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Report of the individual review of the greenhouse gas inventories of Japan submitted in 2007 and 2008*

* In the symbol for this document, 2008 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2007 and 2008 greenhouse gas (GHG) inventory submissions of Japan, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. In accordance with the conclusions of the Subsidiary Body for Implementation at its twenty-seventh session,[1] the focus of the review is on the most recent (2008) submission. The review took place from 15 to 20 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland), Mr. Jan Pretel (Czech Republic); energy – Mr. Javier Gonzalez (Spain), Mr. Simon Wear (New Zealand), Mr. Scott McKibbon (Canada); industrial processes – Mr. Stanford Mwakasonda (South Africa), Mr. Eilev Gjerald (Norway); agriculture – Mr. Tom Wirth (United States of America), Mr. Jorge Alvarez (Peru); land use, land-use change and forestry (LULUCF) – Ms. Thelma Krug (Brazil), Mr. Chris Cameron (New Zealand); and waste – Mr. Mark Hunstone (Australia), Mr. Qingxian Gao (China). Mr. Goodwin and Mr. Mwakasonda were the lead reviewers. The review was coordinated by Ms. Astrid Olsson and Mr. Vitor Gois Ferreira (UNFCCC secretariat).

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

B. Inventory submission and other sources of information

3. The 2008 annual inventory was submitted on 16 May 2008; it contains a complete set of common reporting format (CRF) tables for the period 1990–2006 and a national inventory report (NIR). This is in line with decision 15/CMP.1. Japan indicated that the 2008 submission is also its voluntary submission under the Kyoto Protocol.[2] In its 2007 submission, Japan included a complete set of CRF tables for the period 1990–2005 and an NIR. When necessary the expert review team (ERT) also used the 2006 submission, additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report.

C. Emission profiles and trends

4. In 2006 (as reported in the 2008 annual submission), the main GHG in Japan was carbon dioxide (CO_2), accounting for 95.0 per cent of total GHG emissions[3] expressed in CO_2 equivalent (CO_2 eq); nitrous oxide (N_2O) accounted for 1.9 per cent and methane (CH_4) for 1.8 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) together accounted for 1.3 per cent of the total GHG emissions. The energy sector accounted for 89.2 per cent of the total GHG emissions, industrial processes for 5.4 per cent, waste for 3.3 per cent, agriculture for 2.0 per cent, and solvent and other product use for 0.02 per cent. Total GHG emissions amounted to 1,340,080.59 Gg CO_2 eq and increased by 6.2 per cent between the base year[4] and 2006. In 2005 (as reported in the 2007 annual inventory submission), total GHG emissions amounted to 1,359,914.27 Gg CO_2 eq. The shares of gases and sectors in 2006 (2008 annual inventory submission) were similar to those in 2005 (2007 annual inventory submission).

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[1] FCCC/SBI/2007/34, paragraph 104.

[2] Parties may start reporting information under Article 7, paragraph 1, of the Kyoto Protocol from the year following the submission of the initial report, on a voluntary basis (decision 15/CMP.1).

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

[4] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

5. Tables 1 and 2 show GHG emissions by gas and by sector, respectively.

D. Key categories

6. Japan used the IPCC tier 1and tier 2 approach to identify its key categories using the level and trend assessment. The key category analysis performed by Japan and performed by the secretariat[5] produced similar results. Japan has included the LULUCF sector in its key category analysis. However, Japan's trend analysis is based on its base year estimates (which includes 1995 for HFCs, PFCs and SF_6). This approach is not consistent with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The same key categories were identified in the 2007 submission. The key category analysis is a driving factor for the preparation of the inventory. Japan is using the analysis to prioritize the development and improvement of the inventory. Japan did not include a key category analysis for 1990 in its 2008 submission, but did so during the review. The ERT encourages Japan to use only 1990 rather than a combination of 1990 and 1995 as the basis for its trend assessment. The ERT reiterates the recommendation from the previous ERT that Japan include its base year key category analysis in its next annual submission.

E. Main findings

7. Japan has submitted a complete set of CRF tables for the years 1990–2006 and an NIR. The submission is complete in terms of geographical coverage, years and sectors, and generally complete in terms of categories and gases. The inventory is generally in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Japan has a very good inventory system, utilizing sector experts and ministries in the preparation of the inventory. However, Japan still reports emissions from waste incineration with energy recovery in the waste sector instead of in the energy sector. This is not in line with the IPCC good practice guidance. In addition, Japan does not report actual emissions of HFCs, PFCs and SF_6 for the years 1990–1994. The NIR is complete and Japan has addressed many of the issues raised in previous ERT reports. The NIR provides information on the methodologies used, activity data (AD) and emission factors (EFs), and the ERT welcomes the improvements made by Japan in response to previous reviews such as including more information on uncertainties, time-series consistency, quality assurance/quality control (QA/QC) and verification, and category-specific recalculations. However, the ERT noted the need to provide more information and explanation in the NIR, including in annexes if needed, to facilitate future reviews. Such information should include better documentation of drivers for the emission trends and information outlining national system actions and plans for the following year (as contained in the document provided by Japan to the ERT during the review week).

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

Table 1. Greenhouse gas emissions by gas, 1990–2006

Greenhouse gas emissions	Gg CO_2 eq								Change base year–2006 (%)
	Base year[a]	1990	1995	2000	2003	2004	2005	2006	
CO_2	1 144 197.38	1 144 197.38	1 228 053.03	1 256 735.63	1 286 203.46	1 284 419.28	1 290 591.41	1 273 594.71	11.3
CH_4	33 385.53	33 385.53	30 964.16	26 979.69	24 745.87	24 351.90	23 929.96	23 637.35	–29.2
N_2O	32 633.50	32 633.50	33 442.15	29 891.06	25 887.59	25 953.65	25 566.29	25 558.83	–21.7
HFCs	20 211.80	17 930.00	20 211.80	18 586.00	12 519.01	8 349.79	7 259.68	6 618.01	–67.3
PFCs	14 301.93	5 670.00	14 301.93	9 270.99	6 820.59	7 046.19	6 489.53	6 323.13	–55.8
SF_6	16 928.79	38 240.00	16 928.79	6 859.12	4 822.43	4 581.87	4 227.89	4 348.58	–74.3

