COMPLIANCE COMMITTEE **CC/ERT/IRR/2007/2**
17 August 2007

Report of the review of the initial report of Japan

Note by the secretariat

The report of the review of the initial report of Japan was published on 16 August 2007. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2), the report is considered received by the secretariat on the same date. This report, FCCC/IRR/2007/JPN, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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Report of the review of the initial report of Japan

According to decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Kyoto Protocol shall submit to the secretariat, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later, a report (the 'initial report') to facilitate the calculation of the Party's assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol, and to demonstrate its capacity to account for emissions and the assigned amount. This report reflects the results of the review of the initial report of Japan conducted by an expert review team in accordance with Article 8 of the Kyoto Protocol.

CONTENTS

I. Introduction and summary

A. Introduction

1. This report covers the in-country review of the initial report of Japan, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 29 January to 3 February 2007 in Tokyo, Japan, and was conducted by the following team of nominated experts from the roster of experts: generalist – Mr. William Kojo Agyemang-Bonsu (Ghana); energy – Ms. Sophia Mylona (Norway); industrial processes – Ms. Natalya Parasyuk (Ukraine); agriculture – Mr. Sergio González (Chile); land use, land-use change and forestry (LULUCF) – Ms. Thelma Krug (Brazil); waste – Mr. Davor Vešligaj (Croatia). Ms. Natalya Parasyuk and Ms. Thelma Krug were the lead reviewers. In addition, the expert review team (ERT) reviewed the national system, the national registry, and the calculations of the Party's assigned amount and commitment period reserve (CPR), and took note of the LULUCF parameters and the elected Article 3, paragraph 4, activities. The review was coordinated by Ms. Katia Simeonova and Ms. Astrid Olsson (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, in this final version of the report.

B. Summary

1. Timeliness

3. Decision 13/CMP.1 requests Parties to submit their initial report prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later. The initial report was submitted on 30 August 2006, which is in compliance with decision 13/CMP.1. With its initial report Japan submitted a greenhouse gas (GHG) inventory revised compared to its original 2006 GHG inventory submission of 25 May 2006. Japan submitted revised emission estimates on 16 March 2007 and a revised initial report on 13 June 2007 in response to questions raised by the ERT during the course of the in-country visit.

2. Completeness

4. Table 1 below provides information on the mandatory elements that have been included in the initial report and the revised values of the assigned amount and the commitment period reserve provided by Japan resulting from the review process. These revised values are based on the revisions of the nitrous oxide (N_2O) emissions from agricultural soils (see paragraph 68), which resulted in revisions of the base year emissions from 1,261,441,934 tonnes carbon dioxide (CO_2) equivalent as reported originally by Japan to 1,261,331,418 tonnes CO_2 equivalent (see paragraphs 94 and 95).

5. The inventory covers all categories for the entire period 1990–2004 and it is complete in terms of geographical coverage. Japan has submitted a complete set of common reporting format (CRF) tables, except for table 7, covering all years, all categories and almost all gases. Japan reports potential emissions for the fluorinated gases (F-gases) but has not estimated actual emissions for the F-gases from 1990 to 1994 due to lack of activity data. It has selected 1995 as its base year for F-gases.

6. The information in the initial report covers all the elements required by decision 13/CMP.1, section I of decision 15/CMP.1, and relevant decisions of the Conference of the Parties serving as the Meeting of the Parties (CMP).

Table 1. Summary of the reporting on mandatory elements in the initial report

Item	Provided	Value/year/comment
Complete GHG inventory from the base year (1990) to the most recent year available (2004)	Yes	1990–2004
Base year for HFCs, PFCs and SF_6	Yes	1995
Agreement under Article 4	Yes	Not applicable
LULUCF parameters	Yes	Minimum tree crown cover: 30% Minimum land area: 0.3 ha Minimum tree height: 5 m
Election of and accounting period for Article 3, paragraphs 3 and 4, activities	Yes	Elected Article 3, paragraph 4, activities are forest management and revegetation. The accounting period for Article 3, paragraphs 3 and 4, activities is the commitment period.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8	Yes	5 928 777 090 tonnes CO_2 eq.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8, revised values		5 928 257 666 tonnes CO_2 eq.
Calculation of the commitment period reserve	Yes	5 335 899 381 tonnes CO_2 eq.
Calculation of the commitment period reserve, revised values		5 335 431 899 tonnes CO_2 eq.
Description of the national system in accordance with the guidelines for national systems under Article 5, paragraph 1	Yes	
Description of the national registry in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for data exchange between registry systems adopted by the CMP	Yes	

3. Transparency

7. The initial report is generally transparent. During the review the ERT identified emission trends as an area where transparency needs to be further enhanced. Japan provided the ERT with documentation and explanations of the nature of its emission trends during the in-country review. The ERT recommends that Japan include a summary of this information in its next inventory submission and also provide an explanation of the main drivers of its emission trends.

