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

* 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 Japan, 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 29 September to 4 October 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Paul Filliger (Switzerland) and Mr. Yuriy Pyrozhenko (Ukraine); energy – Ms. Duduzile Nhlengethwa-Masina (Swaziland), Mr. Peter Seizov (Bulgaria) and Mr. Nguyen Tran Hong (Viet Nam); industrial processes and solvent and other product use – Mr. Stanford Mwakasonda (United Republic of Tanzania) and Ms. Emilija Poposka (the former Yugoslav Republic of Macedonia); agriculture – Ms. Olga Gavrilova (Estonia) and Mr. Simon Wear (New Zealand); land use, land-use change and forestry (LULUCF) – Mr. Nagmeldin Elhassan (Sudan), Mr. Craig Elvidge (New Zealand), Mr. Sabin Guendehou (Benin) and Mr. Agustin Inthamoussu (Uruguay); and waste – Mr. Qingxian Gao (China) and Ms. Mayra Rocha (Brazil). Mr. Gao and Mr. Wear were the lead reviewers. The review was coordinated by Mr. Vitor Góis Ferreira (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Japan, 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 Japan was carbon dioxide (CO₂), accounting for 95.0 per cent of total GHG emissions¹ expressed in CO₂ equivalent (CO₂ eq), followed by hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆), which collectively accounted for 2.0 per cent of the overall GHG emissions in the country, nitrous oxide (N₂O) (1.5 per cent) and methane (CH₄) (1.5 per cent). The energy sector accounted for 91.5 per cent of total GHG emissions, followed by the industrial processes sector (5.2 per cent), the agriculture sector (1.8 per cent), the waste sector (1.5 per cent) and the solvent and other product use sector (0.01 per cent). Total GHG emissions amounted to 1,343,136.79 Gg CO₂ eq and increased by 7.0 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 CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. 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 (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, 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	1 141 137.74	1 141 137.74	1 223 687.33	1 213 831.69	1 141 462.93	1 191 067.25	1 240 631.91	1 275 610.70	11.8
		CH ₄	32 467.31	32 467.31	29 745.18	21 697.68	21 122.03	20 716.33	20 306.33	20 025.83	-38.3
		N ₂ O	29 727.70	29 727.70	31 014.84	21 722.29	21 446.26	20 770.07	20 493.63	20 231.21	-31.9
		HFCs	20 260.17	12 595.25	20 260.17	15 298.88	16 546.60	18 291.38	20 451.53	22 925.68	13.2
		PFCs	14 271.14	5 276.71	14 271.14	4 615.07	3 265.25	3 408.71	3 016.35	2 758.27	-80.7
		SF ₆	16 961.45	13 167.85	16 961.45	3 761.22	1 851.27	1 862.42	1 637.85	1 585.09	-90.7
KP-LULUCF	Article 3.3 ^b	CO ₂				1 738.31	2 195.43	2 563.34	1 147.89	1 457.91	
		CH ₄				0.03	0.01	0.01	0.01	0.002	
		N ₂ O				3.14	3.32	3.02	2.84	2.58	
	Article 3.4 ^c	CO ₂	-77.82			-47 458.07	-49 213.57	-52 063.63	-52 785.17	-54 303.89	NA
		CH ₄	NO			12.86	5.26	2.63	3.48	1.05	NA
		N ₂ O	NO			1.78	1.03	0.84	0.90	0.66	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 CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. 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.

9 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	Base year–2012		
Annex A sources	Energy	1 079 469.94	1 079 469.94	1 156 693.83	1 161 556.25	1 096 930.60	1 145 089.85	1 195 025.95	1 229 596.97	13.9	
	Industrial processes	119 992.81	99 539.86	121 359.81	70 671.41	63 521.07	65 832.56	67 195.24	69 515.75	-42.1	
	Solvent and other product use	287.07	287.07	437.58	129.10	120.50	98.95	97.15	90.68	-68.4	
	Agriculture	29 134.72	29 134.72	28 166.22	24 786.68	24 404.59	24 209.74	24 025.99	23 904.76	-18.0	
	Waste	25 940.96	25 940.96	29 282.66	23 783.38	20 717.59	20 885.07	20 193.27	20 028.63	-22.8	
	LULUCF	NA	-66 817.90	-79 410.32	-77 499.59	-72 506.74	-72 357.39	-75 587.65	-75 065.36	NA	
Total (with LULUCF)	NA	1 167 554.65	1 256 529.79	1 203 427.23	1 133 187.61	1 183 758.79	1 230 949.95	1 268 071.43	NA		
Total (without LULUCF)	1 254 825.50	1 234 372.55	1 335 940.11	1 280 926.82	1 205 694.34	1 256 116.17	1 306 537.60	1 343 136.79	7.0		
Other ^b	NA	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA		
KP-LULUCF	Article 3.3 ^c	Afforestation and reforestation			-426.28	-447.99	-469.67	-482.25	-494.39		
		Deforestation			2 167.75	2 646.75	3 036.04	1 632.98	1 954.89		
		Total (3.3)			1 741.48	2 198.76	2 566.37	1 150.73	1 460.50		
	Article 3.4 ^d	Forest management				-46 363.73	-48 096.39	-50 931.50	-51 638.70	-53 140.34	
		Cropland management	NA			NA	NA	NA	NA	NA	NA
		Grazing land management	NA			NA	NA	NA	NA	NA	NA
		Revegetation	-77.82			-1 079.70	-1 110.88	-1 128.66	-1 142.08	-1 161.85	1 392.9
		Total (3.4)	-77.82			-47 443.43	-49 207.27	-52 060.16	-52 780.78	-54 302.19	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, NO = not occurring.

^a The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. 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 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Japan 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 15 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Japan submitted revised emission estimates on 14 November 2014 in response to the list of potential problems and further questions raised by the ERT. The values used in this report are those submitted by Japan on 14 November 2014.

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

2. Question(s) 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 Japan. 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: "NE" is reported for: CO ₂ and N ₂ O emissions from coal mining and handling; CO ₂ and N ₂ O emissions from solid fuel transformation; CO ₂ emissions from refining/storage of oil; CO ₂ and CH ₄ emissions from distribution of oil products; CO ₂ emissions from asphalt roofing and road paving with asphalt; CH ₄ emissions from ammonia and aluminium production; HFCs and SF ₆ emissions from other non specified (metal production); PFC emissions from other non-specified, reported under other (consumption of halocarbons and SF ₆); HFC-23 emissions from semiconductor manufacture; N ₂ O from other uses of N ₂ O; CO ₂ emissions from degreasing and

Issue	Expert review team assessment	General findings and recommendations
Land use, land-use change and forestry ^a	Not complete	<p>dry cleaning, and from chemical products, manufacture and processing; CH₄ emissions from poultry under enteric fermentation; CH₄ and N₂O emissions from other (field burning of agricultural residues); and CO₂ emissions from inappropriate disposal (reported under other (solid waste disposal on land))</p> <p>Mandatory: “NE” is reported for: carbon stock change in soils from other land converted to cropland and grassland; carbon stock change in organic soils for grassland remaining grassland (grazed meadows); carbon stock change in soils for land converted to wetlands except for forest land converted to wetlands; carbon stock change in soils for cropland and grassland converted to other land; N₂O emissions from disturbance associated with grassland and other land converted to cropland for mineral soils; CO₂, CH₄ and N₂O emissions from biomass burning from controlled burning for cropland remaining cropland and from controlled burning and wildfires for grassland remaining grassland, and from wildfires from forest land converted to grassland and wetlands</p> <p>The ERT recommends that the Party estimate and report emissions from all mandatory categories</p> <hr/> <p>Non-mandatory: “NE” is reported for: carbon stock change in dead organic matter from other land converted to cropland; all carbon stock change for flooded lands for wetlands remaining wetlands; carbon stock change in dead organic matter from other land converted to wetlands; all carbon stock changes for “other than urban green area” for settlements remaining settlements; carbon stock change for dead organic matter and soils for “urban green areas not subject to RV” for settlements remaining settlements; CO₂, CH₄ and N₂O emissions from biomass burning from controlled burning and wildfires for wetlands remaining wetlands; CO₂, CH₄ and N₂O emissions from harvest wood products</p> <p>The ERT encourages the Party to estimate and report emissions from all non-mandatory categories</p>
KP-LULUCF	Complete	
The ERT’s findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	Please see paragraph 62 below for category-specific findings

<i>Issue</i>	<i>Expert review team assessment</i>	<i>General findings and recommendations</i>
Time-series consistency	Sufficiently consistent	The ERT commends Japan for reporting HFC, PFC and SF ₆ emissions for 1990 to 1994, ensuring the completeness and consistency of the time series for these gases (see paras. 57 and 59 below)
The ERT's findings on QA/QC procedures	Sufficient	Japan has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan. The ERT reiterates the recommendation made in the previous review report ³ that the Party strengthen the QC procedures to avoid inconsistencies between the CRF tables and the NIR Please see paragraphs 26, 40, 55 and 101 below for category-specific recommendations
The ERT's findings on transparency	Sufficiently transparent except the energy and the agriculture sectors	Please see the following paragraphs below for category-specific recommendations: 21, 25, 31, 36, 40, 44 and 45 for the energy sector; 52 for the industrial processes sector; 62–70 for the agriculture sector; 73(d), 77, 79 and 83 for the LULUCF sector; and 107 for KP-LULUCF activities

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, 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, NE = not estimated, NIR = national inventory report, RV = revegetation, 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 Intergovernmental Panel on Climate Change (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 Land Use, Land-Use Change and Forestry*).

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 (chapter 1 and annex 6.1) describes the national system for the preparation of the inventory. As indicated by the Party in its NIR, 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 Japan submitted in 2013,⁴ remains relevant. The ERT noted that the previous review report recommended that Japan move all information from annex 6.1 to chapter 1 of the NIR. The current NIR states that this will be done for the next annual submission taking into account the revised outline and general structure of NIRs under the UNFCCC Annex I inventory reporting guidelines. The ERT reiterates the recommendation made in the previous review report that Japan move all information from annex 6.1 to chapter 1 of the NIR.

³ FCCC/ARR/2013/JPN, paragraph 86.

⁴ FCCC/ARR/2013/JPN, paragraphs 10 and 11.

