Within the sector, 68.3 per cent of the emissions were from enteric fermentation, followed by 29.5 per cent from agricultural soils, 2.0 per cent from manure management and 0.1 per cent from field burning of agricultural residues. Prescribed burning of savannas accounted for less than 0.1 per cent. Emissions from rice cultivation are reported as “NO”.

46. New Zealand has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by New Zealand between the 2013 and 2014 annual submissions had impacts on the following categories: enteric fermentation, manure management and agricultural soils. The recalculations were

made following changes in AD and EFs (in particular in the tier 2 model for livestock population, productivity and energy equations, and the reduction of the fraction of nitrogen from fertilizer that volatilizes as nitrogen oxide and ammonia where urease inhibitors are used). Compared with the 2013 annual submission, the recalculations decreased emissions in the agriculture sector by 198.39 Gg CO₂ eq (0.6 per cent), and decreased total national emissions by 0.3 per cent. The recalculations were adequately explained.

47. During the review week the ERT found a minor inconsistency in the reporting of the EF for swine, which was in some parts of the NIR reported as country specific and in others as the IPCC default value. In response to a question raised by the ERT during the review on this issue, New Zealand explained that table A3.1.5 in annex 3 of the NIR needs to be updated for enteric fermentation and manure management CH₄ emissions from swine. The country-specific enteric fermentation EF for swine is 1.06 kg CH₄/head/year and the country-specific manure management EF is 5.94 kg CH₄/head/year. New Zealand also explained that it does not use IPCC defaults for swine. The ERT recommends that New Zealand correct this inconsistency in the annual submission.

2. Key categories

Enteric fermentation – CH₄

48. New Zealand uses a tier 2 country-specific methodology (based on a nutritional and energy model) to calculate EFs for enteric fermentation from dairy cattle, non-dairy cattle, sheep and deer, which is in line with the IPCC good practice guidance. Emissions from other livestock were estimated using tier 1 methods and default EFs (horses, alpaca, mules and asses) or a country-specific EF (goats and swine). This is in line with the IPCC good practice guidance.

49. Following recommendations made in previous review reports, New Zealand has improved the transparency of the category, by including for example information on: why some of the country-specific EFs are lower than the IPCC default values; how the monthly milk production is calculated; and the progress of the research project on pasture quality. The ERT commends New Zealand for such improvements.

50. In the NIR, New Zealand has listed several planned further improvements related to the tier 2 model, some of which could be implemented in time for the 2015 annual submission (e.g. the review of national data verifying the values used for the metabolizable energy and nitrogen content of pasture) and other improvements that will probably be introduced in future annual submissions (e.g. an update of the current estimate of the relationship between dry matter intake and CH₄ for lactating cattle and sheep EFs based on the results of recent trials using new calorimeters; an update of the values used for metabolizable energy and nitrogen content of pasture based on future measurements). The ERT commends New Zealand for such improvements and encourages the Party to report back on progress in its annual submissions.

Manure management – CH₄ and N₂O

51. A tier 2 country-specific methodology (based on e.g. the estimation of the total faecal material produced; the partitioning of this material between that deposited directly onto pastures and that stored in anaerobic lagoons; feed intake; nitrogen content of feed; and country-specific EFs) are used to estimate emissions from key subcategories (i.e. dairy cattle, non-dairy cattle, sheep and deer). Emissions from other livestock were estimated using tier 1 methods and default EFs (goats, horses, mule and asses) or a country-specific EF (swine, poultry and alpaca), all in line with the IPCC good practice guidance.

52. Following a recommendation made in the previous review report, New Zealand has introduced additional text in the NIR to further explain/update the partition of excreted

nitrogen into nitrogen from urine and nitrogen from dung. New Zealand is planning to conduct a wider review of available data to improve further the accuracy of partitioning nitrogen in excreta between dung and urine and to possibly differentiate the partitioning for different livestock. The results will be presented to a meeting of the national Agriculture Inventory Advisory Panel.⁶ The ERT commends New Zealand for such improvements and encourages the Party to report back on the progress in its annual submissions.

53. New Zealand uses an Australian Feeding Standards algorithm in order to estimate manure management emissions of CH₄ for cattle and sheep, since these algorithms better reflect the New Zealand agricultural situation. In the previous review report, the ERT recommended New Zealand to include access to information in the Australian Feeding Standards algorithms and to provide explanations of the differences between the estimates produced by the New Zealand methodology and the IPCC tier 2 methodologies. During the review, in response to a question raised by the ERT, New Zealand explained that the references and background studies are still planned to be posted onto the website of the Ministry for Primary Industries⁷ during a project to update that website, and that also other reports supporting New Zealand's inventory for the agriculture sector will be added to the new website over the coming year. The ERT reiterates the recommendation made in the previous review report that New Zealand provide information on the Australian Feeding Standards algorithms for cattle and sheep in order to estimate manure management emissions of CH₄ and to provide explanations for the differences between the estimates produced by the methodologies used by New Zealand and the IPCC tier 2 methodologies.