4. Emission profile in the base year, trends and emission reduction target

8. In the base year for CO_2, methane (CH_4) and N_2O (1990), and the base year for hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) (1995), the most important GHG in Japan was CO_2, contributing 90.7 per cent to total[1] national GHG emissions expressed in CO_2 equivalent, followed by CH_4, 2.6 per cent, and N_2O, 2.6 per cent (see figure 1). HFCs, PFCs and SF_6 taken together contributed 4.1 per cent of overall GHG emissions in the base year. The energy sector accounted for 84.8 per cent of total GHG emissions in the base year, followed by industrial processes (9.7 per cent), waste (2.9 per cent) and agriculture (2.6 per cent) (see figure 2). Total GHG emissions (excluding LULUCF) amounted to 1,261,331.42 Gg CO_2 equivalent[2] in the base year, and increased by 7.4 per cent from the base year to 2004.

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

[2] The values for total emissions in the base year and in 2004 reflect the revised estimate for emissions from agriculture submitted by Japan in response to the request made by the ERT during the review (see paragraph 68).

Figure 1. Shares of gases in total GHG emissions, base year

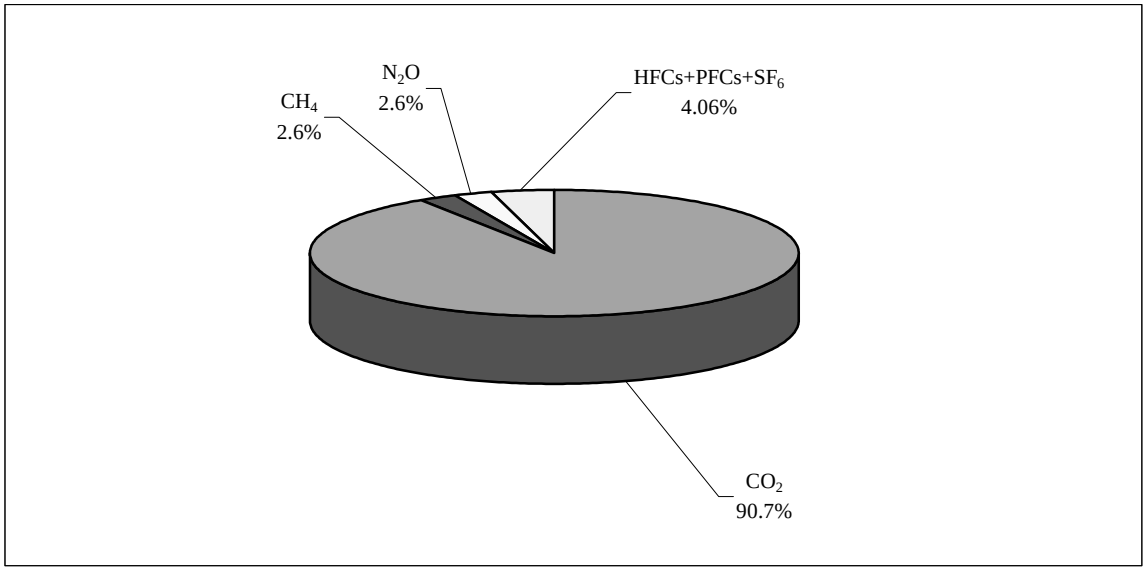
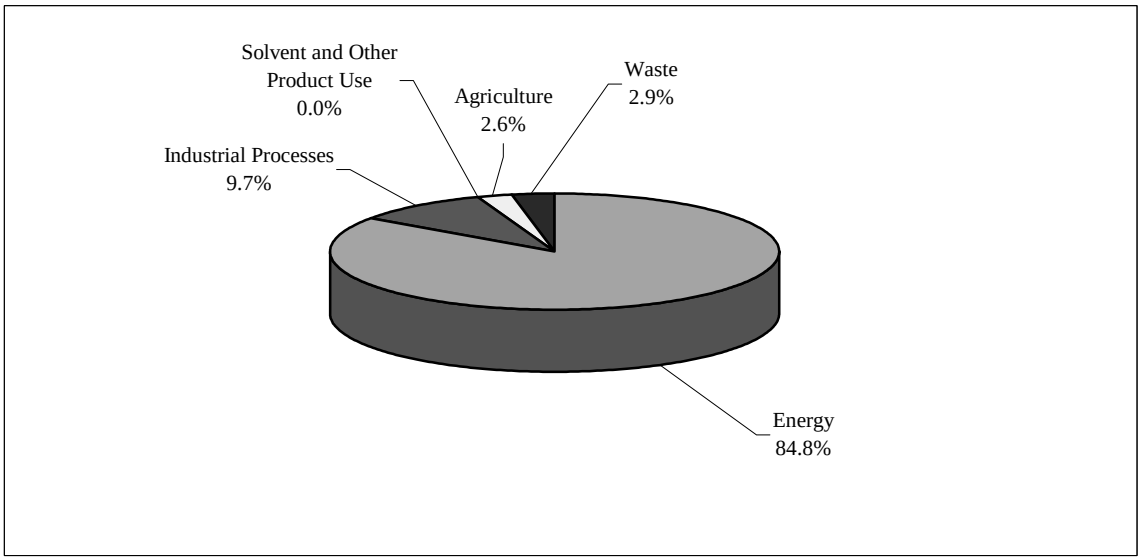