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

Table 2. Greenhouse gas emissions by sector, 1990–2006

Sectors	Gg CO_2 eq								Change base year–2006 (%)
	Base year[a]	1990	1995	2000	2003	2004	2005	2006	
Energy	1 069 583.46	1 069 583.46	1 145 771.65	1 177 382.80	1 207 599.48	1 207 718.97	1 212 109.03	1 194 702.30	11.7
Industrial processes	122 385.45	132 782.92	124 242.12	96 464.51	77 808.51	74 377.23	73 316.45	72 932.48	–40.4
Solvent and other product use	287.07	287.07	437.58	340.99	320.83	297.54	266.41	266.41	–7.2
Agriculture	32 217.84	32 217.84	30 854.45	28 408.81	27 745.43	27 583.33	27 443.04	27 368.18	–15.1
LULUCF	NA	–91 843.62	–93 280.25	–92 599.04	–102 491.82	–102 213.57	–95 870.49	–91 500.92	NA
Waste	37 185.11	37 185.11	42 596.07	45 725.36	47 524.70	44 725.60	44 929.82	44 811.21	20.5
Other	0.00	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	
Total (with LULUCF)	NA	1 180 212.79	1 250 621.62	1 255 723.44	1 258 507.12	1 252 489.11	1 262 194.26	1 248 579.68	NA
Total (without LULUCF)	1 261 658.93	1 272 056.41	1 343 901.86	1 348 322.48	1 360 998.95	1 354 702.68	1 358 064.76	1 340 080.59	6.2

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

8. The ERT noted that by supplying the additional information requested by the ERT, Japan has demonstrated sufficient capacity to comply with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) and the IPCC good practice guidance.

F. Cross-cutting topics

1. Completeness

9. Japan has submitted a complete set of CRF tables covering all years, most categories and almost all gases. Categories not reported are HFC emissions from fire extinguishers and other applications using ozone depleting substance (ODS) substitutes, CO_2 emissions from carbon stock changes in dead organic matter for cropland remaining cropland and grassland remaining grassland, and CO_2 emissions from agricultural lime application. Japan reports potential emissions for the fluorinated gases (F-gases) for the whole time series but has not estimated actual emissions for the F-gases from 1990 to 1994 because of lack of AD; Japan indicated that any attempt to calculate them could lead to the introduction of large uncertainties and errors in the inventory. The ERT recommends that Japan estimate actual emissions for the years 1990–1994 following the IPCC good practice guidance. In response to questions raised during the review regarding categories reported as not estimated ("NE") in the 2008 annual submission, Japan responded that it is considering how to develop a method for estimating CO_2 emissions from agricultural lime application, that it will change the reporting of HFC emissions from fire extinguishers to not occurring ("NO"), and that carbon stock changes from dead organic matter for the two categories are optional.

2. Transparency

10. In response to the initial review report Japan has provided additional detailed descriptions of time series in the NIR, including detailed descriptions of different components of the trends. The ERT encourages Japan to also provide in future NIRs an overview of the main drivers for the trend in order to enhance the transparency of the reported emissions. The ERT reiterates the recommendation from the previous ERT that Japan report emissions from waste incineration with energy recovery in the energy sector, in accordance with the IPCC good practice guidance so that emissions estimates are transparently presented. The ERT also recommends that Japan, in future NIRs, improve the transparency of the description of methods used in the agriculture chapter as indicated in the agriculture chapter below. The ERT welcomes the additional information provided, in the 2008 submission and in response to recommendations in the initial review report, on uncertainties, time-series consistency, QA/QC and verification, category-specific recalculations and category-specific planned improvements throughout the sectoral chapters in the NIR at the subcategory level.

3. Recalculations and time-series consistency

11. The ERT notes that Japan has undertaken recalculations of the time series from 1990 to 2005 to take account of revised methodologies and new survey data and AD. Only minor recalculations have been undertaken for 1990 for the energy, LULUCF and waste sectors. The impact of these recalculations on total GHG emissions was an increase by 0.001 per cent. More significant recalculations for 2005 have been presented for all sectors, except solvent and other product use, and the impact of these recalculations on the total GHG emissions is a decrease in emissions by 0.14 per cent. The rationale for these recalculations is provided in the NIR. Recalculations that have not been suitably described in the NIR or CRF tables are those for composting and specially controlled industrial solid waste incineration. Japan is encouraged to ensure that all recalculations are fully documented in the NIR and CRF tables.

4. Uncertainties

12. Japan calculated uncertainties using both a tier 1 and a tier 2 approach. Japan's uncertainty for the overall inventory is 2 per cent, which is low compared with the uncertainties reported by other Parties because of a particularly low estimate of uncertainty for emissions from agricultural soils. Japan's uncertainty analyses have not changed greatly across the 2006, 2007 and 2008 annual inventory submissions. The ERT encourages Japan to provide more details of its uncertainty calculations for emissions from agricultural soils (including the basis of the assumptions or background details of measurements which give the uncertainty range used for the analysis) and information on their relative importance to the overall uncertainty estimates for the inventory.

5. Verification and quality assurance/quality control approaches

13. Japan has a QA/QC plan in place and has implemented general and category-specific procedures in accordance with the IPCC good practice guidance. During the review Japan indicated that it is drafting a document that describes its national system and QA/QC procedures. A number of previously issued documents, such as the report on Japan's assigned amount and Annex 6 (Additional information to be considered as part of the NIR Submission or Other Useful Reference Information) of the NIR, will be integrated into this document. The improvements will be reviewed at the upcoming meeting of the Committee for Greenhouse Gas Emissions Estimation Methods. Japan also intends to complete the enhancement of the national system and QA/QC procedures, with documentation including future work plans and agendas, by March 2009, and will try to include the information in the next inventory submission. The ERT recommends that Japan include additional descriptions of the QA/QC processes carried out across the LULUCF sector in order to improve transparency. Japan does not undertake any category-specific QC measures in the waste sector. The Party is encouraged to undertake and document category-specific QC measures in future NIRs.

6. Follow-up to previous reviews

14. The ERT acknowledges the improvements in transparency that Japan has made across all sectors (energy, industrial processes (e.g. for consumption and production of halocarbons and SF_6), agriculture, LULUCF (e.g. the parameter used for estimating the value for grassland biomass before conversion to other land) and waste) in response to previous reviews.

15. However, the ERT noted that Japan has not followed up on some of the recommendations from previous ERTs, such as the recommendation to include its key category analysis for the base year in its NIR, to reallocate emissions from waste incineration with energy recovery to the energy sector, and to provide estimates of actual emissions of HFCs, PFCs and SF_6 for the years 1990–1994. Recommendations relating to the different sectors and categories are included in the sectoral chapters below.