Inventory preparation

13. Table 4 contains the ERT’s assessment of Japan’s inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4

Assessment of inventory preparation by Japan

<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 performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Both tier 1 and tier 2	
Were additional key categories identified using a qualitative approach?	No	Japan applied a qualitative approach in determining its key categories, but no additional key categories were identified
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 Japan use the key category analysis to prioritize inventory improvements?	Yes	
<i>Assessment of uncertainty analysis</i>		
Approach followed?	Tier 1	
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 = 2% Trend = 1%	
Quantitative uncertainty (excluding LULUCF)	Level = not provided (see para. 14) Trend = not provided (see para. 14)	

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.

14. Information on the total uncertainty including LULUCF as well as detailed information on the uncertainties for all sectors is provided in annex 7 of the NIR; however, no information is provided on the total uncertainty (level and trend) excluding LULUCF. The ERT reiterates the encouragement from the previous review report for Japan to include this information in its NIR to ensure comparability with other Parties.

Inventory management

15. 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 its NIR. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Japan submitted in 2013,⁵ remains relevant.

5. Follow-up to previous reviews

16. A large number of improvements have been made in the 2014 annual submission, including changes in estimation methods and emission factors (EFs) (e.g. CO₂, CH₄ and N₂O emissions from road transportation (see para. 39 below), revision of CH₄ emissions from enteric fermentation for dairy cattle). An overview table is presented in the NIR (chapter 10). For the first time, Japan included estimates of consumption of halocarbons and SF₆ for the years 1990–1994, which made the time series of the fluorinated gases (F-gases) complete and consistent. Major revisions have been also made to the LULUCF sector (e.g. areas of all land categories have been revised (see para. 72 below)).

17. In response to a recommendation made in the previous review report, Japan provided (in table 10-12 of the NIR) a detailed summary of the current status of the actions taken to fulfil the recommendations made in previous review reports: 66 recommendations are listed and actions taken are described briefly with a reference to the NIR chapter or CRF table where the improvement is better described. The ERT commends Japan for this transparency and encourages Japan to continue updating this table in subsequent annual submissions.

18. Recommendations from previous review reports 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

19. The energy sector is the main sector in the GHG inventory of Japan. In 2012, emissions from the energy sector amounted to 1,229,596.97 Gg CO₂ eq, or 91.5 per cent of total GHG emissions. Since 1990, emissions have increased by 13.9 per cent. The key drivers for the rise in emissions are the increase of fossil fuel consumption in public electricity and heat production because of an increase of electricity demand and the increase in traffic volumes in road transport. Within the sector, 41.7 per cent of the emissions were from energy industries, followed by 27.3 per cent from manufacturing industries and construction, 17.9 per cent from transport and 13.1 per cent from other sectors. Fugitive emissions from fuels accounted for 0.03 per cent. Emissions from other (fuel combustion) were reported as “NO” (not occurring).

20. Japan has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Japan between the 2013 and

⁵ FCCC/ARR/2013/JPN, paragraph 15.

2014 annual submissions were in the following categories: transport and other sectors . The recalculations were made following changes in activity data (AD). Compared with the 2013 annual submission, the recalculations increased emissions in the energy sector by 546.06 Gg CO₂ eq (0.05 per cent), and increased total national emissions by 0.04 per cent. The recalculations were adequately explained in the NIR.

21. The ERT considers that reporting in the energy sector inventory is complete, covering all categories and gases, and generally accurate in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). The ERT notes that the accuracy of the Party’s report could be further improved by following the recommendations or encouragements outlined in paragraphs 33, 35 and 36. The transparency of reporting is generally sufficient and the NIR presents the AD, EFs and applied methodologies in detail. However, the ERT identified several issues regarding the transparency and the comparability of the inventory (see paras. 25, 26, 31, 33, 35, 36, 40, 41, 43, 44 and 45 below) and the ERT recommends that the Party address these issues in the next annual submission.

22. The ERT noted significant improvements since the previous annual submission, including the update of the CH₄ and N₂O emission estimates from road transport using EFs based on actual measurements, the inclusion of CO₂ CH₄ and N₂O emissions from natural gas powered vehicles (see para. 39 below) and the update of the estimate of CH₄ fugitive emissions from underground mines owing to the inclusion of CH₄ recovery from coal mines. The ERT commends the Party for these improvements.

2. Reference and sectoral approaches

23. 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 24–31 below.

Table 5
Review of reference and sectoral approaches

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross references</i>
Difference between the reference approach and the sectoral approach	Energy consumption: –379.94 PJ, –2.10% CO ₂ emissions: –4 456.80 Gg CO ₂ , –0.36%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	24, 26
Are differences with international statistics adequately explained?	Yes	26
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	27
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	No	28–31

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

24. The differences between the reference and the sectoral approaches have been explained in detail in the NIR. In line with the previous review report, the ERT encourages Japan to complete the documentation box of CRF table 1.A(c), referencing the information provided in annex 4 of the NIR and briefly explaining the differences between the two approaches.

25. The NIR provides information on the AD and the EFs used for the CO₂ emission estimates for the reference approach expressed in gross calorific value (GCV), but does not clearly state the factors used for the conversion to net calorific value (NCV). In response to a question raised by the ERT during the review, Japan provided additional information explaining that it uses the conversion factors provided by the International Energy Agency (IEA): NCV values are 5 per cent lower than GCV values for solid and liquid fuels and 10 per cent lower for natural gas. In order to improve the transparency of the inventory, the ERT recommends that Japan include in the NIR detailed information on the conversion factors used to convert GCV to NCV for all fuels.

26. Japan provides detailed information on the discrepancies between the figures reported in the CRF tables and the international statistics from IEA in annex 2 of the NIR. Japan reported production of coal as not occurring (“NO”) in CRF table 1.A(b) of the reference approach. However, the NIR states that there are some coal mining activities in Japan, and the corresponding AD have been provided in CRF table 1.B.1. In response to a question raised by the ERT during the review, the Party explained that there are no official statistics for the Domestic production of coal in the country and the relevant data are provided by an industrial association. In order to ensure consistency with the data provided to the IEA and the official national statistics, Japan has not included these data in the reference approach. Japan further explained that the CO₂, CH₄ and N₂O emissions resulting from consumption of domestic coal have been estimated and reported in the sectoral approach, because the coal is used in power generation and the consumption is reported in the energy balance. Nevertheless, the ERT considers that this inconsistency might lead to differences between the reference and sectoral approaches. The ERT reiterates the recommendation made in previous review reports that Japan address this inconsistency by providing coal production data in CRF table 1.A(b) and by including relevant explanations on the discrepancies with international statistics in annex 2 of the NIR.

International bunker fuels

27. Following a recommendation made in the previous review report, Japan has provided additional information on the method used to derive the country-specific CO₂ implied emission factor (IEF) for jet kerosene (67.14 t CO₂/TJ based on the GCV, or 70.67 t CO₂/TJ based on the NCV) and provided justification for its lower value compared with the default values from the Revised 1996 IPCC Guidelines (19.5 t C/TJ, or 71.5 t CO₂/TJ). The ERT considers that this is an improvement to the transparency of the NIR and commends Japan for this.

Feedstocks and non-energy use of fuels

28. Previous review reports have recommended that Japan report the emissions from solid fuels used as feedstock in the non-ferrous metals category under industrial processes categories separately from any emissions from the combustion of solid fuels as energy sources, which should be reported in the energy sector (e.g. used in the production of soda ash, and ferroalloys and aluminium production). However, the NIR (table 3-37) states that currently there are process emissions from non-energy use of fuels that are reported in the energy sector. The rationale behind this decision, provided in the NIR, is that both emissions from energy and non-energy use of fuels in the manufacturing processes of non-ferrous metals are reported together in order to ensure accuracy and to avoid double

counting and/or omissions. The ERT considers that this is not in line with the Revised 1996 IPCC Guidelines. In response to a question raised by the ERT during the review, Japan informed the ERT of ongoing efforts to separate the emissions between the energy sector and the industrial processes sector regarding metal production. While welcoming Japan's efforts, the ERT notes that there is no specific time frame provided in the NIR regarding the implementation of these improvements. Therefore, the ERT encourages the Party to report the emissions from solid fuels used as feedstock under the manufacturing processes of non-ferrous metals under industrial processes sector separated from the energy sector (see para. 35 below).

29. Following a recommendation made in the previous review report, Japan has provided additional information in the NIR on the feedstock quantities for each fuel and the corresponding category where emissions occur or carbon is stored. The ERT commends Japan for this improvement. However, some discrepancies between the data provided in the energy balance and CRF table 1.A(d) were identified, as follows:

(a) According to the energy balance, the total amount of non-energy use of fuels is equal to 1,639,906 TJ (excluding recovered sulphur), while CRF table 1.A(d) reports 2,002,134.66 TJ;

(b) For some of the fuels there is agreement in the reported quantities (e.g. coke oven gas, gas/diesel oil, bitumen, liquefied petroleum gas (LPG) and natural gas), but for others, such as naphtha, coal tar and lubricating oil, large differences were observed between the energy balance and CRF table 1.A(d).

30. During the review, in response to questions raised by the ERT, Japan provided additional explanations for these discrepancies, as follows:

(a) For naphtha, the energy balance does not account for the quantities used in the petrochemical industry in the final non-energy consumption of fuels category;

(b) For lubricants, the reported non-energy consumption of fuels according to the energy balance frequently shows higher values than the reported supplied amount. For that reason Japan reports the non-energy consumption of fuels in CRF table 1.A(d) based on the difference between the provided values for "energy transformation and own use" and the "domestic primary energy supply" variables from the energy balance;

(c) For coal tars, the energy balance accounts as non-energy use only the consumption in chemical industry, assuming the remaining quantities to be energy consumption. Recognizing that this does not represent the actual situation, Japan has included in CRF table 1.A(d) the quantities for the variable "coal products" of the "energy transformation and own use" from the energy balance.

31. The ERT commends Japan for providing the additional explanations regarding the discrepancy of the reported data with the data from the energy balance. However, the ERT considers that there is a lack of transparency in reporting regarding the non-energy use of fuels. In order to improve the transparency, the ERT recommends that Japan provide detailed information on the methodology used to estimate the reported quantities of non-energy use of fuels for each individual fuel, with a clear indication of its correspondence to the respective category codes in the energy balance. The ERT also recommends that Japan provide a table in the NIR mapping the various types of fuels as reported in the energy balance with the corresponding fuels as reported in CRF table 1.A(d).