Figure 2. Shares of sectors in total GHG emissions, base year



9. Tables 2 and 3 show the greenhouse gas emissions by gas and by sector, respectively.

10. Japan's quantified emission limitation is 94 per cent as included in Annex B to the Kyoto Protocol.

Table 2. Greenhouse gas emissions by gas, 1990–2004

GHG emissions (without LULUCF)	Gg CO_2 equivalent								Change KP BY–2004 (%)
	Base year Kyoto Protocol[a]	1990[a]	1995	2000	2001	2002	2003	2004[a]	
CO_2	1 144 129.51	1 144 129.51	1 226 389.96	1 254 619.01	1 239 274.57	1 276 772.17	1 284 376.08	1 285 813.80	12.4
CH_4	33 382.33	33 382.33	30 960.19	26 976.89	26 180.90	25 219.03	24 734.69	24 424.13	–26.8
N_2O	32 633.05	32 633.05	33 547.19	29 915.68	26 425.34	26 028.34	25 753.88	25 889.67	–20.7
HFCs	20 211.80	17 930.00	20 211.80	18 585.39	15 837.00	13 147.94	12 519.09	8 349.96	–58.7
PFCs	14 045.93	5 670.00	14 045.93	8 610.59	7 191.30	6 521.39	6 194.39	6 318.17	–55.0
SF_6	16 928.79	38 240.00	16 928.79	6 823.27	5 678.65	5 306.86	4 745.95	44 74.32	–73.6

Note: BY = Base year; KP = Kyoto Protocol; LULUCF = Land use, land-use change and forestry.

[a] Japan submitted revised estimates for the base year and 2004 in the course of the initial review on 16 March 2007. These estimates differ from Japan's GHG inventory submitted in 2006.

Table 3. Greenhouse gas emissions by sector, 1990–2004

Sectors	Gg CO_2 equivalent								Change KP BY–2004 (%)
	Base year Kyoto Protocol[a]	1990[a]	1995	2000	2001	2002	2003	2004	
Energy	1 069 514.73	1 069 514.73	1 144 100.31	1 175 259.72	1 161 767.52	1 200 787.23	1 205 767.46	1 205 367.74	12.7
Industrial processes	122 129.45	132 782.92	123 986.12	95 767.65	85 014.47	78 969.72	77 105.91	74 129.86	–39.3
Solvent and other product use	287.07	287.07	437.58	340.99	343.60	334.05	320.83	297.54	3.6
Agriculture	32 217.84	32 217.84	30 965.92	28 438.15	28 132.98	27 862.15	27 648.95	27 611.89	–14.3
LULUCF[c]	NA	–74 621.68	–81 371.29	–84 964.70	–84 807.87	–85.333.18	–94 978.14	–94.879.19	NA
Waste	37 182.33	37 182.33	42 593.94	45 724.31	45 329.18	45 042.58	47 480.91	47 863.01	28.7
Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
Total (with LULUCF)	NA	1 197 363.21	1 260 712.57	1 260 566.12	1 235 779.90	1 267 662.55	1 263 345.93	1 260 390.86	NA
Total (without LULUCF)	1 261 331.42	1 271 984.89	1 342 083.87	1 345 530.83	1 320 587.76	1 352 995.73	1 358 324.07	1 355 270.05	7.4

Note: BY = Base year; KP = Kyoto Protocol; LULUCF = Land use, land-use change and forestry; NA = Not applicable; NO = Not occurring.