G. Areas for further improvement

1. Identified by Japan

16. The 2008 NIR identifies several areas for improvement. For example, Japan indicated that it is working on:

(a) Enhancing the national system and improving its QA/QC procedures by reviewing the structure of its national system with regard to organization and the division of roles and other relevant elements. Japan has indicated that it will review its QA/QC activities and revise the QA/QC plan;

(b) Reviewing the estimation methods, AD, EFs and other relevant elements through the Committee for Greenhouse Gas Emissions Estimation Methods. Japan will focus its work on improving the inventory on key categories – including categories where default

IPCC values have been used, for example, EFs for road transportation for some vehicles – and on issues pointed out in previous reviews;

(c) Addressing the problems of non-availability of data arising from the discontinuity in data collection and/or exclusion of these data from national statistics;

(d) Further improving the transparency of the inventory by examining the descriptions of methodologies, assumptions, data and other elements in the NIR, and by adding necessary information to the NIR.

2. Identified by the expert review team

17. The ERT identifies the following cross-cutting issues for improvement:

(a) Using only 1990 rather than a combination of 1990 and 1995 as the basis for its trend assessment in the key category analysis, and including its base year key category analysis in the next annual submission;

(b) Providing an overview of the main drivers for the emission trend in future NIRs in order to enhance the transparency of the emission estimates;

(c) Ensuring that all recalculations are fully documented in the NIR and CRF tables;

(d) Completing work on the enhancement of the national system and QA/QC procedures, with documentation including future work plans and agendas.

18. Recommended improvements relating to specific source/sink categories are presented in the relevant sectoral chapters of this report.

II. Energy

A. Sector overview

19. The energy sector is the main sector in the GHG inventory of Japan. In 2006, emissions from the energy sector amounted to 1,194,702.30 Gg CO_2 eq, or 89.2 per cent of total GHG emissions. Emissions from the sector increased by 11.7 per cent between 1990 and 2006.

20. The key driver for the rise in emissions is public electricity and heat production, which accounted for 30.5 per cent of 2006 energy emissions and increased by 25.1 per cent from 1990 to 2006. Emissions from road transportation accounted for 18.8 per cent of 2006 energy emissions and increased by 16.2 per cent from 1990 to 2006.

21. Within the energy sector, 32.5 per cent of the emissions were from energy industries, 31.5 per cent were from manufacturing industries and construction, 20.9 per cent were from transport and 14.9 per cent were from other sectors. The remaining 0.1 per cent of energy emissions were from other energy and fugitive emissions.

22. The ERT noted that Japan reports the following categories as "NE": CO_2 emissions from coal mining, and CO_2 emissions from solid fuel transformation. Japan comments in the CRF tables that the concentration of CO_2 within its mines is the same as in the atmosphere and therefore CO_2 emissions from coal mining are reported as "NE". Japan further comments in the CRF that emissions of CO_2 from solid fuel transformation are not estimated due to lack of data. There are, however, no IPCC methodologies available in the Revised 1996 IPCC Guidelines or IPCC good practice guidance for estimating CO_2 emissions from these two categories.

23. Recalculations were carried out for the 2007 and 2008 annual inventory submissions for the energy sector. This includes recalculations for the base year estimate of CH_4 and N_2O for the energy

sector, but the percentage changes between the old and new estimates were zero at two decimal places. When comparing the 2007 and 2008 submissions, changes for the latest year (2005) were small. Japan has documented the changes and reasons for the recalculations in the NIRs for 2007 and 2008 under the appropriate sections.

B. Reference and sectoral approaches

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

24. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2006, there is a difference of –0.70 per cent in the CO_2 emission estimates between the reference approach and the sectoral approach. Over the whole time series, the difference in emissions between the two approaches ranges from –1.08 per cent to +1.25 per cent. The ERT notes that the values for the differences calculated between the reference and sectoral approaches, for both energy consumption and CO_2 emissions, differ between the CRF tables and the NIR. The ERT reiterates the recommendation from the previous review that Japan correct these discrepancies and provide consistent information in the CRF tables and the NIR in the next annual submission.

25. The ERT acknowledges the substantial improvement since 2007 in transparency and explanations provided in annex 2.3 of the NIR for differences between International Energy Agency (IEA) statistics and the data presented in the CRF table for specific fuels. The ERT notes that the amount of sub-bituminous coal produced and reported in the CRF table up to 2002 is reported in the IEA statistics as other bituminous coal. The ERT encourages Japan to reconcile these different definitions for coal.

26. To assist future review teams this ERT recommends that Japan provide a printed energy balance table in the NIR, possibly as an annex or an electronic attachment. Japan has explained to the ERT that the energy balance is too large for printing. The ERT suggests that Japan consider summarizing the energy balance table for publishing in the NIR by aggregating some of the energy categories to the classification reported in the CRF.

2. International bunker fuels

27. The ERT acknowledges the improvements that Japan has made in the transparency of data on international bunker fuels in the NIR by providing an explanation of how international and domestic aviation and marine emissions are allocated. Japan uses data on the bonded fuel imports and exports provided by the Ministry of Economy, Trade and Industry to determine international fuel AD for aviation and marine transport. The IPCC good practice guidance recommends that Parties allocate fuel use between domestic and international segments using the criteria for defining international or domestic marine transport provided in table 2.8 of the guidance. This guidance defines each leg of a journey depending on whether goods or passengers are dropped off and/or picked up, or whether there is just a stopover. The ERT encourages Japan to use the definitions in the IPCC good practice guidance for international bunker fuels and improve the reliability of data sources for international bunkers.

28. Japan reports residual fuel used as international marine bunker fuel as included elsewhere ("IE"). Japan reports the use of residual oil in international marine bunkers under heavy oil A, heavy oil B and heavy oil C. During the review Japan provided the oil specifications to the review team to explain the definitions used for heavy oil A, heavy oil B, and heavy oil C. To improve transparency the ERT encourages Japan to provide a descriptive definition of the different fuel oils in future NIRs.

3. Feedstocks and non-energy use of fuels

29. During the initial review it was observed that there was no discussion of feedstocks and non-energy use of fuels. The ERT acknowledges the improvements in transparency made by Japan by including a discussion of feedstocks and non-energy use of fuels in section 3.2.9 of the 2008 NIR.

The ERT reiterates the recommendation from the previous ERT that Japan review its calculation methodology in the light of the guidance available in the Revised 1996 IPCC Guidelines, and include an explicit discussion on this issue in its future NIRs, together with documentation justifying the fractions of carbon stored that it has adopted.