3. Key categories

Stationary combustion: solid, liquid, gaseous and other fuels – CO₂, CH₄ and N₂O⁶

32. Japan reports emissions from manufacturing industries and construction under the respective subcategories in the CRF tables, further disaggregating the category other (manufacturing industries and construction) into several subcategories (cement and ceramics, construction, glass wares, machinery, mining, oil products and other industries). The ERT commends the Party for this approach, which significantly improves the transparency of the inventory.

33. However, Japan has also included under the category other (manufacturing industries and construction) a subcategory named “duplication adjustment” under which are reported negative values for the AD and emission estimates, thus effectively reducing the total amount of emissions reported under the category manufacturing industries and construction compared with the aggregate of its other subcategories. This approach follows closely the reporting approach of the energy balance. During the review, the ERT requested that Japan provide additional information on the accounting methodology for this category in order to ensure that total emission estimates are complete and no underestimations occur. According to the information provided by the Party during the review, when the energy balance is prepared, if a company reports on more than one economic activity, it sometimes happens that it reports its total energy consumption under multiple activities without reporting the share of consumption for each of the individual activities. Effectively, this approach leads to an overestimation of fuel consumption in the energy balance, which explains the use of the correction in the form of negative emissions reported under “duplication adjustment”. The ERT considers that the current approach does not lead to an underestimation of the total emissions of the Party. However, this approach reduces the ability to compare the inventory with those of other Parties and it is not in accordance with the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories” (hereinafter referred to as the UNFCCC reporting guidelines). The ERT considered that there are no provisions under the UNFCCC reporting guidelines indicating that negative emissions could be reported, as negative values are accepted for removals only. While acknowledging that the inventory compilers might not have access to individual company reports and thus it may not be feasible to allocate fuel consumption and emissions for each individual subcategory, the ERT recommends that Japan develop a method to subtract the amount of the fuels reported under the duplication adjustment (e.g. proportionally to fuel consumption) from all subcategories under manufacturing industries and construction in order to improve the accuracy and comparability of the NIR and to avoid reporting negative energy emissions. The ERT also recommends that the Party explain the changes made to the energy balance in the NIR.

34. Following a recommendation in the previous review report, Japan has provided additional information in the NIR regarding how the measurement data are used to derive the country-specific EFs and information on actual measurements for individual fuel, category and furnace types. Japan has also provided information ensuring the validity of the background measurement data and the appropriateness of these measurements to current boiler types/technologies. The ERT commends Japan for these improvements.

35. Japan has reported all CO₂ and CH₄ emissions from blast furnaces in the iron and steel subcategory under the energy sector, while emissions from metal production in the industrial processes sector are reported as “IE” (included elsewhere), with the exception of

⁶ CH₄ emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sessions.

emissions from electric arc furnaces (reported under the subcategory “other non-specified (iron and steel production)” under the industrial processes sector). The ERT encourages Japan to disaggregate the fuel combustion and process emissions occurring in blast furnaces and report them separately in the categories iron and steel (energy) and iron and steel production, respectively. The ERT also encourages the Party to provide additional explanations in the NIR, clearly stating the types and the amounts of fuels which have been included either as energy or as feedstocks in order to avoid double counting in the energy and the industrial processes sectors.

36. The applied country-specific carbon contents and CO₂ EFs, as reported in the NIR table 3-2, for blast furnace gas (BFG) (26.1 t C/TJ, 95.70 t CO₂/TJ) and converter furnace gas/oxygen steel furnace gas (38.4 t C/TJ, 140.80 t CO₂/TJ) are significantly lower than the default values provided in the Revised 1996 IPCC Guidelines (242 t CO₂/TJ for BFG). In response to a question raised by the ERT during the review, Japan provided an explanation that the country-specific CO₂ EFs for BFG and coke furnace gas (CFG) are based on the unoxidized carbon contained in the fuel and they exclude the already oxidized carbon during the blast furnace process, while the IPCC default EFs are based on the total carbon content of the fuel. The NIR also describes the methodology used for the calculation of the annual EFs of BFG, which depends on the quantity and the energy content of CFG, ensuring the balance of carbon in the blast furnace process. The ERT concluded that the current approach does not lead to an underestimation of the emissions from blast furnaces. However, the ERT considers that the emission estimates are not reported in a sufficiently transparent manner, and providing the carbon content for BFG and CFG which are derived only based on the unoxidized carbon might impede the comparability with other Parties. Therefore, the ERT encourages Japan to calculate and report country-specific CO₂ EFs of BFG and CFG based on the total carbon content of each fuel, and recommends that Japan provide additional information in the NIR on the CO₂ EFs of BFG and CFG.

37. The energy chapter of the NIR does not include any reference to the use of alternative fuels (waste used as fuels); instead, the relevant information regarding AD, EFs and methodologies are provided in the waste chapter of the NIR. The ERT confirmed that Japan has reported the emissions from waste incineration with energy recovery in the energy sector, while the emissions from waste incineration without energy recovery are reported under the waste sector, which is in accordance with the IPCC good practice guidance. In order to ensure transparency of the textual description of each sector in the NIR, the ERT encourages Japan to separate the relevant information in the corresponding sectors or to provide references in the energy chapter to the applicable chapters for the waste sector.

Civil aviation: liquid fuels – CO₂, CH₄ and N₂O⁷

38. Japan uses a tier 2a method to estimate emissions from civil aviation. The current estimates are based on a fleet-average landing and take-off (LTO) cycle EF for jet kerosene provided in the Revised 1996 IPCC Guidelines. The ERT encourages the Party to apply a tier 2b approach to estimate emissions in order to improve the accuracy of the emission estimates, by using AD and EFs per individual aircraft type. For that purpose, the ERT encourages Japan to collect detailed information on the annual numbers of LTO cycles per individual aircraft type.

⁷ CH₄ emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sessions.

Road transportation: liquid fuels – CO₂, CH₄ and N₂O

39. Japan has performed recalculations and improvements to the CH₄ and N₂O emission estimates from road transportation owing to the use of actual measurement data to estimate EFs for gasoline, diesel and LPG. The Party has made further improvements in response to recommendations in previous review reports, including: the inclusion of CO₂, CH₄ and N₂O emission estimates from compressed natural gas (CNG) vehicles based on updated AD about the total number of CNG-powered vehicles and their annual mileage. The ERT commends Japan for these improvements.

40. However, the ERT considers that the transparency of reporting for this subcategory could be improved further and recommends that Japan provide additional information on the annual number of vehicles by type, the annual mileage per vehicle and the fuel efficiency per vehicle type. As the AD are provided by the Ministry of Land, Infrastructure, Transport and Tourism in the Statistical Yearbook of Motor Vehicle Transport, the ERT recommends that Japan include in its quality assurance/quality control (QA/QC) procedures a comparison of the annual mileage and fuel efficiency by vehicle category with the fuel consumption reported by the energy balance to ensure that no discrepancies occur.

Coal mining and handling – CH₄

41. Regarding fugitive CH₄ emissions from mining activities in surface mines, the NIR states that a tier 1 method with a default EF has been used (a mean value of the provided range equal to 1.15 m³/t). However, the IPCC good practice guidance (page 2.75) states that in the absence of data on overburden thickness, it is good practice to use an EF towards the high end of the range of the default EF from the Revised IPCC Guidelines, namely 1.5 m³/t. In response to a question raised by the ERT, the Party stated that the depth of surface coal mining in Japan is shallow for economic reasons and the average overburden thickness is less than 25 m. The ERT considers that the use of the mean value of the default range therefore does not lead to an underestimation of emissions. The ERT recommends that the Party provide this justification in the NIR.

42. Japan has reported emissions of CH₄ recovered/flared during post-mining activities in underground mines and mining and post-mining activities in surface mines as “NE” (not estimated), because the existence of such activities has not been confirmed. The ERT encourages the Party to collect information on whether these emissions occur or not, and change the notation key to “NO”, if appropriate.

4. Non-key categoriesStationary combustion: biomass – CO₂

43. The NIR provides information on the AD, the CH₄ and N₂O EFs and the methodologies used for the assessment of the CH₄ and N₂O emissions from biomass combustion, but it does not provide sufficient information regarding the CO₂ emissions. Noting that the CO₂ emissions from biomass use are not accounted in the national total emissions, but are provided as memo items, the ERT encourages Japan to provide additional information on the applied methodology for estimating the CO₂ emissions, as well as AD, CO₂ EFs and calorific values of all solid, liquid and gaseous biomass fuels, in order to improve the transparency of the inventory and comparability to other Parties.

Other transportation: gaseous fuels – CO₂, CH₄ and N₂O

44. The previous review report recommended that Japan report AD and fuel combustion emissions associated with the fuel used for pipeline transport under the subcategory other transportation or report the AD and emissions using a notation key in CRF table 1.A(a) and provide a description of the approach taken in the NIR. Responding to the recommendation made in the previous review report, the Party has stated in its NIR that the gas pipelines are

owned by industries and that all emissions associated with the fuel used by these industries are included under the categories energy industries or manufacturing industries and construction. Japan has reported these emissions as “IE” in CRF table 1.A(a). Further clarifications provided by the Party during the review, in response to questions raised by the ERT, clarified that compressor stations in Japan are driven by electric motors and thus no fuel is combusted. Some fuel consumption occurs in gas heaters in governor stations in order to protect temperature dropdown, and the resulting emissions are reported under the subcategory manufacture of solid fuels and other energy industries. In order to improve the comparability and transparency of reporting, the ERT recommends that Japan report emissions from pipeline transport as “NO” and provide explanations in the NIR.

Oil and natural gas: natural gas distribution – CH₄

45. The NIR states that fugitive emissions from natural gas distribution to industrial plants are included in the estimates of distribution of natural gas. However, the NIR (chapter 3.3.2.2.d) only provides information on town gas supply networks. As there are separate quantities of town gas and natural gas supplied to industrial consumers (as reported in the energy balance), the ERT requested the Party to confirm, during the review, whether fugitive emissions from natural gas distribution to industrial consumers have been assessed. Japan explained that these emissions are included in the category natural gas transmission, because the AD of this category (length of natural gas pipelines) includes also the natural gas distribution networks to industrial consumers. Although default CH₄ EFs for natural gas distribution from the IPCC good practice guidance are higher than the default CH₄ EF for transmissions, the ERT concluded that there is no underestimation of the emissions, because Japan uses a country-specific EF for estimating the emissions from transmission. In order to ensure transparency in reporting, the ERT recommends that Japan clarify the text of the NIR regarding fugitive emissions from natural gas distribution to industrial consumers.