Direct soil emissions – N₂O

54. New Zealand uses country-specific EFs that are based on in-country research to estimate direct emissions from soils. Following recommendations made in previous review reports New Zealand has made small amendments to the 2014 NIR to clarify the use of a weighted average to derive the EF and the methodology used to carry out the uncertainty analysis. In response to questions raised by the ERT during the review, New Zealand stated that it is “aiming to update the uncertainty analysis for the 2015 submission or the 2016 submission at the latest”. The ERT welcomes the improvements made and encourages the Party to report back on the progress on the uncertainty analysis in its annual submissions.

55. In its 2014 NIR New Zealand has presented the mitigation results from the application of urease inhibitors. Urease inhibitors have been applied in New Zealand from 2001 to the present. Calculations for urease inhibitors are weight-based (i.e. on the weight of nitrogen that is applied with urease inhibitors). Urease data are provided directly by one company (Ballance-Agrinutrients) that is importing and applying the urease inhibitor. In response to questions raised by the ERT during the review, New Zealand informed the ERT that urease inhibitor data for 2001–2007 are being reviewed in preparation for the 2015 annual submission, and, in response to questions related to the methodology used to estimate the emissions, presented a copy of the study by Saggar et al (2013),⁸ that suggest that the application rate of 0.025 per cent reduces ammonia emissions by 44.7 per cent, on average, with a confidence interval of 39–50 per cent. On this basis, a New Zealand specific value of 0.055 for Frac_{GASF} FNUI (fraction of urease inhibitor treated total fertilizer nitrogen emitted as ammonia) is used. In the study, it is stated that it was not possible to

⁶ See <<http://www.mpi.govt.nz/news-resources/statistics-forecasting/greenhouse-gas/agricultural-greenhouse-gas-inventory-panel>>.

⁷ See <<http://mpi.govt.nz/news-and-resources/statistics-and-forecasting/greenhouse-gas-reporting>>.

⁸ Saggar S, Singh J, Giltrap DL, Zaman M, Luo J, Rollo M, Kim D-G, Rys G and van der Weerden TJ. 2013. Quantification of reductions in ammonia emissions from fertiliser urea and animal urine in grazed pastures with urease inhibitors for agriculture inventory: New Zealand as a case study. *Science of the Total Environment*. 465: pp.136–146.

accurately measure the efficacy of urease inhibitors in reducing ammonia emissions from animal urine-N deposited during grazing, and therefore the Party decided not to adopt a $\text{Frac}_{\text{GASM}}$ value adjusted for the inclusion of urease inhibitors. New Zealand also explained that urease inhibitors have no effect on the estimate of total emissions from agriculture using the Revised 1996 Guidelines and the IPCC good practice guidance. Under the specifications of the Revised 1996 IPCC Guidelines urease inhibitors reduce emissions from volatilization by the same amount that emissions from direct N_2O are increased, because the Revised 1996 IPCC Guidelines adjust for volatilization. The 2006 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the 2006 IPCC Guidelines), which will be used from 2015 onwards, do not adjust direct N_2O from fertilizer for volatilization and so for the 2015 annual submission there will be a small reduction in the estimate of emissions from using urease inhibitors. The ERT welcomes the information presented and the revisions planned, and recommends that the above-mentioned study is made available on the website of the Ministry for Primary Industries.

56. In relation to the emission factor for indirect N_2O emissions from leaching and run-off, in particular the river component, the Party's initial studies did not measure an EF for leaching and run-off from rivers higher than 0.005 kilograms $\text{N}_2\text{O-N/kg N}_{\text{LEACHED}}$ (IPCC default value is 0.0075 kilograms $\text{N}_2\text{O-N/kg N}_{\text{LEACHED}}$). This could be explained since rivers in New Zealand are short and fast-flowing, compared with rivers in other parts of the world on which the IPCC default values are based. In the light of this initial evidence, New Zealand had planned further studies in order to consider what value should be a country-specific emission factor. During the review, in response to a question raised by the ERT, New Zealand explained that a previously planned improvement for EF5 will not be carried out. According to New Zealand there is not sufficient justification to change the default EF from the 2006 IPCC Guidelines as earlier planned. According to New Zealand "given the greater contact with sediments in the drains and the relatively slow velocity of drains it may be that EF5 from drains is comparatively high when compared to larger water ways within New Zealand".