4. Country-specific issues

30. The ERT notes that Japan has provided in its 2008 submission a clear explanation in section 2.3 of annex 2 to the NIR regarding reporting of negative emissions under other (manufacturing industries and construction)(duplication adjustment). The ERT reiterates the recommendation from the previous review that Japan provide a short explanation and cross-reference to the NIR in the documentation box to CRF table 1.

C. Key categories

1. Stationary combustion: solid fuel – N_2O

31. The ERT observed a large increase in the implied emission factor (IEF) for public electricity and heat production – from 0.9 kg N_2O/TJ in 1994 to 1.9 kg N_2O/TJ in 1995. During the review Japan explained that a new large fluidized-bed boiler for power generation went on line in 1995. As a result, the solid fuel consumption of fluidized-bed boilers for commercial power generation increased in 1995, resulting in an increase of N_2O emissions from solid fuel in public electricity and heat production. The ERT recommends that Japan provide this information in its next NIR.

2. Stationary combustion: liquid, solid fuels – CO_2

32. The ERT notes that the CO_2 IEF for combustion of liquid fuels in other (manufacturing industries and construction) (71.10–72.73 t CO_2/TJ) is among the lowest of Parties (57.54–99.63 t CO_2/TJ). The ERT asked Japan to provide further information to support the unidentified methodology used to develop this CO_2 EF. Japan's response is qualitative in nature and includes references to varying annual precipitation and nuclear generation rates between years. However, in the view of the ERT, the presented material does not fully explain the low IEF and the ERT recommends Japan provide the following information in its next submission: carbon content, gross calorific values and density of the component fuels being consumed, and the portions of these components consumed through the time series and ultimately contributing to the low IEF.

33. Fuel consumption of solid fuels and emissions of CO_2 from glassware, reported under other (manufacturing industries and construction), are not reported (blank entries), but CH_4 and N_2O are reported as "NO". The ERT encourages Japan to provide information on fuel used and CO_2 emissions, or to report them as "NE" if they cannot be estimated.

3. Road transportation: liquid fuels – CO_2

34. The ERT notes that the IEF for diesel consumption in road transportation (72.29 t CO_2/TJ) is one of the lowest among reporting Parties (56.78–79.45 t CO_2/TJ), except for 2006, and also does not change over time. The ERT asked Japan to provide further information to support the methodology for estimating emissions from this category and encourages Japan to improve the transparency of the methodology used for the development of this IEF. During the review Japan provided additional information to support the low IEF in the form of a qualitative discussion of country-specific refining and taxation influences for mid-range oil products and an allusion to the national practice of combining heavy fuel oil and diesel to prepare gas oil for on- and off-road use. Also, Japan uses terms unfamiliar to the ERT, such as "slack kerosene" and "slack gas oil", which could provide additional understanding if defined. However, in the view of the ERT, the presented material does not fully explain the low IEF and the ERT recommends that Japan provide the following information in its next submission: carbon

content, gross calorific values and density of the component fuels being blended, and the portions of these components through the time series.

4. Fugitive emissions: solid fuels – CH_4

35. In 1990 fugitive emissions were 0.3 per cent of total energy emissions. In 2006 fugitive emissions were 0.04 per cent of total energy emissions due to reduced underground mining activity and a substantially lower IEF. This IEF has decreased by 81.2 per cent, from 19.6 kg CH_4/t in 1990 to 3.7 kg CH_4/t in 2006; relative to other Parties this reduction initially appears anomalous. This decrease has moved Japan's IEF from the upper range of reported IEFs for this category to the lower range. Japan explained during the review that the emissions from mining activities and post-mining activities are reported in this category. Although the IEF of mining activities changes year by year, the reported emissions of mining activities are measured data. During the review Japan explained that coal mining practices in the country have been moving away from operating costly deep mines to operating shallower mines. Shallower mines have lower CH_4 concentrations. The ERT encourages Japan to provide this explanation in future NIRs.

D. Non-key categories

Rail transportation: solid fuels – all gases

36. Japan reports a small quantity of CH_4 and N_2O emissions from solid fuel (coal) in rail transport (steam locomotives) and reports emissions of CO_2 and coal consumption as "NO". Page 3.30 of the 2008 NIR provides an estimate of coal consumption in rail transport. The ERT encourages Japan to provide information on fuel used and CO_2 emissions or to report them as "NE" if they cannot be estimated.

III. Industrial processes and solvent and other product use

A. Sector overview

37. In 2006, emissions from the industrial processes sector amounted to 72,932.48 Gg CO_2 eq, or 5.4 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 266.41 Gg CO_2 eq, or 0.02 per cent of total GHG emissions. Between the base year and 2006, emissions from the industrial processes sector decreased by 40.4 per cent and emissions from the solvent and other product use sector decreased by 7.2 per cent.

38. Since 1990, emissions have decreased by 45.1 per cent. The key driver for the fall in emissions is the decrease in emissions from the chemical industry. Within the industrial processes sector, 69.3 per cent of GHG emissions were from mineral products, 17.9 per cent were from consumption of halocarbons and SF_6, 6.8 per cent were from the chemical industry, and 4.5 per cent were from production of halocarbons and SF_6. Metal production accounted for 1.5 per cent.

39. The industrial processes sector is fairly complete, but the notation key "NE" was notably used for actual emissions of HFCs, PFCs and SF_6, especially for the years 1990–1994, due to difficulties in obtaining past AD. The ERT reiterates the recommendation of previous review teams for Japan to estimate actual emissions for HFCs, PFCs and SF_6 for the whole time series 1990–2006.

40. The documentation of the industrial processes sector in the 2007 and 2008 annual inventory submissions is almost the same. The NIRs included sectoral explanations on QA/QC, uncertainty analysis and recalculations.

B. Key categories

1. Cement production – CO_2

41. The ERT noted that Japan has developed country-specific EFs that take into consideration waste materials included as cement production raw materials. The ERT commends Japan on this approach, which is in line with the IPCC good practice guidance.

42. Japan reported use of non-carbonate materials in cement production, providing percentage ratios of lime (CaO) from non-carbonate materials. The ERT recommends that Japan provide clearer explanations of the nature of non-carbonate materials in order to give a better understanding of the CaO percentage ratios.

2. Lime production – CO_2

43. Japan uses the tier 1 methodology to calculate CO_2 emissions from lime production. The ERT commends Japan for improvements made to the description of the methodology by including, in the NIR, documentation on AD, uncertainty analysis and time-series consistency.