Solid fuel transformation: biomass – CH₄

46. In its original 2014 annual submission, Japan reported fugitive CH₄ emissions from solid fuel transformation as “NE” because of a lack of AD. The NIR provides information only on coal briquette production and does not provide any information on charcoal production. The ERT found evidence suggesting that charcoal is produced in Japan; for instance, FAOSTAT, the database of the Food and Agriculture Organization of the United Nations (FAO), reports the annual production to be 25 Gg for recent years and around 109 Gg for 1990.⁸ The ERT considers that the Revised 1996 IPCC Guidelines provide the required methodology and EFs in order to estimate emissions from charcoal production. Specifically, the Revised 1996 IPCC Guidelines define transformation of solid fuels as “the transformation of primary fuels into secondary fuels by physical or chemical processes not involving the combustion of the primary fuel”, and footnote b to table 1-11 indicates that, for charcoal production, one should refer to table 1-14, “Default Non-CO₂ Emission Factors for Charcoal Production”. Table 1-14 provides a default CH₄ EF for charcoal production (300 kg/TJ of wood input or 1,000 kg/TJ of charcoal produced). The ERT considers that there is evidence that the activity is occurring in Japan and therefore the ERT considers that the emissions were underestimated from this subcategory for the entire time series 1990–2012, and included this issue in the list of potential problems and further questions raised by the ERT.

47. In response to the list of potential problems and further questions raised by the ERT, Japan recognized that charcoal is produced in Japan and prepared CH₄ emission estimates for the full time series (1990–2012) that were included under the category solid fuel

⁸ Source: <<http://faostat3.fao.org/faostat-gateway/go/to/download/F/FO/E>>.

transformation. The estimates were prepared using the amount of charcoal produced in Japan in accordance with statistical information from the Forestry Agency of Japan (30.26 kt for 2012), an NCV of 30 TJ/Gg (table 1-13 in the Revised 1996 IPCC Guidelines) and the default CH₄ EF from the Revised 1996 IPCC Guidelines (table 1-14) of 1,000 kg/TJ of charcoal produced. For 2012, emissions were estimated to be 19.07 Gg CO₂ eq (0.91 Gg CH₄) and total national emissions increased by 0.001 per cent. The ERT agrees with the revised estimate prepared by the Party.

Oil and natural gas: oil production – CO₂ and CH₄

48. In CRF table 1.B.2 Japan has provided the AD used for the estimate of the fugitive emissions (CH₄ and CO₂) from oil production, equal to 281,166 m³ of oil produced for 2012, excluding condensate production. According to the NIR, there is an additional quantity of condensate of 477,789 m³ for 2012. Both values are provided in Japanese official statistics.⁹ In response to a question raised by the ERT during the review week, the Party stated that the AD used for the assessment of fugitive emissions from oil production includes only the conventional oil production and does not include the condensate. The ERT noted that, because condensate is lighter than conventional oil, it is expected that fugitive emissions from its production should occur. Japan also stated that, according to a previous discussion with the expert authors of the IPCC good practice guidance, the term “conventional oil” in table 2.16 of the IPCC good practice guidance is relevant to light and medium-density crude oil and does not include condensate. Following this explanation, Japan did not include the production of condensate in the AD of the fugitive emissions from oil production, making the assumption that the fugitive emissions including venting and flaring from condensate production are accounted for by the EFs of gas production and gas processing. While the ERT acknowledges this rationale, it noted that the term “condensate” covers a very broad range of hydrocarbons, which are sometimes differentiated from light crude oil based only on their American Petroleum Institute (API) gravity. If the production of condensate is related to the production of conventional oil, it could be expected that fugitive emissions from condensate production occur and it cannot be assured that they would be included in the default EF for gas production and gas processing. The ERT considers that, based on the actual properties of the condensate produced in Japan, it might be addressed as an additional production of conventional oil, and thus missing from the emission estimates of fugitive emissions from oil production, leading to a potential underestimate of the emissions, and therefore included this issue in the list of potential problems and further questions raised by the ERT.

49. In response to the list of potential problems and further questions raised by the ERT, Japan provided further information on condensate and light crude oil, in particular the exact definition of each product and the quantities produced in 2012. Japan confirmed that condensate is related only to the production of natural gas and therefore fugitive emissions related to condensate production are accounted for by the default EFs of the gas production and gas processing categories shown in IPCC good practice guidance and they have been included in the emission estimates. The ERT accepts the additional clarifications provided by Japan and concluded that there is no underestimations of the emissions; however, the ERT recommends that Japan includes this explanation in the NIR.

⁹ The Yearbook of Mineral Resources and Petroleum Statistics and in the national energy balance.

C. Industrial processes and solvent and other product use

1. Sector overview

50. In 2012, emissions from the industrial processes sector amounted to 69,515.75 Gg CO₂ eq, or 5.2 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 90.68 Gg CO₂ eq, or 0.01 per cent of total GHG emissions. Since the base year, emissions have decreased by 42.1 per cent in the industrial processes sector, and decreased by 68.4 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are the decrease in CO₂ emissions from cement production as clinker production declined, the decrease in N₂O emissions from adipic acid production as the N₂O abatement equipment came on-stream and decreases in PFC and SF₆ emissions owing to the promotion of substitute materials use and the capture and destruction of these gases. Within the industrial processes sector, 56.0 per cent of the emissions were from mineral products, followed by 38.4 per cent from consumption of halocarbons and SF₆ and 4.5 per cent from chemical industry. Metal production accounted for 0.6 per cent. The remaining 0.5 per cent were from production of halocarbons and SF₆.

51. Japan has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculations made by Japan between the 2013 and 2014 annual submissions were in production of halocarbons and SF₆ and consumption of halocarbons and SF₆ in the period 1990–1994. The recalculations were made in response to the 2013 annual review report (see paras. 57 and 59 below). Compared with the 2013 annual submission, recalculations in 2011 increased emissions in the industrial processes sector by 31.48 Gg CO₂ eq (0.05 per cent), and increased total national emissions by 0.1 per cent. The recalculations were adequately explained in the NIR.

52. The ERT noted that Japan has made improvements to increase the transparency of the NIR in the areas recommended by previous review reports. In particular, Japan has provided explanations on the use of expert judgements, including assumptions made and other specific explanations requested by previous review reports.¹⁰ To further enhance transparency, the ERT recommends that Japan include in the NIR a sector overview of the drivers behind significant increases or decreases of emissions, as was provided by the Party during the review in response to questions raised by the ERT.

53. The ERT observed that in the CRF tables (2.I.A–G) Japan does not provide AD and IEFs for most of the subcategories where emissions are reported as “IE”, but instead uses the notation key “NE” for AD and IEFs because of a lack of data. The ERT encourages Japan to collect such AD in order to enhance the transparency and comparability of the emission estimates and in order to make the appropriate separation between energy and process emissions.

2. Key categories

Limestone and dolomite use – CO₂

54. The previous ERT noted that in all categories of carbonates use in mineral production, Japan reports the use of country-specific CO₂ EFs for limestone and dolomite use emissions, and that the CO₂ EFs are almost constant in the period 1990–2012 (from 0.44 t/t carbonate consumed in 1990 to 0.45 t/t carbonate consumed in 2012). In response to a question raised during the previous review, Japan explained that a review was conducted in 2009, but information on this has not been included in the NIR. The current ERT

¹⁰ FCCC/ARR/2013/JPN, paragraph 38.

recommends that Japan introduce a periodic review of country-specific factors (e.g. every 3–5 years) and include the results of such a review in the NIR.

Adipic acid production – N₂O

55. The ERT noted in the NIR (page 4–17) that the expression used to calculate N₂O emissions did not include the components for decomposition effectiveness, giving the impression that the effectiveness factor was 1. In response to a question raised by the ERT during the review, Japan indicated that this was due to a translation error from Japanese to English, and this will be corrected in the next annual submission. Japan also explained that, instead of what was presented in the NIR, the following formula should be given on page 4-17: N₂O emissions from adipic acid production = N₂O generation rate × (1 – N₂O decomposition rate × decomposition unit operation rate) × adipic acid production. The Party also explained that the effectiveness factor is less than 1, as indicated on page 4-18 of the NIR under ‘rate of decomposition of nitrous oxide’. The ERT accepted this explanation and recommends that Japan make the necessary correction in the NIR as proposed in its response to the ERT and that Japan improve its QC procedures to avoid such situations.

Production of halocarbons and SF₆ – HFCs, PFCs and SF₆¹¹

56. The ERT noted that the NIR does not provide sufficient information about the estimation of fugitive emissions from the production of halocarbons and SF₆. In response to a question raised by the ERT during the review regarding fugitive halocarbons and SF₆ emissions, Japan explained that the reported destruction of fugitive gases is that of residual gases in the production process, and the remaining gases in F-gas cylinders are collected by F-gas manufacturers. Understanding that this type of fugitive emission can be directly correlated to the production amounts of halocarbons and SF₆ if recovery/destruction is not considered, the ERT recommends that Japan provide, in the NIR, more details on how the fugitive emissions are quantified and whether the fugitive emissions relate to production and destruction rates.

Consumption of halocarbons and SF₆ – HFCs, PFCs and SF₆

57. The ERT noted that Japan has included for the first time estimates of HFC, PFC and SF₆ emissions for the period 1990–1994 for consumption of halocarbons and SF₆, as recommended in previous review reports. It was also noted by the ERT that Japan has made changes and made use of the appropriate notation keys in CRF table 2(II).F by replacing the zero values that were previously reported (e.g. the product manufacturing factor of HFC-152a for hard foam and the product manufacturing factor of HFC-134a for domestic refrigeration) with the new estimates. The ERT commends Japan for this enhancement to the completeness and comparability of the inventory.

58. The ERT commends Japan for including estimations of both actual and potential emissions of F-gases. For potential emissions of F-gases, Japan has continued to report these gases as an aggregated emission under other (consumption of halocarbon and SF₆) in the subcategory other non-specified, citing the challenge of identifying uses of the gases in each subcategories. The ERT encourages Japan to report potential F-gas emissions in their respective subcategories in the next annual submission.