E. Land use, land-use change and forestry

1. Sector overview

57. In 2012, net removals from the LULUCF sector amounted to 26,598.32 Gg CO_2 eq. Since 1990, net removals have decreased by 28.6 per cent. The key drivers for the fall in removals are the result of increased harvesting of plantation forests and a shift between grassland subcategories and the conversion from plantation forests to grassland. Within the sector, 33,149.94 Gg CO_2 eq of net removals were from forest land, followed by 2.99 Gg CO_2 eq from settlements. Net emissions were reported from grassland (5,985.14 Gg CO_2 eq), cropland (507.25 Gg CO_2 eq) and wetlands (44.45 Gg CO_2 eq). The remaining 17.77 Gg CO_2 eq net emissions were from other land. Emissions from other (LULUCF) were reported as "IE", "NA", "NE".

58. New Zealand has made recalculations between the 2013 and 2014 annual submissions for all categories of this sector. The two most significant recalculations made by New Zealand between the 2013 and 2014 annual submissions were in the following categories: forest land and grassland. The recalculations were made in response to the 2013 annual review report and following changes in AD and EFs. Compared with the 2013 annual submission, the recalculation increased removals in the LULUCF sector by 16,054.66 Gg CO_2 eq (118.6 per cent) in 2011. The recalculations were adequately explained.

59. New Zealand reports, for the first time, AD based on the completed land-use map for 2012 and improved land-use maps for 1990 and 2008. The main sources for the land-

use maps are satellite imagery and aerial photography. The land-use information from the three maps is interpolated to obtain a complete time series of land-use change from 1990 to 2012. The new land-use data have enabled New Zealand to improve the accuracy of land-use change data in comparison to the previous annual submission, when it explained that areas of less than 100 ha and hence areas smaller than 100 ha could not be reported. Some land-use conversions were therefore reported as not occurring (“NO”) in previous annual submissions. The ERT commends New Zealand for this improvement, made in response to the recommendations made in the previous review reports. However, the ERT noted that New Zealand has reported three land-use change matrices, one for the years 1962–1989, one for 1990–2012 and one for 2011–2012. In response to a question raised by the ERT during the review New Zealand provided more detailed information on the times series. The ERT recommends that New Zealand provide additional information on the time series, particularly regarding conversions from and to forest land in its annual submission.

60. In response to a recommendation made in the previous review report, New Zealand has reported steady state carbon stocks of all subcategories and has applied a tier 2 instead of tier 1 approach to calculate estimates from the stock change of soil organic carbon (SOC) of mineral soils. The ERT commends New Zealand for the improvement but notes that some of the steady state SOC stocks should be verified. Particularly in need of verification are the values for SOC reference stocks of mineral soils in the settlements and other land categories seem high compared with the stocks of forest or grassland soils. The ERT encourages New Zealand to verify certain SOC reference stocks, to improve the estimates of emissions and removals from conversions from and to these land-use categories.

2. Key categories

Forest land remaining forest land – CO₂

61. In response to a recommendation made in the previous review reports, New Zealand reported for the first time estimates for changes in carbon stocks of living biomass and dead organic matter for natural forests. These forests are estimated as a net sink by the stock change approach based on a remeasurement of the plot network in those forests. In addition, AD and EFs were updated. These updates result in an increase of removals by 41.2 per cent in 1990 and 100.2 per cent in 2012 mainly due to removals to natural forests. The ERT commends New Zealand for this effort.

62. In response to a recommendation made in the previous review report, New Zealand provided additional information on the methods applied which are leading to large inter-annual variations in estimates. In response to a question raised by the ERT during the review, New Zealand provided, inter alia, a graph of the times series of annually harvested areas from forest land remaining forest land and harvests including forest land that has been converted to other land uses. The ERT recommends that New Zealand include such information on the time series in the NIR to explain the inter-annual variations.

Forest land converted to other land uses – CO₂

63. The new land-use mapping methodology based on SPOT satellite imagery with a resolution of 10 m allowed a more accurate classification of land use and land-use change and, among other things, a stratification of grassland with woody biomass and an improved identification of conversions from different forest land subcategories to the grassland subcategories. The recalculation resulted in an increase of the area of forest land converted to grassland by 138.2 kha in 1990 and 42.2 kha in 2011 and an increase in emissions of 42.23 Gg CO₂ and 1,643.71 Gg CO₂ in 1990 and 2011, respectively. The ERT commends New Zealand for the efforts made to increase the accuracy of its reporting. The ERT noted large inter-annual variation in the emissions from conversions from forest land to cropland and conversions from forest land to grassland. In responding to a question raised by the

ERT during the review, New Zealand provided detailed time series from 1962 to 2012 on conversions from forest land to cropland and grassland, explaining the variation of annual emissions from those conversions. The ERT recommends that New Zealand include such information in the NIR to explain the inter-annual variations.