3. Limestone and dolomite use – CO_2

44. The ERT noted that Japan reported limestone and dolomite use only for activities in the glass and iron and steel industries. AD were obtained from national statistics, and EFs were calculated from stoichiometry of the chemical process. The ERT recommends that Japan provide information in the next NIR on how it ensures that all limestone and dolomite use in Japan has been covered in the inventory.

C. Non-key categories

1. Nitric acid – N_2O

45. To increase transparency in this category, despite confidentiality issues, the ERT recommends that Japan provide information on what nitric acid production processes are used in the country (i.e. whether atmospheric, medium pressure, etc).

2. Consumption of halocarbons and SF_6 – HFC

46. On fire extinguisher emissions, the NIR reported stock emissions as "NE" and disposal emissions as "NO". Recognizing that emissions from fire extinguishers are not necessarily due only to disposal of equipment but also to leakage and discharges, the ERT recommends that Japan provide better explanation of HFC emissions from fire extinguishers.

IV. Agriculture

A. Sector overview

47. In 2006, emissions from the agriculture sector in Japan amounted to 27,368.18 Gg CO_2 eq, or 2.0 per cent of total GHG emissions. Emissions from the sector decreased by 15.1 per cent between 1990 and 2006. The key drivers for the fall in emissions are reduced emissions from agricultural soils, manure management and rice cultivation. Within the sector, 26.3 per cent of the emissions were from manure management, 26.3 per cent were from agricultural soils, 25.7 per cent were from enteric fermentation, 21.0 per cent were from rice cultivation and 0.6 per cent were from field burning of agricultural residues.

48. The inventory is complete for all categories and gases and the emissions are calculated in accordance with the IPCC good practice guidance by using country-specific EFs for agricultural soils, manure management and enteric fermentation. The documentation is generally sufficient, allowing for satisfactory transparency, and appropriate QA/QC procedures have been followed. Uncertainty estimates are also included at the subcategory level.

49. A comparison of the 2008 submission with the 2007 submission shows no major changes in the estimates or major improvements to the transparency. The ERT welcomes the additional information provided on uncertainties, time-series consistency, QA/QC and verification, category-specific recalculations and category-specific planned improvements throughout the agriculture chapter at the subcategory level. In the 2008 submission some additional description of the methodology for estimating emissions from enteric fermentation has been provided, which has improved transparency, together with some revisions to the AD on dairy cattle weights used for calculating dry matter intake, which is the input used by Japan for determining the appropriate EFs for enteric fermentation.

B. Key categories

1. Enteric fermentation – CH_4

50. Japan estimates emissions from this category using an approach similar to the IPCC tier 2 method for cattle. For sheep, swine and goats a tier 1 method with country-specific EFs was applied, and for buffalo and horses a tier 1 method with default EFs was used. The approaches applied for enteric fermentation are in line with the IPCC good practice guidance. The approach described by Japan to estimate enteric emissions from cattle uses CH_4 measurement data to develop an equation for estimating CH_4 emissions from dry matter intake rather than from total gross energy intake as described in the IPCC good practice guidance. The method is clearly explained and the equations are shown. The ERT recommends that Japan improve transparency by showing the cattle types in table 6-2 in the NIR together with the corresponding dry matter intake and resulting EFs. Japan has carried out research on enteric emissions from swine, goats and sheep in Japan. This work has produced CH_4 EFs lower than the IPCC defaults: swine 1.1 kg/head/year (IPCC default 1.5 kg/head/year); goats 4.1 kg/head/year (IPCC default 5 kg/head/year); and sheep 4.1 kg/head/year (IPCC default 8 kg/head/year). The estimates developed by Japan are documented in published papers. The ERT recommends that Japan include additional explanation in the NIR on why the EFs are lower than IPCC defaults (e.g. because of smaller animals or different feed).

2. Manure management – CH_4 and N_2O

51. Japan estimates emissions for cattle, swine and poultry by applying a country-specific approach with country-specific EFs, and for buffalo, sheep, goats and horses using a tier 1 method with default EFs. This approach is in line with the IPCC good practice guidance.

52. The CH_4 IEFs for dairy cattle (63.11–63.40 kg/head/year) are among the highest of reporting Parties (2.31–66.05 kg/head/year) across the entire time series. Japan explains that the manure system called piling, which is the predominant system used for dairy cattle, has a high EF. But when the piling system is used with swine it results in a very low IEF (1.40 kg/head/year), the lowest of reporting Parties (1.40–23.16 kg/head/year). Japan has explained this by stating that dairy manure has a higher water content. The ERT recommends that Japan be more transparent in the NIR by describing the manure management system of piling so that these differences can be better understood.

53. Japan uses a high nitrogen (N) excretion rate for poultry (0.907 kg N/head/year), which is 30 per cent higher than the IPCC default (0.6 kg N/head/year). The high N excretion rate is based on measurement data from Japan and is considered appropriate.

54. N_2O emissions from grazing (pasture, range and paddock) animals, which should be reported under agricultural soils, are reported under manure management. The ERT reiterates the recommendation from the previous review that Japan reallocate these emissions, at least for cattle, which are explicitly estimated, and gather information for the remaining animals in order to be able to allocate these emissions correctly.

3. Rice cultivation – CH_4

55. Japan estimates CH_4 emissions from rice cultivation using a country-specific method that is in line with the IPCC good practice guidance. The ERT reiterates the recommendation from previous review reports that Japan fill in table 4.C of the CRF with activity data for organic amendment available in table 6-22 of the NIR.

4. Agricultural soils – N_2O

56. Japan estimates direct N_2O emissions by applying a national approach that is based on the IPCC good practice guidance tier 1b method, bottom-up-derived AD and country-specific EFs based on national research, which is referenced in the NIR. The EF for both synthetic and organic fertilizers applied to soils (0.0062–0.0066 kg N_2O-N/kg N) is the lowest among reporting Parties (0.0062–0.0142 N_2O-N/kg N). Japan has explained that the EF is based on measurement data from Japan and is low because Japan has a high coverage of paddy fields, which have a low N_2O emission rate when synthetic or organic N fertilizer is applied.

57. Emissions from N-fixing crops are included either under synthetic fertilizers or under animal manure applied to soils, on the basis that it is difficult to list them separately and that this is backed up by national research. The ERT encourages Japan to rectify this misallocation for its next submission, especially if the AD needed are available, and to allocate pasture, range and paddock N_2O emissions to agricultural soils, as mentioned in paragraph 54 above.