¹¹ PFC emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sessions.

3. Non-key categories

Aluminium production – PFCs

59. The ERT noted that Japan has now included estimates of PFC emissions from aluminium production for the period 1990–1994, as recommended in previous review reports. The ERT commends Japan for this enhancement to the completeness of the inventory.

Iron and steel production – CO₂

60. Despite repeated encouragements and recommendations made in previous review reports, Japan has continued to report all emissions relating to coke from iron and steel production in the energy sector, including when coke is used as a reducing agent, in which case emissions should have been reported under the industrial processes sector in accordance with the Revised 1996 IPCC Guidelines. In response to a question raised by the ERT during the review, Japan explained that it considers the benefit of achieving complete accounting of GHGs to be larger for such aggregated reporting in the energy sector than would be the case if the emissions were to be separated. Japan further indicated that it is currently preparing to change the reporting method for the next annual submission. The ERT encourages Japan to report CO₂ emissions from coke used as a reducing agent in the industrial processes sector (see para. 35 above).

D. Agriculture

1. Sector overview

61. In 2012, emissions from the agriculture sector amounted to 23,904.76 Gg CO₂ eq, or 1.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 18.0 per cent. The key drivers for the fall in emissions are the decrease in livestock population, the decreasing area of paddy fields for rice cultivation and the decreasing application of nitrogen (N) fertilizers. Within the sector, 26.7 per cent of the emissions were from enteric fermentation, followed by 25.7 per cent from agricultural soils. Manure management accounted for 24.4 per cent and rice cultivation accounted for 22.9 per cent. The remaining 0.3 per cent were from field burning of agricultural residues.

62. Japan has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Japan between the 2013 and 2014 annual submissions were in the following categories: manure management (decrease of 21.8 per cent in 2011) and enteric fermentation (decrease of 1.9 per cent in 2011). The recalculations were made in response to the 2013 annual review report following changes in AD. Compared with the 2013 annual submission, the recalculations decreased emissions in the agriculture sector in 2011 by 1,732,07 Gg CO₂ eq (6.7 per cent), and decreased total national emissions by 0.1 per cent. The recalculations were explained in the NIR, but the ERT recommends that Japan improve the transparency of its reporting by providing initial and recalculated data in a table in its next annual submission.

2. Key categories

Enteric fermentation – CH₄

63. Japan has applied country-specific CH₄ EFs for sheep and goats (4.15 kg/head/year for both categories of animals), which are lower than the IPCC default values for developed countries (8 kg/head/year for sheep, 5 kg/head/year for goats from table 4-3 in the Revised 1996 IPCC Guidelines). In response to a question raised by the ERT during the review,

Japan provided a reference article¹² explaining that the low CH₄ production per head of sheep and goat is determined by the consumption of feed concentrates. The ERT reiterates the recommendation made in the previous review report that Japan improve the transparency of its reporting by providing information in the NIR on the justification of the CH₄ EFs for enteric fermentation for sheep and goats.

64. Japan has used a country-specific CH₄ EF to estimate CH₄ emissions from enteric fermentation for swine, which is lower than the IPCC default (1.10 kg/head/year versus 1.5 kg/head/year, respectively, from table 4-3 in the Revised 1996 IPCC Guidelines), but the value used by the Party has not been transparently explained in the NIR. In response to a question raised by the ERT during the review, Japan provided a reference article¹³ indicating the CH₄ EFs related to each weight category of swine and a calculation sheet determining how the EF was obtained. The ERT agrees with the explanation provided and recommends that Japan include this additional information on EFs in its NIR.

Manure management – CH₄ and N₂O

65. Japan has reported the fraction of livestock N excretion that volatilizes as ammonia and nitrogen oxides (Frac_{GASM}) in CRF table 4.Ds2 using a constant default value of 0.2 over the entire time series. The ERT noted from the NIR (table 6-53, page 6-44) that Japan used specific values for Frac_{GASM} from manure management for different categories of livestock (i.e. dairy and non-dairy cattle, swine and poultry – 0.1, 0.2 and 0.3, respectively). Hence, to ensure consistency, transparency and comparability the ERT recommends that Japan report a weighted average value of Frac_{GASM} in its next annual submission.

66. Japan used a tier 2 approach to estimate CH₄ emissions from dairy cattle, non-dairy cattle, swine and poultry manure management. The tier 2 method involves using methane conversion factors (MCFs) for different animal waste management systems (AWMS) and climatic zones. However, the ERT noted that values for the MCF for dairy cattle, non-dairy cattle, swine and poultry AWMS are reported as “NE” in CRF table 4.B(a). The ERT reiterates the recommendation made in previous review reports that Japan increase the transparency of its reporting by providing the MCF values in CRF table 4.B(a).

67. Japan has used country-specific CH₄ and N₂O EFs to estimate CH₄ and N₂O emissions from pasture, paddock and range for cattle and from heaping and sun-drying for poultry waste (NIR, table 6-23, p. 6–18). The ERT noted that the methodology on how these EFs were obtained is not transparently presented in the NIR.. The ERT reiterates the recommendations made in previous review reports that Japan improve the description of the methodology used to obtain the country-specific CH₄ and N₂O EFs for pasture, paddock and range for cattle. The ERT also noted that the NIR does not contain sufficient information on the methodology used to estimate emissions from the heaping and sun-drying of poultry waste. Therefore, the ERT recommends that the Party improve the transparency of the description of the methodology used to estimate emissions from the heaping and sun-drying of poultry waste.

Agricultural soils – N₂O

68. Japan reported the fraction of livestock N excreted and deposited onto soil during grazing (Frac_{GRAZ}) in CRF table 4.Ds2 as “NA” (not applicable). The ERT noted that the practice of pasture, range and paddock manure management exists in Japan. In response to a question raised by the ERT during the review, Japan stated that because the amounts of

¹² Shibata M, Terada F, Kurihara M, Nishida T, Kazuo I. 1993. Estimation of methane production in ruminants. *Anim. Sci. Technol.* 64(8): pp. 790–796.

¹³ Saitoh M. 1988. Methane excretion in fattening pigs and pregnant sows. *Jpn. J. Zootech. Sci.* 59 (9): pp. 773–778.

animal manure disposed on pasture differ between livestock animal types and sub-types “NA” was used to report the aggregated value. The ERT recommends that Japan calculate and report the weighted average values of $Frac_{GRAZ}$ and report them in CRF table 4.D in order to improve transparency and comparability.

69. Japan reported that all N_2O emissions from sewage sludge are included under the waste sector only. However, in response to a question raised by the ERT during the review, Japan stated that the application of sewage sludge to agricultural soils is allowed in Japan and the inventory team recognizes that emissions from the application of sewage sludge should be reported under the agriculture sector to improve the transparency of the reporting. In addition, Japan noted that information on amounts applied on agricultural lands are still being researched and when AD are finalised, Japan will estimate N_2O emissions from sewage sludge application on agricultural land. The ERT recommends that Japan estimate and report N_2O emissions from sewage sludge applied to soils under the agriculture sector.

Rice cultivation – CH_4

70. Japan has used the notation key “NE” in CRF table 4.C to report the type and amounts of organic amendments added to rice cultivation areas. However, in accordance with the NIR, the area of paddy fields covered with straw and other various compost amendments made up 88 per cent of the total area of paddy fields in 2012. The ERT recommends that Japan improve the transparency of its reporting by including the information on amounts of type and amounts of organic amendments added to rice cultivation areas in CRF table 4.C and provide documentation for this information in the NIR.

E. Land use, land-use change and forestry

1. Sector overview

71. In 2012, net removals from the LULUCF sector amounted to 75,065.36 Gg CO_2 eq. Since 1990, net removals have increased by 12.3 per cent. The key drivers for the rise in removals are increased removals from forest land and a reduction in emissions resulting from land conversion because of the decrease in areas of land conversion since 1990. Net removals from the LULUCF sector decreased by 0.7 per cent between 2011 and 2012. Japan reports that the main contributing factor for this recent decrease in removals is the maturity of Japan’s forests and the decrease in emissions in cropland and settlements caused by the reduction in land-use change occurring since 1990 as a result of the economic recession (see para. 75 below). Within the sector, 77,670.44 Gg CO_2 eq of net removals were from forest land, followed by 116.01 Gg CO_2 eq from grassland. Net emissions were reported from cropland (1,645.20 Gg CO_2 eq), settlements (508.33 Gg CO_2 eq) and other land (288.96 Gg CO_2 eq). The remaining 246.78 Gg CO_2 net emissions were reported under other (LULUCF) corresponding to emissions from lime application in all land-use categories.

72. Japan has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Japan between the 2013 and 2014 annual submissions were made following changes in area data estimates and to address recommendations made in the previous review report, and occurred in the following categories: settlements, forest land and cropland. Compared with the 2013 annual submission, the recalculations increased removals in the LULUCF sector in 2011 by 153.55 Gg CO_2 eq (0.2 per cent). The recalculations were adequately explained, and the main recalculations are as follows:

(a) Carbon stock change in living biomass, dead organic matter and soils in forest land, owing to newly available data, resulting in a total decrease in net removals for the category of 173.70 Gg CO₂ (0.2 per cent);

(b) Direct N₂O emissions from N fertilization, resulting from separating the amount of N fertilization from agriculture (reported in the agriculture sector) and forest land. This improvement resulted in reported direct N₂O emissions from N fertilization in forest land increasing by 0.55 Gg CO₂ eq in 2011;

(c) Carbon stock change in living biomass and soils in grassland, because of a revision of the distribution of land, a revision of forest carbon pools before conversion and a revision of emissions from organic soil, resulting in a total increase in net removals for the category of 42.9 Gg CO₂ eq (47.5 per cent);

(d) Carbon stock change in living biomass and soils in settlements, because of a revision of the distribution of land and a revision of forest carbon pools before conversion, resulting in a total decrease in net emissions for the category of 254.9 Gg CO₂ eq (62.0 per cent);

(e) Carbon stock change in wetlands, because of a recalculation of urban parks in river banks, green areas along rivers and erosion control areas, which resulted in a total decrease in net emissions for the category of 16.1 Gg CO₂ eq (27.0 per cent).