3. Non-key categories

Biomass burning – CO₂, CH₄ and N₂O

64. New Zealand has reported for the first time controlled burning associated with deforestation and it used annual estimates replacing averages reported in the previous annual submissions. Controlled burning of grassland with woody biomass for the establishment or re-establishment of pasture is explained in the NIR as being reported under the agriculture sector. However, the ERT did not find any indication on emissions from burning of woody biomass in the agriculture sector. In response to an earlier version of this report, New Zealand explained that controlled burning of grassland, which includes the subcategory grassland with woody biomass, is reported under the agriculture sector within “Prescribed burning of savannah” (NIR 2014, section 6.6, pages 198–200). In CRF table 5(V) it is indicated that emissions from prescribed burning of grassland remaining grassland are reported in the agriculture sector. Table 6.6.1 of the NIR provides the EFs used; for above ground biomass, an EF of 28 t dm/ha is used. Responding to a question raised by the ERT during the review, New Zealand explained that it will report controlled burning of grassland with woody biomass in the LULUCF sector in its next annual submission. The ERT commends the Party for its improvement efforts and welcomes the planned transfer of the estimates to the LULUCF sector. Regarding CH₄ and N₂O emissions, New Zealand reported cropland remaining cropland, forest land converted to cropland and wildfire on land converted from forest land to grassland as “NE,” indicating in comments in the CRF table that these are very minor activities and that there is insufficient information available to estimate values, instead of reporting “IE” to reflect that these emissions are reported under the agriculture sector. The ERT recommends that New Zealand improve its QA/QC procedures to ensure the correct use of notation keys.

F. Waste

1. Sector overview

65. In 2012, emissions from the waste sector amounted to 3,595.67 Gg CO₂ eq, or 4.7 per cent of total GHG emissions. Since 1990, emissions have increased by 8.7 per cent. The key drivers for the rise in emissions are a rise in solid waste disposal on land and, recently, a rise in the volume of total wastewater processed in wastewater handling. Within the sector, 86.8 per cent of the emissions were from solid waste disposal on land, followed by 13.2 per cent from wastewater handling. The remaining 0.1 per cent were from waste incineration. Emissions from other (waste) were reported as “NO”.

66. The Party has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by New Zealand between the 2013 and 2014 annual submissions were in the following categories: solid waste disposal on land and wastewater handling. The recalculations were made in response to recommendations in the 2013 annual review report and following changes in AD and EFs. Compared with the 2013 annual submission, the recalculations increased emissions in the waste sector by 1,660.77 Gg CO₂ eq (83.6 per cent), and increased total national emissions by 2.3 per cent. The recalculations were adequately explained. They were made on the basis of unpublished reports, which New Zealand shared with the ERT during the review. The ERT noted with appreciation the improvement of the completeness of the inventory for

solid waste disposal on land and wastewater handling, particularly from key industries such as meat processing, pulp and paper, dairy, wine and wool scouring.

67. The ERT noted that QA/QC procedures have been enhanced in several categories. The ERT encourages New Zealand to further improve the QA/QC procedures in the remaining categories (domestic and industrial sludge and waste incineration) as indicated in the NIR.

2. Key categories

Solid waste disposal on land – CH₄

68. New Zealand has carried out major improvements in this key category on the basis of national studies. The ERT considers that the improvements are justified. The results of these studies were referenced in the NIR and provided to the ERT upon request. The ERT considers that transparency of the documentation of the inventory for this category needs to be enhanced and recommends that New Zealand publish the reports or make the information in the reports available by other means (e.g. by submitting a summary in the NIR).

69. During the review, New Zealand identified a mistake in its submission related to AD, and therefore its IEF, and submitted revised AD on annual municipal solid waste at solid waste disposal sites and the IEF for managed waste disposal on land in CRF table 6.A for years 2008–2011 (cells B11 and E11). This change does not affect the reported emission values under this category. The ERT welcomes this improvement.

Wastewater handling – CH₄

70. The ERT noted that the improvement of AD for industrial wastewater that was carried out because of completeness, led to a lack in consistency between information provided in the CRF tables and the NIR. For instance, table 6.B is not consistent with the information provided in the NIR. In response to a question raised by the ERT during the review on this issue, New Zealand answered that a more transparent description of the industrial wastewater categorization will be included in the NIR of the annual submission. The ERT recommends that New Zealand ensure consistency between its NIR and CRF tables, and improve transparency in its annual submission.

3. Non-key categories

Waste incineration – CO₂, CH₄ and N₂O

71. This category represents 0.1 per cent of waste emissions. The ERT noted that AD and the description of incineration activities are not transparently presented in the NIR (small facilities are excluded and there is a lack of information on the composition of incinerated waste), and recommends that New Zealand improve its reporting of AD. The EFs used for waste incineration are all IPCC defaults. The ERT recommends that New Zealand provide more information on waste incineration practices in the country, including information on practices that are considered to be open burning.