C. Non-key categories

Field burning of agricultural residues – CH_4 and N_2O

58. Japan estimates emissions from this category following default methods as described in the Revised 1996 IPCC Guidelines and using a mixture of country-specific and default AD. To obtain crop production values for wheat and barley (green crops) and rye and oats, a bottom-up approach is followed, whereas values for rice, wheat (grain) and barley (grain) are estimated from crop statistics data in Japan. CRF table 4.F has been only partly filled in, although most of the missing data are provided in the NIR. The ERT encourages Japan to submit the CRF files filled in with the complete AD in its next submission.

V. Land use, land-use change and forestry

A. Sector overview

59. In 2006 the LULUCF sector in Japan accounted for net removals of 91,500.92 Gg CO_2 eq, or 6.8 per cent of total GHG emissions. Removals by the sector decreased by 0.4 per cent between 1990 and 2006. Japan includes all land uses, gases and pools in its reporting for the LULUCF sector. However, the following categories are reported as "NE": N_2O emissions from drainage of soils; CO_2 emissions from application of lime; and carbon stock changes in dead organic matter and in soil prior to 2004 for some categories. The ERT encourages Japan to provide estimates for all categories and subcategories identified in CRF table 9(a).

60. Within the sector, 91.1 per cent of the removals were from forest land, and 8.5 per cent were from settlements. The remaining 0.4 per cent were emissions or removals in cropland (emissions), grassland (removals), wetlands (emissions) and other land (emissions).

61. The NIR provides an adequate level of transparency for emissions and removals from LULUCF. However, the ERT notes that for dead organic matter and soils, Japan reports only for 2005 and 2006 and uses not applicable ("NA") for previous years. Japan is moving to a higher tier method for these pools, but a change of methodology is not recommended if this leads to time-series inconsistency. The ERT

recommends that Japan ensure that the entire time series is reported for these pools. Japan stated during the review that it aims to report these categories consistently from the 2010 submission onwards.

62. The 2006 review recommended that the AD in the land-use transition matrices need to be provided in a transparent manner, in particular the methods used (interpolation/extrapolation) and the identification of the latest source of data. In particular, allocation of land to the category other land should ensure that it meets the definition in the IPCC good practice guidance for LULUCF. It is noted that these remain issues that the ERT would like to see resolved. During the review Japan stated that area estimates for land-use are to be re-examined.

63. An uncertainty analysis is provided for all land-use categories. Japan provided a table during the review indicating uncertainty of parameters used in calculations, including country-specific and default factors used. The ERT recommends that such a table be included in the NIR in future submissions in order to improve transparency, and that additional descriptions be given of the processes used to estimate and combine uncertainty in the sector. This is in line with the 2006 review report, which recommended that "Japan not only provide the methodology to estimate the uncertainties, but also explain how the use of it could lead to the combined uncertainty of 6 per cent for the sector".

64. The ERT recommends that additional descriptions be given of the QA/QC processes carried out across the sector, in order to improve transparency. Japan provided additional information to the ERT during the review, describing the process in more detail. However, the ERT believes that transparency would be increased if more category-specific information on QA/QC were included in the NIR.

65. The overall impact of recalculations is low. However, due to revised assumptions for on-site biomass the estimate for emissions from biomass burning has increased considerably. Planned improvements for the sector for each category are provided (these include addressing the issue of time-series consistency for soils and dead organic matter, improving area estimates for land conversions and for other land, and examining the appropriateness of soil management factors).

66. There are no major changes between the 2007 and 2008 annual inventory submissions. Compared to the 2006 submission, the 2007 and 2008 annual submissions both incorporate an improvement made to the assumption of carbon stock in grassland converted to other land uses.

B. Key categories

1. Forest land – CO_2

67. Methods used for forest land (remaining and converted) are appropriate and in line with the IPCC good practice guidance for LULUCF. All land converted to forest land is assumed to be intensively managed, and Japan assesses the type of land converted based on existing land-cover ratios. Japan recognizes that this assumption may not be correct, and has identified the need for further work as a future improvement.

68. Previous reviews have recommended that Japan clarify how the various variables collected in the forest surveys are taken into account in its estimates of emissions and removals. The ERT reiterates the need for more transparency in this area.

2. Land converted to cropland – CO_2

69. Methods for estimating emissions and removals in this category generally follow the IPCC good practice guidance for LULUCF. Japan states that the area of cropland converted from other land has doubled between 2005 and 2006. However, the CRF data do not support this. The ERT recommends that Japan transparently describe the AD used in these calculations, and ensure that the estimate for net stock change in living biomass/area is within the appropriate range.

3. Land converted to grassland – CO_2

70. Methods used for the land converted to grassland category generally follow the IPCC good practice guidance for LULUCF. The ERT recommends that Japan ensure that the estimate for net stock change in living biomass/area is within the appropriate range.

71. Japan has altered the parameter used for estimating the value for grassland biomass (13.5 t dry matter/ha) before conversion to other land uses, in line with recommendations made in the previous review report.

4. Land converted to settlements – CO_2

72. Reporting is generally in line with the IPCC good practice guidance for LULUCF, but it is not clear in the NIR what soil carbon factor was used for settlements; no factor was included in the soil carbon table in the NIR (table 7.14). During the review Japan informed the ERT that the factor used is the same as that used for grassland. The ERT recommends that Japan include the soil carbon factor for soils in table 7.14 of the NIR.

C. Non-key categories

1. Other land – CO_2

73. Reporting of emissions and/or removals from other land may not follow the IPCC good practice guidance for LULUCF as indicated in paragraph 62 above. The ERT noted that Japan plans to revise the methods used for categorizing land use, for the category other land as well as for all other land-use categories. The ERT supports this revision, which will ensure that Japan can allocate all land uses appropriately.

2. Cropland remaining cropland – CO_2

74. Methods for estimating emissions and removals in this category generally follow the IPCC good practice guidance for LULUCF. Japan reports that living biomass in perennial cropland is in a steady state, as is soil carbon. Japan plans to investigate this assumption and report its findings in future inventories. The ERT commends Japan for this approach.

3. Settlements remaining settlements – CO_2

75. Methods for estimating emissions and removals in this category generally follow the IPCC good practice guidance for LULUCF. Japan currently uses a growth factor for trees of 2.9 t C/ha, and plans to investigate the net change (gains and losses) of carbon in trees and report its findings in future inventories.