73. The ERT commends Japan for implementing the majority of the recommendations made in the previous review report. The description of the improvements is detailed in table 10-12 of the NIR, within each subsection and in CRF table 8(b). Japan addressed many of the previous recommendations in its 2014 annual submission, as follows:

(a) Japan has provided additional explanations on LULUCF emission and removal trends in the NIR (chapter 2, section 2.3.5), and further explanations in sections 7.1, 7.4 and 7.4.1;

(b) Japan has reported a single land-use transition matrix for the period 1990–2012 (NIR table 7-3);

(c) Japan provided an explanation in section 7.5.1, page 7-29, of the NIR of why the area of organic soils under the LULUCF sector differs from that reported for the agriculture sector;

(d) Japan provided an explanation of why the total land area has increased between 1990 and 2012 in section 7.1 of the NIR. In addition, in response to a question raised by the ERT during the review, Japan provided a statistical report on the land area by prefectures and municipalities, and also provided additional information on the increase in land area, so that the ERT could verify why Japan's area has increased since 1990. The ERT commends Japan for providing this additional information and recommends that the explanation provided be included in Japan's next annual submission.

2. Key categories

Forest land remaining forest land – CO₂

74. Of Japan's total land area (37.8 million hectares) the largest part constitutes forest land remaining forest land, covering about 24.9 million hectares, or 66 per cent of the territory. All forests in Japan are considered managed.

75. Net removals in forest land remaining forest land have fluctuated since 1990. In 2012, the net CO₂ removals in this subcategory amounted to 77,324.20 Gg CO₂, and accounted for 99.5 per cent of the total net CO₂ removals from forest land. Even though net CO₂ removals from forest land remaining forest land have increased by 1.0 per cent since

1990, net removals from the category increased steadily until 2003 but after that year a decrease was reported. Japan reported in the 2014 submission that the declining trend in removals since 2003 is due to the maturity of Japan's forests, along with variations in the quantity of domestic timber being harvested year on year because of economic trends.

76. The previous review report recommended that Japan provide explanations for the changes in the trend of net removals, particularly for those that occur from one year to the next. The ERT commends Japan for providing in the NIR an explanation for the carbon stock fluctuations/inter-annual change in forest land remaining forest land.

77. The ERT commends Japan for the improvement made to the explanation for reporting the biomass carbon stock changes in bamboo forest as "NA", as well as the reasons for using the notation key "NA" to report the dead organic matter and soil carbon changes in the subcategories "bamboo" and "forests with less standing trees". During the review the ERT requested further information on the assumptions made. In response to this request, Japan provided additional information. The ERT recommends that Japan provide the information that supports these assumptions in the NIR to increase transparency.

78. In previous annual submissions Japan reported the area of organic soils in forest land as "IE" in CRF table 5.A. The previous review report recommended that Japan report the area of organic soils separately in forest land to improve transparency and completeness. The ERT notes that Japan reported estimates of the carbon stock changes in mineral and organic soils separately for the subcategory "semi-natural forests" in its 2014 annual submission (for the other subcategories, areas of organic soils are reported as "NO"). The ERT commends Japan for implementing this recommendation.

79. In 2012, Japan reported soil drainage in forest land with organic soils as "NO". During the review the ERT requested Japan to provide further information on this expert judgement assumption, given that Japan also reports in its annual submission that the area of organic soil has decreased since 1990. In response to a question raised by the ERT during the review, Japan provided further information from forestry experts that cases of drainage in forest land with organic soils never occurred. The ERT recommends that Japan provide this additional information in its next annual submission in order to increase the transparency of its reporting.

Land converted to forest land – CO₂

80. In 2012, land converted to forest land represented a minor component of the forest land category (0.45 per cent), accounting for net CO₂ removals of 348.59 Gg CO₂ eq. The estimated net removals have decreased by 7.4 per cent relative to 2011 and by 82.6 per cent since 1990. Previous review reports recommended that Japan explain the drivers for this decreasing trend in removals in the NIR. The ERT commends Japan for its explanation in the 2014 submission, which is that the declining trend in removals for new forest establishment is primarily based on a declining area of new planting because of the current relative economic situation of forestry in Japan.

Land converted to cropland – CO₂

81. In 2012, land converted to cropland accounted for net CO₂ emissions of 179.99 Gg CO₂ eq. The estimated net emissions have decreased by 26.6 per cent relative to 2011 and by 93.0 per cent since 1990.

82. The previous review report recommended that Japan improve the transparency of: the information on land-use classification and representation; the different sources of information used for the estimations; the appropriateness of the ratio used for the conversion of private forest land to other land uses that has been applied to forest land converted to cropland in its annual submission; and the reversal of the decreasing trend in

emissions from land converted to cropland. The ERT commends Japan for the explanations provided in the NIR.

83. For the subcategory other land converted to cropland, previous review reports recommended that Japan provide an estimate of the carbon stock changes in soils for mineral and organic soils separately (currently reported as “IE” for organic soils) and provide a better justification for the assumption of zero gains and losses for other land converted to cropland. The ERT welcomes the Party’s ongoing work to improve the accuracy and transparency of this subcategory and reiterates the recommendation made in previous review reports.

3. Non-key categories

Direct N₂O emissions from nitrogen fertilization – N₂O

84. Previous review reports recommended that Japan report N₂O emissions from N fertilization of forest land in the LULUCF sector in its annual submission. The ERT commends Japan for the work done to enable the reporting of N₂O emissions from fertilization in forest land, separating it from agriculture sector and reporting N₂O emission estimates for this category.

Other land remaining other land – CO₂

85. The previous review report recommended that Japan report abandoned cultivated areas under an appropriate land-use category (e.g. cropland). Japan notes in its 2014 submission that this improvement is under investigation. The ERT welcomes this planned improvement and reiterates the recommendation made in the previous review report.

F. Waste

1. Sector overview

86. In 2012, emissions from the waste sector amounted to 20,028.63 Gg CO₂ eq, or 1.5 per cent of total GHG emissions. Since 1990, emissions have decreased by 22.8 per cent. The key driver for the fall in emissions is the decrease in the amount of disposal of biodegradable waste resulting from improvements in recycling rates. Within the sector, 68.1 per cent of the emissions were from waste incineration, followed by 14.6 per cent from solid waste disposal on land. Wastewater handling accounted for 13.2 per cent. The remaining 4.1 per cent were from other (waste).

87. Japan has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Japan between the 2013 and 2014 annual submissions were in the following categories: waste incineration and other (waste). The recalculations were performed following changes in AD. Compared with the 2013 annual submission, the recalculations decreased emissions in the waste sector in 2011 by 392.10 Gg CO₂ eq (1.9 per cent), and decreased total national emissions by 0.03 per cent. The recalculations were adequately explained in the NIR.

88. The waste sector is complete in terms of gases, years and mandatory IPCC categories covered. The ERT commends Japan for having implemented some of the planned improvements since the previous annual submission, which have resulted in enhanced transparency (e.g. flow charts of waste management processes for the different types of waste, references to national studies used for emission calculations, more detailed description of the subcategories).

89. However, the ERT noted that other planned improvements have not yet been implemented, such as the development of the country-specific parameter methane

generation rate constant (k) for sludge, country-specific CH₄ EFs for industrial wastewater and the estimation of CH₄ recovery from industrial wastewater. The ERT welcomes Japan's intentions and efforts to improve the sectoral assessment and reiterates the encouragement made in the previous review report that Japan implement the planned improvements in its next annual submission.

2. Key categories

Solid waste disposal on land – CH₄

90. Japan estimates CH₄ emissions from solid waste disposal on land using the revised first-order decay (FOD) method from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the 2006 IPCC Guidelines) with a combination of IPCC default values and country-specific parameters. The ERT considers that the method used to calculate the historical AD for 1954–1979 for the amount of biodegradable waste landfilled is not the most appropriate method, because data for the most current year available (data from 1980) were applied for all years back to 1954. In response to a question raised by the ERT during the review, Japan explained that it applied the most conservative data available as there are no statistical data and no adequate estimation method to derive historical data for 1954–1979. The ERT recognizes that the emissions are not underestimated but encourages Japan to improve the consistency of the time series by using more appropriate methods (e.g. using proxy data such as population and/or gross domestic product or a combination thereof).

Wastewater handling – CH₄

91. CH₄ emissions from wastewater handling were estimated by applying a country-specific method (multiplying biological oxygen demand-based AD and country-specific EFs). Japan has reported CH₄ emissions from wastewater and sludge together. To improve transparency the ERT encourages Japan to report these emissions separately in the next annual submission.

92. According to the NIR, CH₄ recovery does occur in industrial wastewater plants in the country; however, Japan has not estimated these associated quantities (reported as “NE”). In response to a question raised by the ERT during the review, Japan explained that it intends to report these quantities in the next annual submission. The ERT encourages Japan report these recovery quantities in order to enhance the accuracy of the inventory.

Waste incineration – CO₂, CH₄ and N₂O¹⁴

93. Japan estimated emissions from waste incineration for CO₂, CH₄ and N₂O and for all types of waste (municipal, industrial and specially controlled solid waste), with a differentiation between the biogenic and non-biogenic fractions, because the biogenic CO₂ emissions are not included in the total emissions, in accordance to the Revised 1996 IPCC Guidelines. The emissions were reported for the parts of waste incinerated with (energy sector) and without (waste sector) energy recovery. CO₂ emissions have been estimated based on the carbon content, in line with the Revised 1996 IPCC Guidelines; and the CH₄ and N₂O emissions have been estimated using country-specific EFs based on measurements, types of incineration facilities and their efficiency of combustion. The ERT commends Japan for the high level of disaggregation and accuracy of the estimates.

¹⁴ CH₄ emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sessions.

3. Non-key categories

Other (waste) – CO₂, CH₄ and N₂O

94. Japan reported CO₂ emissions as a result of the decomposition of petroleum-derived surfactants and CH₄ and N₂O emissions from composting of organic waste. The CO₂ emissions from petroleum-derived surfactants were calculated using a country-specific carbon-content-based method; and the CH₄ and N₂O emissions from composting of organic waste were calculated using methodology and EFs from the 2006 IPCC Guidelines. The ERT commends Japan for including these activities in the inventory.

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

95. Table 6 provides an overview of the information reported and parameters selected by Japan 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	Activities elected: forest management and revegetation Years reported: 1990, 2008, 2009, 2010, 2011, 2012	
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	

96. Section G.1 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 97–106 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.