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

72. Table 6 provides an overview of the information reported and parameters selected by New Zealand under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6

Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

<i>Issue</i>	<i>Expert review team assessment, if applicable</i>	<i>Findings and recommendations</i>
Assessment of the Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	none	
Period of accounting		Commitment period accounting
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	Improvement of land-use mapping increased the detected area of afforestation/reforestation and deforestation compared with the previous annual submission (see paras. 61 and 64 above).

73. Section G.I includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities and the change from the first commitment period to the second commitment period, paragraphs 74–76 below contain the ERT's assessment of the Party's adherence to the current guidelines for reporting and do not provide specific recommendations for reporting of these activities for the 2015 annual submission.

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

Afforestation and reforestation – CO₂, CH₄ and N₂O

74. The area of afforestation (“post-1989 forests”) is estimated on the basis of the wall-to-wall mapping at 1990, 2008 and 2012 and on an annual survey carried out by the Ministry for Primary Industries. New Zealand considers all land-use conversions to forests as afforestation and reforestation, because it considers all land as under some form of management. However, in the NIR under the sectoral description the ERT noted that wetlands are categorized as unmanaged. In response to a question raised by the ERT during the review as to whether natural regeneration would be directly human-induced on wetlands, New Zealand explained that it applies different interpretations of “managed” land. The term, as used in the wetlands chapter, differs from that used in chapter 2.2 of the IPCC good practice guidance for LULUCF and used for general classification in the LULUCF sector and for KP-LULUCF activities. The ERT accepted the explanation and also accepted that wetlands can be considered as managed because, inter alia, hydroelectric schemes are based on natural lakes and rivers and this presupposes a human intervention.

Regarding the different applications of the term “managed” the ERT considers that a Party should apply terms and definitions the same way throughout its report.

Deforestation – CO₂, CH₄, N₂O

75. New Zealand applies a four-year waiting period to discriminate whether a destocked area is deforestation or a temporary loss of tree cover in cases where neither a land-use change nor reforestation or regeneration of forest are detectable. The area that is finally considered as deforestation could be determined for awaiting forests that were destocked in 2008. For the years 2009–2012, New Zealand reports a deforestation area of 30.51 kha and an area of “awaiting” land of 23.89 kha. Although New Zealand was strongly recommended in the previous review reports to avoid an underestimation from awaiting land, the ERT concludes that the Party’s reporting cannot be considered as underestimation because the method is in line with the IPCC good practice guidance for LULUCF (chapter 4.2.6.2.1), which states that the awaiting land has to be reassessed annually in the next commitment period or at a minimum prior to the end of the next commitment period.

76. New Zealand was strongly recommended in the previous review report to provide estimates for non-CO₂ emissions from controlled burning of post-harvest residues associated with deforestation. The ERT notes that New Zealand implemented this in its 2014 annual submission. The ERT commends the Party for this improvement.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

77. 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 standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.⁹ 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.

78. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, 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 (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol 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.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol

79. New Zealand has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

80. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

⁹ The SEF comparison report is prepared by the international transaction log (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.

Table 7
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO₂ eq

	2014 annual submission ^a	
	As reported	Revised estimates
		Final accounting quantity ^b
Afforestation and reforestation		
Non-harvested land	-91 795 399	-91 795 399
Harvested land	0.00	0.00
Deforestation	20 242 601	20 242 601
Forest management	NA	NA
Article 3.3 offset ^c	NA	NA
Forest management cap ^d	NA	NA
Cropland management	NA	NA
Grazing land management	NA	NA
Revegetation	NA	NA

Abbreviations: CRF = common reporting format, 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 The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

^b The “final accounting quantity” is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

^c “Article 3.3 offset”: for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

^d In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

81. Based on the information provided in table 7 for the activity afforestation and reforestation, New Zealand shall: for non-harvested land, issue 91,795,399 removal units (RMUs) in its national registry. Neither issuance nor cancellation is required for harvested land due to the fact that units of land harvested are reported as “0”.

82. Based on the information provided in table 7 for the activity deforestation, New Zealand shall cancel 20,242,601 assigned amount units, ERUs, certified emission reduction units and/or RMUs in its national registry.