4. Biomass burning – CO_2

76. For biomass burning the ERT noted that using two methods to estimate the damaged timber volume (for national and private forests) could lead to different results. During the review Japan provided the ERT with further information which clarified that data used for biomass burning are consistent for both private and national forests. However, the ERT believes that further information on the processes of data collection and aggregation for biomass burning, including the QA/QC processes applied, would be useful in the NIR.

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

A. Overview

77. An annex to the NIR provides supplementary information under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. In addition, Japan has completed the Kyoto Protocol CRF tables for 2005 and 2006. The ERT recommends that Japan review the structure of the annex to improve readability (e.g. by bringing all information relating to Article 3, paragraph 3, together in one section and all information relating to Article 3, paragraph 4, into another section). Information on how Japan meets reporting requirements under decisions 15/CMP.1 and 16/CMP.1 could be presented in a separate section.

78. Japan indicates that impacts of CO_2 concentrations above pre-industrial levels, indirect N deposition and dynamic effects of age structure (relating to variable forest planting and harvesting cycles) resulting from pre-1 January 1990 activities have not been factored out. The ERT notes that factoring out these impacts is the intent of the forest management cap included in the appendix to the annex to decision 16/CMP.1 for the first commitment period.

79. The ERT recommends that Japan provide more detail on how sampled data are used to determine geographical boundaries of land areas. National or regional maps indicating land allocation to afforestation, reforestation and deforestation, forest management and revegetation activities, and tracking these changes over time, would be useful. It is important to indicate activities which have occurred since 1990.

80. Japan uses reporting method 1 from the IPCC good practice guidance for LULUCF, in which units of land are encompassed within a geographical boundary (prefecture) subject to multiple activities. However, for inventory reporting Japan uses approach 1 from the IPCC good practice guidance for LULUCF, which considers the net change in areas under different land-use categories. The ERT notes that, according to the IPCC good practice guidance for LULUCF, section 4.2.2.3.1 and table 4.2.2, approach 1 can only be applied to reporting method 1 if additional spatial information is made available by recompiling inventories. The ERT requests that Japan provide transparent descriptions in its reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol to identify the additional information used.

B. Article 3, paragraph 3, activities

81. Harvesting and land-use change are separately determined in the reporting. However, it is not clear how Japan determines that a definite land-use change has occurred. The ERT recommends that this is clarified in reporting, in accordance with section 4.2.6.2.1 of the IPCC good practice guidance for LULUCF.

82. Japan does not provide information on the extent to which GHG removals by sinks offset the debit incurred under Article 3, paragraph 3. The ERT encourages Japan to provide this information from the 2008 values in its future NIRs.

C. Elected Article 3, paragraph 4, activities

83. Japan has elected forest management and revegetation activities under Article 3, paragraph 4.

84. The description in the annex to the NIR states that “forest management [FM] land area is calculated by subtracting afforestation, reforestation and deforestation [ARD] land area from forest land area stored in the National Forest Resources Database and multiplying by ratio of forest maintained and managed appropriately [FM ratio] for each region and tree type”. This description may lead to confusion as it could be read that the ARD area, not the remaining area, is multiplied by the FM ratio. It would be useful to reword this information to make it clear that it is the remaining forest land (once ARD is subtracted) that is multiplied by the FM ratio.

85. Japan does not estimate emissions from soil organic carbon in revegetation, but it indicated during the review that this pool is not a source and that it continues to collect fundamental information on soil carbon. The ERT recommends that Japan include an explanation of why the soil in revegetated land is not a source, as required by decision 16/CMP.1.

86. Activities under Article 3, paragraph 4, must be shown to have occurred since 1990. It is not clear how Japan intends to separate forest management and revegetation activities which took place before 1990 from those which commenced from 1990 onwards. The ERT recommends that Japan indicate how this separation is established.

VII. Waste

A. Sector overview

87. In 2006, emissions from the waste sector amounted to 44,811.21 Gg CO_2 eq, or 3.3 per cent of total GHG emissions. Emissions from the sector increased by 20.5 per cent between 1990 and 2006. The key driver for the rise in emissions is the increase in emissions from waste incineration. Within the sector, 81.0 per cent of the emissions were from waste incineration, 12.0 per cent were from solid waste disposal on land, 5.8 per cent were from wastewater handling and 1.2 per cent were from the decomposition of petroleum-derived surfactants. The predominant gas in the waste sector is CO_2, contributing 75.4 per cent of the waste sector's emissions. CH_4 and N_2O contribute 15.4 and 9.2 per cent, respectively.

88. Japan does not undertake any category-specific QC measures in the waste sector. The Party is encouraged to do so and provide documentation of this work in future NIRs.

89. The Party has performed recalculations for a number of years and categories, as a result of revisions to AD. The net effect of these recalculations is an increase in total estimated emissions from waste of 0.04 per cent in the base year and a decrease of 6.6 per cent in 2005. There are two examples of recalculations performed that have not been addressed in the NIR or CRF tables: composting and specially controlled industrial solid waste incineration. The Party is encouraged to ensure that all recalculations are fully documented in the NIR and CRF tables.

90. Overall, the methodologies, AD and assumptions used are transparently documented with references to extensive calculation sheets which outline each step used in the calculation process.

91. No major differences between 2007 and 2008 submissions have been identified.

B. Key categories

1. Solid waste disposal on land – CH_4

92. Japan uses the first order decay model in the recognized international scientific literature to determine the quantity of degraded waste in the landfill and country-specific EFs which are applied to this degraded waste. The country-specific EFs are determined primarily on the basis of carbon contents of each type of waste. The methodology is described transparently. However, the Party is encouraged to include some further information about the measurement of the country-specific carbon contents in future NIRs.

93. The CH_4 IEF per tonne of waste disposed (0.11–0.21 t/t of municipal solid waste) is among the highest of the reporting Parties, with Japan's minimum value being higher than the minimum value of any other Party. A possible reason for this is Japan's use of "dry-weight" biodegradable AD. Japan is encouraged to explore the possibility of using an IEF calculated by "wet-weight" waste disposal data.

94. The Party has identified a number of areas for further improvement, such as the use of waste-type-specific gas conversion rates, updated carbon contents of waterworks sludge, use of a

country-specific half-life for sludge, and inclusion of an anaerobic/aerobic split for industrial waste disposal sites. The ERT welcomes these plans and the Party is encouraged to proceed with these improvements for incorporation into future submissions.

2. Waste incineration – CO_2

95. Emissions from the incineration of municipal and industrial solid waste are estimated using IPCC default methods and country-specific EFs. Methods are transparently described and data sources are well documented in the NIR.