97. Japan has made recalculations for all reported KP-LULUCF activities between the 2013 and 2014 submissions. Japan explained that the recalculations result from changes of

forest areas, data in forest registers and the relocation of direct N₂O emissions from N fertilization and allocation of areas of organic soils under forest land.

98. The recalculations resulted in an increase in net removals in 2009 for all activities considered (afforestation/reforestation, deforestation, forest management and revegetation) of 0.003 per cent (1.3 Gg CO₂ eq), and a decrease in net removals for all categories considered in 1990, 2008, 2010 and 2011, of 0.06 per cent (0.1 Gg CO₂ eq), 0.17 per cent (78.0 Gg CO₂ eq), 0.62 per cent (309.1 Gg CO₂ eq) and 1.07 per cent (557.7 Gg CO₂ eq), respectively. Japan presented the recalculated values in table 10-8 of the NIR and explained the reasons for recalculations in section 11.4.1.4 of the NIR in a transparent manner.

99. The previous review report recommended that Japan present the disaggregated uncertainty calculations more transparently in the annual submission to enable the review of the uncertainties. Japan has provided additional detail in its 2014 submission; the ERT commends Japan for this improvement to transparency.

100. During the review the ERT identified three errors in reported KP-LULUCF activities of Japan's 2014 submission, as follows:

(a) There are errors in reporting the land-use matrix (CRF table NIR-2 and table 11-5 of Japan's original 2014 submission) which resulted in the area of deforestation being reported inaccurately. In response to questions raised by the ERT during the review, Japan commented that the errors occurred during the process of compiling the NIR-2 tables from the deforested area used for the calculations in each year. During the review and in its submission of 14 November 2014, Japan provided the ERT with updated and corrected NIR-2 tables for all five years;

(b) The area of deforestation under organic soils in CRF table (KP-I)A.2 has been reported inaccurately. During the review and in its submission of 14 November 2014, Japan provided updated and corrected values.

101. The ERT noted that there was no impact to the carbon stock change calculations resulting from these errors. Japan resubmitted the full set of KP-LULUCF tables on 14 November 2014, correcting the above-mentioned errors. The ERT recommends that Japan review, and update as necessary, related QA/QC procedures to ensure accurate reporting in the future.

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

Afforestation and reforestation – CO₂

102. Afforestation and reforestation activities and associated net removals are reported in line with the requirements of the annex to decision 15/CMP.1, and the estimates have been prepared in accordance with the IPCC *Good Practice Guidance for Land use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The area reported under afforestation and reforestation totals 32.33 kha over the period 1990–2012, and net removals of 494.4 Gg CO₂ eq during 2012. Japan assumes no afforestation and reforestation lands were harvested during the period.

Deforestation – CO₂

103. Japan reported 343.1 kha of deforestation from 1990–2012, with 34.34 kha of this occurring between 2008 and 2012. Japan reports that deforestation has decreased over recent years as a result of the economic recession.

104. The previous review report recommended that Japan provide information on the possible over- or underestimation of the rate of deforestation based on the use of satellite imagery. The ERT notes from information in the NIR that Japan has conducted additional measures (enhancing field surveys) to improve the accuracy of data on deforestation. The

ERT commends Japan for its efforts and welcomes the improvements in the accuracy and transparency of its reporting.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO₂

105. The previous review report recommended that Japan include appropriate references to the legislation that has motivated forest management practices or activities since 1990 and also report the time frames for tree planting after harvest. The ERT notes that Japan has implemented these recommendations in its 2014 submission and commends Japan for these improvements to the transparency of its reporting.

Revegetation – CO₂

106. Japan reported 80.06 kha subject to revegetation activities in 2012, resulting in net removals of 1,161.85 Gg CO₂, which is a significant increase compared with the 1990 base year (with an area of 5.87 kha subject to revegetation and net removals of 77.82 Gg CO₂). During the review, in response to a question raised by the ERT, Japan explained that the increase is due to the area of revegetation increasing compared with the base year.

107. During the review the ERT requested that Japan explain why a reported decrease in removals per unit area occurred between 2008 and 2012. Japan explained that revegetated areas were classified into eight subcategories, such as urban parks and green areas on roads, and removals per unit of area for those subcategories (the distribution ratio) were not the same. The ERT welcomes Japan's explanation and recommends that Japan provide this and additional information in the inventory report to increase transparency.

108. The previous review report recommended that Japan report the non-estimated carbon pools as "NE" instead of "NA" in CRF table 5(KP-I)B.4. The ERT notes that Japan has replaced the relevant notation keys with "NE" for the 2014 submission and commends Japan for this improvement.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

109. Japan 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.¹⁵ 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. There were no recommendations reported in the SIAR.

110. 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

¹⁵ 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.

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 and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

111. Japan 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.

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

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	-2 320 583		-2 320 583
Harvested land	0		0
Deforestation	11 438 418		11 438 418
Forest management	-247 451 169		-247 451 169
Article 3.3 offset ^c	-9 117 836		-9 117 836
Forest management cap ^d	-238 333 333		-238 333 333
Cropland management	NA		NA
Grazing land management	NA		NA
Revegetation	-5 234 045		-5 234 045

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.

113. Based on the information provided in table 7 for the activity afforestation and reforestation, Japan shall for non-harvested land, issue 2,320,583 removal units (RMUs) in its national registry; for harvested land, neither issue nor cancel any units in its national registry.

114. Based on the information provided in table 7 for the activity deforestation, Japan shall cancel 11,438,418 assigned amount units (AAUs), emission reduction units (ERUs), certified emission reduction units (CERs) and/or RMUs in its national registry.

115. Based on the information provided in table 7 for the activity forest management, Japan shall issue 247,451,169 RMUs in its national registry.

116. Based on the information provided in table 7 for the activity revegetation, Japan shall issue 5,234,045 RMUs in its national registry.

Calculation of the commitment period reserve

117. Japan has reported its commitment period reserve in its 2014 annual submission. Japan reported that its commitment period reserve has not changed since the initial report review (5,335,431,899 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

118. Japan reported that there are no changes in its national system since the previous annual submission. The ERT concluded that Japan's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

119. Japan reported that there are changes in its national registry since the previous annual submission. Japan described the changes in its NIR: the name and contact address of the registry system administrator changed; information on unit holdings and transactions was updated and made publicly available; the server and the network device were updated with security patches; a new function was added which allows the registry system administrator to conduct retirement and cancellation of selected units which account holders transferred to the governmental holding account.

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

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

121. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Japan 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.

122. Japan 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. Japan described the changes in its NIR: Japan announced its proactive diplomatic strategy for countering global warming "Actions for cool earth

(ACE)”; Japan plans to launch a survey to identify potential CO₂ storage sites in waters surrounding Japan; and research was conducted to judge the application of the sub-seabed geological storage of CO₂. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

III. Conclusions and recommendations

A. Conclusions

123. Table 8 summarizes the ERT’s conclusions on the 2014 annual submission of Japan, in accordance with the Article 8 review guidelines.

Table 8

Expert review team’s conclusions on the 2014 annual submission of Japan

<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 Japan 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	See table 3
LULUCF ^a	Not complete	See table 3
KP-LULUCF	Complete	See tables 3 and 6
The ERT concludes that the inventory submission of Japan has been prepared and reported in accordance with the UNFCCC reporting guidelines	Generally	31 and 33
Japan’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	Yes	
Japan 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	

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross references for identified problems</i>
Did Japan 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

124. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified. The ERT notes that this review report of the 2014 annual submission will be published after 15 April 2015. Where recommendations cannot be fully implemented in time for the 2015 annual submission, the ERT recommends that Japan provide an update on progress of implementation in the NIR.

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	QA/QC	Strengthen the QC procedures to avoid inconsistencies between the CRF tables and the NIR	Yes	Table 3
	Inventory planning	Move all information from annex 6.1 to chapter 1 of the NIR	Yes	12
Energy	General	Address issues related to the transparency and the comparability of the inventory	No	21
	Comparison of the reference approach with the sectoral approach and international statistics	Include in the NIR detailed information on the conversion factors used to convert GCV to NCV for all fuels	No	25

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross references</i>
		Address inconsistencies between the figures reported in the CRF tables and the international statistics from IEA in annex 2 of the NIR by providing coal production data in CRF table 1.A(b) and by including relevant explanations on the discrepancies with international statistics in annex 2 of the NIR	Yes	26
	Feedstocks and non-energy use of fuels	Provide detailed information on the methodology used to estimate the reported quantities of non-energy use of fuels for each individual fuel, with a clear indication of its correspondence to the respective category codes in the energy balance	No	31
		Provide a table in the NIR mapping the various types of fuels as reported in the energy balance with the corresponding fuels as reported in CRF table 1.A(d)	No	31
	Stationary combustion: solid, liquid, gaseous and other fuels – CO ₂ , CH ₄ and N ₂ O	Develop a method to subtract the amount of the fuels reported under the duplication adjustment (e.g. proportionally to fuel consumption) from all subcategories under manufacturing industries and construction in order to improve the accuracy and comparability of the NIR and to avoid reporting negative energy emissions	No	33
		Explain the changes made to the energy balance in the NIR	No	33
		Provide additional information in the NIR on the CO ₂ EFs of BFG and CFG	No	36
	Road transportation: liquid fuels – CO ₂ , CH ₄ and N ₂ O	Provide additional information on the annual number of vehicles by type, the annual mileage per vehicle and the fuel efficiency per vehicle type	No	40
		Include in the QA/QC procedures a comparison of the annual mileage and fuel efficiency by vehicle category with the fuel consumption reported by the energy balance to ensure that no discrepancies occur	No	40
	Coal mining and handling – CH ₄	Provide, in the NIR, justification on the mean value of the default range regarding fugitive CH ₄ emissions from mining activities in surface mines	No	41