Calculation of the commitment period reserve

83. New Zealand reported its commitment period reserve in its 2014 annual submission. New Zealand reported that its commitment period reserve has not changed since the initial report review (278,608,260 t CO₂ 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

84. New Zealand did not provide information on changes to its national system in its annual submission. However, in response to questions raised by the ERT during the review, the Party confirmed that there were no changes to the national system since the last annual submission. The ERT noted that the NIR does not provide a clear statement on if any changes have or have not occurred in the national system since the last annual submission. The ERT recommends that the Party include a statement in its annual submission on whether or not changes have occurred in its national system, or in the case of any change(s) occurring, report on these in accordance with decision 15/CMP.1, annex, chapter I.F, and/or further relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

4. Changes to the national registry

85. New Zealand reported that there are changes in its national registry since the previous annual submission regarding the contact details, which were documented in its NIR, where it also stated that no other changes occurred. The ERT concluded that, taking into account the confirmed change in the contact details to the national registry, New Zealand'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 CMP.

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

86. Consistent with paragraph 23 of the annex to decision 15/CMP.1, New Zealand provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

87. New Zealand reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The Party described the changes: a capacity-building workshop around fossil fuel subsidy reform; activities to assist Parties not included in Annex I to the Convention that are dependent on the export and consumption of fossil fuels; and updated information in the NIR on energy projects in the Cook Islands, Tokelau, Tonga and Tuvalu in its NIR. The ERT concluded that the information provided continues to be complete and transparent.

III. Conclusions and recommendations

A. Conclusions

88. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of New Zealand, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of New Zealand

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross-references for identified problems</i>
The ERT concludes that the inventory submission of New Zealand is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources ^a	Complete	
LULUCF ^a	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of New Zealand has been prepared and reported in accordance with the UNFCCC reporting guidelines	Generally	Table 5, para. 23
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Yes	
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	Generally	84
The Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
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	Yes	
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for 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, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

^a The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

89. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9

Recommendations identified by the expert review team

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
Cross-cutting	Inventory planning	Provide a clear statement in the NIR as to whether any changes have or have not occurred in the national system since the last annual submission	No	12
Energy	Reference and sectoral approaches	Subtract the values for non-energy use of fuel in CRF table 1.A.(c) before performing the comparison between the reference and the sectoral approaches	No	21
		Review the approach for justifying differences between the reference and sectoral approaches by taking into account the definitions applied in energy statistics and report on this review in its NIR	No	22
		Use the threshold of 2 per cent as referenced in the UNFCCC reporting guidelines instead of 5 per cent as an indication of a discrepancy between emissions from the top-down reference approach and the bottom-up sectoral approach requiring additional explanations in the NIR – exclude non-energy use of fuels from CRF table 1.A(c) from this determination	No	23
		Endeavour to separate liquefied petroleum gas and natural gas liquid fuels with a view to improving the transparency of the reference approach as well as the accuracy of the reporting of non-energy use and feedstocks, focusing resources, as appropriate, on improvements in line with the principles of IPCC good practice	No	24
	International bunker fuels	Reconcile the differences between the monthly oil supply survey and the delivery of petroleum fuels by industry (DPFI) survey and/or to consider using the DPFI survey to report fuel consumption in the reference approach to ensure greater consistency	No	25
	Feedstocks and non-energy use of fuels	Improve the reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d) as well as the consistency between CRF tables 1.A(b), 1.A(c) and 1.A(d)	No	26

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
		Improve the transparency of the reporting of feedstocks and non-energy use of fuels in both CRF table 1.A(d) and the NIR	No	27
	Stationary combustion: solid fuels – CO ₂	Critically assess whether the ETS factors reviewed in 2009 are more appropriate for the estimation of emissions from solid fuels and report on this assessment in its annual submission	No	28
	Road transportation: liquid fuels – CO ₂	Include the calorific values from New Zealand Refinery Company in the NIR in order to improve transparency and to facilitate the work of future reviews	No	29
	Oil and natural gas – CO ₂ , CH ₄	Improve the reporting by endeavouring to provide the required breakdown in the CRF tables and by improving the transparency of the information reported in the NIR regarding methodological issues related to the categories oil exploration and production (1.B.2.a (i, ii)) and natural gas exploration and production/processing (1.B.2.b (i, ii))	No	30
	Stationary combustion: Biomass – CH ₄ , N ₂ O	Improve the transparency of the information by, for example, including a table with the consumption of biomass, emissions and EFs by gas and type of biomass, and allocate the emissions to the appropriate categories in the CRF tables	No	31
	Other: liquid fuels – CO ₂ , CH ₄ , N ₂ O	Allocate mobile military emissions to category other (energy) – military to the extent possible and improve the transparency in the NIR regarding these emissions	No	32
Industrial processes and solvent and other product use	General	Improve the description of the recalculations and improve QA/QC activities to rectify errors in the preparation of the inventory	No	35
		Continue with efforts to improve the transparency of the reporting regarding information from five categories in the industrial processes sector with confidential data by providing more detailed information in the NIR, while maintaining the confidentiality of the sensitive data	Yes	36
		Include in the NIR detailed information and methodological descriptions on how plant-specific data are estimated	Yes	37
	Consumption of halocarbons and SF ₆ – HFCs and	Include background information in the NIR to ensure that all subcategories are reported in line with the IPCC methodology, while maintaining	No	38