96. Japan reports emissions from the incineration of waste for energy and use as alternative fuels in the waste sector. The Party provided both technical and policy explanations to the previous ERT as a justification for this practice and previous review reports have encouraged the Party to include these justifications in future NIRs. The Party is encouraged to expand further on the information already provided in line with the additional information provided during this review, including technical details of temporal variations in moisture content and their effects on incinerator efficiency. The ERT reiterates the recommendation from the previous ERT that Japan report the emissions appropriately in line with the IPCC good practice guidance and as recommended in paragraph 25 of the initial review report[6] or ensure that appropriate notation keys ("IE") and explanations are included in the energy sector.

97. CO_2 emissions increased by 51.3 per cent between 1990 (21,995.80 Gg) and 2006 (33,278.97 Gg). Japan has explained that the increase in CO_2 emissions and inter-annual changes are due to the increased amount of incinerated wastes and the changes in their relative amounts. The Party is encouraged to include some further explanation of these trends in its next NIR.

C. Non-key categories

Wastewater handling – CH_4 and N_2O

98. Emissions from wastewater handling are calculated using country-specific methods and EFs. The CH_4 EFs are based on direct measurement and therefore account for any methane recovery that is occurring at treatment plants. Recovery of methane from wastewater treatment is reported as "NE" in the sectoral CRF tables. Emissions from the treatment of sludge are included with wastewater and not reported separately. All methods and data sources are clearly explained and documented in the NIR.

99. CH_4 and N_2O emissions are reported, but AD are reported as "NE". The previous ERT recommended that Japan improve its emissions estimates by applying the chemical oxygen demand value for different types of wastewater, or provide a clear explanation of its use of the biological oxygen demand (BOD)-based EF. Japan provided an explanation in its NIR, but it is encouraged to include some further explanation, as provided during the review, and to elaborate on reasons in CRF table 9 for the use of NE.

100. CH_4 emissions from industrial wastewater are estimated on the basis of the country-specific EF of 0.0049 kg CH_4/kg BOD. This value is much lower than the IPCC default value for anaerobic systems of 0.6 kg CH_4/kg BOD and is based on measurements from sewage treatment plants taken from research studies conducted in Japan and run-off water quality levels. The Party is encouraged to include some further details in its next NIR about the research studies used.

101. N_2O emissions from human sewage decreased by 90.1 per cent between 1990 and 2006; inter-annual changes range between –57.0 and 11.9 per cent. The Party explained that the decrease in N_2O emissions from human sewage treatment is mainly due to a decrease in the EF for high-load denitrification treatment of human sewage. Inter-annual changes are mainly caused by the changes in AD. The Party included a table of relevant emission factors in the NIR but is encouraged to provide some further technical explanations for the falling N_2O emission factors.

[6] FCCC/IRR/2007/JPN.

102. Japan plans to implement a number of improvements to the emissions estimation process for wastewater handling, such as a revision to industrial wastewater treatment and sewage treatment plant EFs. The ERT welcomes these planned improvements.

VIII. Other issues

1. Changes to the national system

103. The Party reported in its 2008 annual submission that there were no changes to its national system.

2. Changes to the national registry

104. The Party reported on changes in its national registry in the 2008 submission. The changes include an update of the national registry to take into account the latest version of the data exchange standards published in October 2007, and some changes in hardware in December 2007. The ERT considers these changes to be in accordance with the requirements of national registries as defined in decision 19/CMP.1. In addition, Japan provided further information on its national registry, especially on the hardware and the capacity of the national registry, during the review in response to questions raised by the ERT. The ERT recommends that Japan provide this information in its next annual submission.

3. Standard electronic format

105. Japan has provided the standard electronic format tables as required by decision 15/CMP.1. The ERT did not identify any problems with these.

4. Commitment period reserve

106. Japan has not reported its commitment period reserve in the 2008 submission. In response to questions raised by the ERT during the review Japan reported that its commitment period reserve has not changed since the initial report review (5,335,431,899 t CO_2 eq). The ERT agrees with this figure. The ERT recommends that Japan include information on its commitment period reserve in its next annual submission.

IX. Conclusions and recommendations

107. Japan has submitted a complete set of CRF tables for the years 1990–2006 and an NIR, which are generally complete in terms of geographical coverage, years and sectors and fairly complete in terms of categories and gases. The ERT noted that the following emissions are not estimated in the inventory: actual emissions of HFCs, PFCs and SF_6 for the years 1990–1994, HFCs from other ODS substitutes and CO_2 emissions from agricultural lime application.

108. Japan's institutional arrangements are fully functional and designed to utilize the best expertise and resources available to develop, prepare and compile the inventory. The ERT noted that Japan intends to enhance its national system and improve its QA/QC procedures, and it welcomes this development.

109. The ERT noted that Japan submitted an inventory report that is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, there are some areas which need further improvements, such as:

(a) Including its base year key category analysis in the next annual submission;

(b) Reallocating emissions from waste incineration with energy recovery from the waste sector to the energy sector;

(c) Including information on category-specific QA/QC procedures undertaken for the LULUCF and waste sectors which is not currently included in the body of the NIR;

(d) Following up on recommendations in this review report and recommendations in previous review reports that are still pending.

X. Questions of implementation

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

Annex

Documents and information used during the review

A. Reference documents

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

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

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

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

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

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

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

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

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Synthesis and assessment report on the greenhouse gas inventories submitted in 2007. Available at <http://unfccc.int/resources/webdocs/sai/2007.pdf>.

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FCCC/ARR/2006/JPN. Report of the individual review of the greenhouse gas inventory of Japan submitted in 2006. Available at <http://unfccc.int/resource/docs/2007/arr/jpn.pdf>.

FCCC/IRR/2007/JPN: Report of the review of the initial report of Japan. Available at <http://unfccc.int/resource/docs/2007/irr/jpn.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Kohei Sakai (National Institute for Environmental Studies), including additional material on the methodology and assumptions used. The following documents were also provided by Japan:

Akiyama H, Yan X and Yagi K. 2006. Estimations of emission factors for fertilizer-induced direct N_2O emissions from agricultural soils in Japan: summary of available data. *Soil Science and Plant Nutrition*. 52: pp.774–787.

Saitoh M. 1988. Methane excretion in fattening pigs and pregnant sows. *The Japanese Journal of Zootechnical Science*. 59(9): pp.773–778.

Tsuiki M, Shiyomi M and Koyama N. 1990. *Preliminary Study of a Model Describing the Growth of Grazing Cattle*.

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