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross references</i>
	Other transportation: gaseous fuels – CO ₂ , CH ₄ and N ₂ O	Report emissions from pipeline transport as “NO” and provide explanations in the NIR	No	44
	Oil and natural gas: natural gas distribution – CH ₄	Clarify the text of the NIR regarding fugitive emissions from natural gas distribution to industrial consumers	No	45
	Oil and natural gas: oil production – CO ₂ and CH ₄	Include, in the NIR, an explanation on condensate and light crude oil, in particular the exact definition of each product and the quantities produced in 2012	No	49
Industrial processes and solvent and other product use	General	Include, in the NIR, a sector overview of the drivers behind significant increases or decreases of emissions	No	52
	Limestone and dolomite use – CO ₂	Introduce a periodic review of country-specific factors (e.g. every 3–5 years) and include the results of such a review in the NIR	No	54
	Adipic acid production – N ₂ O	Make the necessary corrections, in the NIR, to calculate the efficiency (operation rate) of the N ₂ O decomposition-and improve the QC procedures to avoid such situations	No	55
	Production of halocarbons and SF ₆ – HFCs, PFCs and SF ₆	Provide, in the NIR, more details on how the fugitive emissions are quantified and whether the fugitive emissions relate to production and destruction rates	No	56
Agriculture	Transparency	Improve the transparency of the reporting by providing initial and recalculated data in a table	No	62
	Enteric fermentation – CH ₄	Improve the transparency of the reporting by providing information in the NIR on the justification of the CH ₄ EFs for enteric fermentation for sheep and goats	Yes	63
		Include, in the NIR, the additional information on the country-specific CH ₄ EFs related to each weight category of swine and a calculation sheet determining how the EF was obtained	No	64
	Manure management – CH ₄ and N ₂ O	Report a weighted average value of Frac _{GASM}	No	65

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross references</i>
		Increase the transparency of its reporting by providing the MCF values in CRF table 4.B(a)	Yes	66
		Improve the description of the methodology used to obtain the country-specific CH ₄ and N ₂ O EFs for pasture, paddock and range for cattle	Yes	67
		Improve the transparency of the description of the methodology used to estimate emissions from the heaping and sun-drying of poultry waste	No	67
	Agricultural soils – N ₂ O	Calculate and report the weighted average values of Frac _{GRAZ} and report them in CRF table 4.Ds2 in order to improve transparency and comparability	No	68
		Estimate and report N ₂ O emissions from sewage sludge applied to soils under the agriculture sector	No	69
	Rice cultivation – CH ₄	Improve the transparency of the reporting by including the information on amounts of type and amounts of organic amendments added to rice cultivation areas in CRF table 4.C and provide documentation for this information in the NIR	No	70
LULUCF	Completeness	Estimate and report emissions from all mandatory categories	Yes	Table 3
	Transparency	Include the explanation on why the total land area has increased between 1990 and 2012	Yes	73(d)
	Forest land remaining forest land – CO ₂	Provide the information, in the NIR, that supports assumptions made on the reporting of the biomass carbon stock pools in bamboo forest and on the reporting of the dead organic matter and soil carbon changes in the subcategories “bamboo” and “forests with less standing trees”	No	77
		Provide additional information on the expert judgement assumption on soil drainage in forest land with organic soils and on drainage in forest land with organic soils in order to increase the transparency of the reporting	No	79

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross references</i>
	Land converted to cropland – CO ₂	Provide an estimate of the carbon stock changes in soils for mineral and organic soils separately and provide a better justification for the assumption of zero gains and losses for other land converted to cropland to improve the accuracy and transparency of this subcategory	Yes	83
	Other land remaining other land – CO ₂	Report abandoned cultivated areas under an appropriate land-use category (e.g. cropland)	Yes	85
Activities under Article 3, paragraph 4, of the Kyoto Protocol	QA/QC	Review and update as necessary, QA/QC procedures activities, to improve the accuracy of the reporting for KP-LULUCF activities	No	101
	Revegetation – CO ₂	Provide an explanation, in the inventory report, on the decrease in removals per unit area that occurred between 2008 and 2012 to increase transparency	No	107
Cross-cutting		Provide, in the NIR, an update on the progress of implementation of the recommendations	No	124

Abbreviations: AD = activity data, BFG = blast furnace gas, CFG = coke furnace gas, CRF = common reporting format, EF = emission factor, Frac_{GASM} = fraction of livestock nitrogen excretion that volatilizes as ammonia and nitrogen oxides, Frac_{GRAZ} = fraction of livestock nitrogen excreted and deposited onto soil during grazing, GCV = gross calorific value, IEA = International Energy Agency, 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, MCF = methane conversion factor, NCV = net calorific values, NIR = national inventory report, QA/QC = quality assurance/quality control.

IV. Questions of implementation

125. 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	5 335 431 899			5 335 431 899
Annex A emissions for 2012				
CO ₂	1 275 610 697			1 275 610 697
CH ₄	20 006 768	20 025 834		20 025 834
N ₂ O	20 231 214			20 231 214
HFCs	22 925 685			22 925 685
PFCs	2 758 268			2 758 268
SF ₆	1 585 089			1 585 089
Total Annex A sources^c	1 343 117 721	1 343 136 786		1 343 136 786
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	-494 391			-494 391
3.3 Afforestation and reforestation on harvested land for 2012		NA		NA
3.3 Deforestation for 2012	1 954 888			1 954 888
Activities under Article 3, paragraph 4, for 2012^d				
3.4 Forest management for 2012	-53 140 338			-53 140 338
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	-1 161 850			-1 161 850
3.4 Revegetation for the base year	-77 825			-77 825

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

^a "Adjustment" is relevant only for Parties for which the expert review team (ERT) 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 of 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	1 240 631 907			1 240 631 907
CH ₄	20 286 653	20 306 326		20 306 326
N ₂ O	20 493 628			20 493 628
HFCs	20 451 534			20 451 534
PFCs	3 016 351			3 016 351
SF ₆	1 637 852			1 637 852
Total Annex A sources^c	1 306 517 925	1 306 537 597		1 306 537 597
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	-482 249			-482 249
3.3 Afforestation and reforestation on harvested land for 2011	NA			NA
3.3 Deforestation for 2011	1 632 983			1 632 983
Activities under Article 3, paragraph 4, for 2011^d				
3.4 Forest management for 2011	-51 638 700			-51 638 700
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	-1 142 083			-1 142 083
3.4 Revegetation for the base year	-77 825			-77 825

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

^a "Adjustment" is relevant only for Parties for which the expert review team (ERT) 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 of 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	1 191 067 253			1 191 067 253
CH ₄	20 694 853	20 716 333		20 716 333
N ₂ O	20 770 069			20 770 069
HFCs	18 291 384			18 291 384
PFCs	3 408 706			3 408 706
SF ₆	1 862 425			1 862 425
Total Annex A sources^c	1 256 094 691	1 256 116 171		1 256 116 171
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	-469 671			-469 671
3.3 Afforestation and reforestation on harvested land for 2010	NA			NA
3.3 Deforestation for 2010	3 036 039			3 036 039
Activities under Article 3, paragraph 4, for 2010^d				
3.4 Forest management for 2010	-50 931 496			-50 931 496
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	-1 128 660			-1 128 660
3.4 Revegetation for the base year	-77 825			-77 825

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

^a "Adjustment" is relevant only for Parties for which the expert review team (ERT) 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 of 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	1 141 462 927			1 141 462 927
CH ₄	21 100 322	21 122 025		21 122 025
N ₂ O	21 446 263			21 446 263
HFCs	16 546 601			16 546 601
PFCs	3 265 253			3 265 253
SF ₆	1 851 273			1 851 273
Total Annex A sources^c	1 205 672 640	1 205 694 343		1 205 694 343
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	-447 995			-447 995
3.3 Afforestation and reforestation on harvested land for 2009	NA			NA
3.3 Deforestation for 2009	2 646 754			2 646 754
Activities under Article 3, paragraph 4, for 2009^d				
3.4 Forest management for 2009	-48 096 392			-48 096 392
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	-1 110 878			-1 110 878
3.4 Revegetation for the base year	-77 825			-77 825

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

^a "Adjustment" is relevant only for Parties for which the expert review team (ERT) 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 of 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	1 213 831 687			1 213 831 687
CH ₄	21 674 178	21 697 682		21 697 682
N ₂ O	21 722 290			21 722 290
HFCs	15 298 882			15 298 882
PFCs	4 615 066			4 615 066
SF ₆	3 761 216			3 761 216
Total Annex A sources^c	1 280 903 318	1 280 926 822		1 280 926 822
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	-426 277			-426 277
3.3 Afforestation and reforestation on harvested land for 2008	NA			NA
3.3 Deforestation for 2008	2 167 754			2 167 754
Activities under Article 3, paragraph 4, for 2008^d				
3.4 Forest management for 2008	-46 363 732			-46 363 732
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	-1 079 697			-1 079 697
3.4 Revegetation for the base year	-77 825			-77 825

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

^a "Adjustment" is relevant only for Parties for which the expert review team (ERT) 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 of 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 Japan 2014. Available at <http://unfccc.int/resource/docs/2014/asr/jpn.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/JPN. Report of the individual review of the annual submission of Japan submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/jpn.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 Mr. Naofumi Kosaka (Greenhouse Gas Inventory Office of Japan), including additional material on the methodology and assumptions used. The following documents¹ were also provided by Japan:

Kazunari, K. 2005. *Revision of default Net Calorific Value, Carbon Content Factor and Carbon. Oxidization Factor for various fuels in 2006 IPCC GHG Inventory Guideline*. RIETI, IAI, Government of Japan.

Shibata, M., Terada, F. Kurihara, M., Nishida, T. and Kazuo Iwasaki. 1992. *Estimation of methane emissions in ruminants*. National Institute of Animal Industry, Tsukuba. Anim. Sci. Technol. (Jpn.) 64 (8): 790-796.

¹ Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
AWMS	manure management systems
BFG	blast furnace gas
CER	certified emission reduction unit
CFG	coke furnace gas
CH ₄	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CNG	compressed natural gas
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
F-gas	fluorinated gas
Frac _{GASM}	fraction of livestock nitrogen excretion that volatilizes as ammonia and nitrogen oxides
Frac _{GRAZ}	fraction of livestock nitrogen excreted and deposited onto soil during grazing
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
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kha	kilohectare
kg	kilogram (1 kg = 1,000 grams)
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
LULUCF	land use, land-use change and forestry
LPG	liquefied petroleum gas
LTO	landing and take-off
m ³	cubic metre
N	nitrogen
NCV	net calorific values
MCF	methane conversion factor
N ₂ O	nitrous oxide
NA	not applicable
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
TJ	terajoule (1 TJ = 10 ¹² joule)
UNFCCC	United Nations Framework Convention on Climate Change