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
	PFCs	confidentiality of sensitive data		
		Change the notation keys to “NO” for domestic refrigeration	No	39
		Improve the transparency of reporting by providing a clear and detailed description of the emission estimation process in the NIR	No	40
		Apply more specific QA/QC procedures to ensure that errors are avoided at the inventory preparation stage	No	41
		Improve the description of the methodology used for estimating HFC emissions from fire extinguishers and further investigate if decommissioning is not occurring in New Zealand	No	42
	Soda ash production and use – CO ₂	Report AD for soda ash use	Yes	43
	Other (mineral products) – CO ₂	Improve the transparency of the reporting by limiting the number of emission reallocations and the use of confidential data	No	44
Agriculture	General	Correct the inconsistency in reporting the CH ₄ EF for swine	No	47
	Manure management – CH ₄ and N ₂ O	Provide information on the Australian Feeding Standards algorithms for cattle and sheep to estimate manure management emissions of CH ₄ and provide explanations of the differences between the estimates produced by the country-specific and IPCC tier 2 methodologies	Yes	53
	Direct soil emissions – N ₂ O	Make available the report “Quantification of reductions in ammonia emissions from fertiliser urea and animal urine in grazed pastures with urease inhibitors for agriculture inventory: New Zealand as a case study” on the website of the Ministry for Primary Industries	No	55
LULUCF	General	Provide additional information on the time series regarding conversions from and to forest land	No	59
	Forest land remaining forest land – CO ₂	Report the time series of annually harvested areas from forest land remaining forest land and harvests including forest land that has been converted to other land	No	62
	Forest land converted to other land uses –	Include information to explain the inter-annual variation in emissions from conversions from forest	No	63

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
	CO ₂	land to cropland and grassland		
	Biomass burning – CO ₂ , CH ₄ and N ₂ O	Improve QA/QC procedures to ensure the correct use of notation keys	No	64
Waste	Solid waste disposal on land – CH ₄	Publish the reports provided to the ERT or make the information in the reports otherwise available to ERTs (e.g. by submitting a summary in the NIR)	No	68
	Wastewater handling – CH ₄	Ensure consistency between the NIR and the CRF tables and improve transparency	No	70
	Waste incineration – CO ₂ , CH ₄ and N ₂ O	Improve the reporting of AD and EFs and provide more information on waste incineration practices in the country, including information on practices that are considered as open burning	No	71
National system	Changes in national systems	To add a clear statement of whether or not any changes have taken place in the national system since the last submission	No	84

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, ERT = expert review team, ETS = emissions trading system, IPCC = Intergovernmental Panel on Climate Change, LULUCF = land use, land-use change and forestry, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control, UNFCCC reporting guidelines = Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”.

IV. Questions of implementation

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

Annex I

Information to be included in the compilation and accounting database

Table 10

Information to be included in the compilation and accounting database in t CO₂ eq for 2012, including the commitment period reserve

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Commitment period reserve	278 608 260			278 608 260
Annex A emissions for 2012				
CO ₂	34 258 197			34 258 197
CH ₄	29 038 453			29 038 453
N ₂ O	10 885 699			10 885 699
HFCs	1 804 686			1 804 686
PFCs	40 751			40 751
SF ₆	20 196			20 196
Total Annex A sources^c	76 047 981			76 047 981
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	-19 145 945			-19 145 945
3.3 Afforestation and reforestation on harvested land for 2012	180 842			180 842
3.3 Deforestation for 2012	3 996 491			3 996 491
Activities under Article 3, paragraph 4, for 2012^d				
3.4 Forest management for 2012				
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 11
Information to be included in the compilation and accounting database in t CO₂ eq for 2011

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2011				
CO ₂	33 258 517			33 258 517
CH ₄	28 625 569			28 625 569
N ₂ O	10 644 202			10 644 202
HFCs	1 817 358			1 817 358
PFCs	30 181			30 181
SF ₆	17 620			17 620
Total Annex A sources^c	74 393 446			74 393 446
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	-18 828 782			-18 828 782
3.3 Afforestation and reforestation on harvested land for 2011	253 104			253 104
3.3 Deforestation for 2011	3 375 992			3 375 992
Activities under Article 3, paragraph 4, for 2011^d				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 12
Information to be included in the compilation and accounting database in t CO₂ eq for 2010

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2010				
CO ₂	33 450 613			33 450 613
CH ₄	28 516 473			28 516 473
N ₂ O	10 385 278			10 385 278
HFCs	1 077 694			1 077 694
PFCs	40 809			40 809
SF ₆	20 462			20 462
Total Annex A sources^c	73 491 328			73 491 328
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	-18 458 081			-18 458 081
3.3 Afforestation and reforestation on harvested land for 2010	265 012			265 012
3.3 Deforestation for 2010	4 087 167			4 087 167
Activities under Article 3, paragraph 4, for 2010^d				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 13
Information to be included in the compilation and accounting database in t CO₂ eq for 2009

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2009				
CO ₂	33 513 183			33 513 183
CH ₄	28 558 477			28 558 477
N ₂ O	10 091 170			10 091 170
HFCs	872 408			872 408
PFCs	46 140			46 140
SF ₆	19 786			19 786
Total Annex A sources^c	73 101 163			73 101 163
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	-17 957 179			-17 957 179
3.3 Afforestation and reforestation on harvested land for 2009	121 145			121 145
3.3 Deforestation for 2009	5 616 010			5 616 010
Activities under Article 3, paragraph 4, for 2009^d				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 14
Information to be included in the compilation and accounting database in t CO₂ eq for 2008

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2008				
CO ₂	36 473 352			36 473 352
CH ₄	28 159 757			28 159 757
N ₂ O	10 269 364			10 269 364
HFCs	807 259			807 259
PFCs	38 844			38 844
SF ₆	15 126			15 126
Total Annex A sources^c	75 763 703			75 763 703
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	-17 405 412			-17 405 412
3.3 Afforestation and reforestation on harvested land for 2008	41 876			41 876
3.3 Deforestation for 2008	3 166 941			3 166 941
Activities under Article 3, paragraph 4, for 2008^d				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Annex II

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 for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks 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 2014. Available at <http://unfccc.int/resource/docs/2014/asr/nzl.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/NZL. Report of the individual review of the annual submission of New Zealand submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/nzl.pdf>.

Standard independent assessment report template, parts 1 and 2. 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. Olia Glade (Ministry for the Environment), including additional material on the methodology and assumptions used. The following documents¹ were also provided by New Zealand:

Wayne Hennessy and Cito Gazo. 2014. *Inventory of HFC, SF₆ and Other Industrial Process Emissions for New Zealand 2012*.

Simon Wear and Nicki Stevens. 2013. *Dung and Urine Activity Data Split*. Wellington: Ministry for Primary Industries. Available at <<http://www.mpi.govt.nz/document-vault/3034>>.

AgResearch. 2014. *Partitioning of animal excreta N into urine and dung and developing the N₂O inventory*. Wellington: Ministry of Primary Industries. Available at <<http://www.mpi.govt.nz/document-vault/2962>>.

Surinder Sagggar, Harry Clark, Carolyn Hedley, Kevin Tate, Andrew Carran and Gerald Cosgrove. 2003. *Methane emissions from animal dung and waste management systems, and its contribution to the national methane budget*.

Surinder Sagggar, J Singha, DL Giltrapa, M Zamanb, J Luoc, M Rolloc, D-G Kima, G Rysd and TJ van der Weerdene. 2013. Quantification of reductions in ammonia emissions from fertiliser urea and animal urine in grazed pastures with urease inhibitors for agriculture inventory: New Zealand as a case study. *Science of The Total Environment*. 465: pp.136–146. Available at <<http://www.sciencedirect.com/science/article/pii/S0048969712010418>>.

Beca Ltd. 2013. *Industrial Wastewater Greenhouse Gas (GHG) Estimates from the Pulp and Paper, Wool Scouring and Wine Industries for New Zealand's GHG Inventory*.

Tonkin & Taylor Ltd. 2014. *GHG Estimates from Non-municipal Landfills New Zealand*.

Waste Not Consulting. 2013. *Reviewing the 2008 National Waste Composition Estimate and Producing a 2012 Estimate*.

Sinclair Knight Merz. 2009. *Estimates of Landfill Methane Recovered in NZ 1990 to 2012*.

¹ Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
C	confidential
CH ₄	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
DPFI	delivery of petroleum fuels by industry
EF	emission factor
ERT	expert review team
ERU	emission reduction units
ETS	emissions trading scheme
FNUI	fraction of urease inhibitor treated total fertilizer nitrogen emitted as ammonia
Frac _{GASF}	fraction of total synthetic fertilizer emitted as NO _x or NH ₃
GCV	gross calorific value
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 g)
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
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
MOS	monthly oil supply
N ₂ O	nitrous oxide
NA	not applicable
NCVs	net calorific values
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10 ¹⁵ joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF ₆	sulphur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
TJ	terajoule (1 TJ = 10 ¹² joule)
UNFCCC	United Nations Framework Convention on Climate Change