[a] Japan submitted revised estimates for the base year and 2004 in the course of the initial review on 16 March 2007. These estimates differ from Japan's GHG inventory submitted in 2006.

II. Technical assessment of the elements reviewed

A. National system for the estimation of anthropogenic GHG emissions by sources and sinks

11. Japan's national system has been set up in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1) and can perform the general and specific functions required by the guidelines for national systems.

12. Table 4 shows which of the specific functions of the national system are included and described in the Party's initial report. Japan also provided a revised initial report which addresses the archiving of inventory data.

Table 4. Summary of reporting on the specific functions of the national system

Reporting element	Provided	Comments
Inventory planning		
Designated single national entity*	Yes	See section II.A.1
Defined/allocated specific responsibilities for inventory development process*	Yes	See section II.A.1
Established process for approving the inventory*	Yes	See section II.A.1
Quality assurance/quality control plan*	Yes	See section II.A.2
Ways to improve inventory quality	Yes	See section II.B.3
Inventory preparation		
Key category analysis*	Yes	See section II.B.1
Estimates prepared in line with the IPCC guidelines and IPCC good practice guidance*	Yes	See section II.B.2
Sufficient activity data and emission factor collected to support methodology*	Yes	See section II.B
Quantitative uncertainty analysis*	Yes	See section II.B.2
Recalculations*	Yes	See section II.B.2
General QC (tier 1) procedures implemented*	Yes	See section II.A.2
Source/sink category-specific QC (tier 2) procedures implemented	Yes	See section II.A.2
Basic review by experts not involved in inventory	Yes	See section II.A.2
Extensive review for key categories	Yes	See section II.A.2
Periodic internal review of inventory preparation	Yes	See section II.A.2
Inventory management		
Archive inventory information*	Yes	See section II.A.3
Archive at single location	Yes	See section II.A.3
Provide ERT with access to archived information*	Yes	See section II.A.3
Respond to requests for clarifying inventory information during review process*	Yes	See section II.A.1

* Mandatory elements of the national system.

1. Institutional, legal and procedural arrangements

13. During the in-country review, Japan explained the institutional arrangements, as part of the national system, for preparation of the inventory. The Ministry of Environment is the designated single national entity responsible for compilation and submission of the inventory. The Greenhouse Gas Inventory Office of Japan (GIO) from the Centre for Global Environmental Research of the National Institute for Environmental Studies is responsible for the calculations, inventory compilation and the archiving of all data. Other official bodies such as Ministry of Economy, Trade and Industry and the Japan Forestry Agency are also involved in the preparation of the inventory and have defined and allocated specific responsibilities for the inventory development process. The Ministry of Economy, Trade and Industry, the Ministry of Land, Infrastructure and Transport, the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Health, Welfare and Labour and the Forestry Agency are responsible for providing relevant parameters for inventory preparation such as activity data (AD) and

emission factors (EFs). The Japan Committee for Greenhouse Gases Emissions Estimation Methods is responsible for the selection of methods for the estimation of emissions. It also undertakes quality assurance of the inventory. Overall, Japan has ensured sufficient capacity for timely performance of the functions relating to inventory preparation.

14. In Japan there is an established process for the official consideration and approval of the inventory, including recalculations, prior to its submission and for responding to any issues raised by the inventory review. The responsible organization is the Ministry of Environment. The GIO is responsible for linking review teams to appropriate experts/agencies if a need for clarification arises.

2. Quality assurance/quality control

15. Japan has in place a comprehensive quality assurance/quality control (QA/QC) plan with clear institutional responsibilities and implementation procedures. The QA/QC plan is 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), except that QA is performed by experts who are members of the Japan's Committee for the Greenhouse Gases Emissions Estimation Methods, and they are therefore part of the inventory process. Taking into account the IPCC good practice guidance, the ERT recommends that Japan invite experts who are not involved in the inventory process to undertake QA of its future GHG inventories.

3. Inventory management

16. Japan has a centralized archiving system. The GIO archives all inventory data, including CRF tables, background information and calculation sheets, in electronic form. It also archives the disaggregated EFs, activity data, and documentation on how these factors and data have been generated and aggregated for the preparation of inventory. The archived information further includes internal documentation on QA/QC procedures, external and internal reviews, documentation on annual key categories and planned inventory improvement. In addition, the GIO keeps hard copies of all documents.

B. Greenhouse gas inventory

17. In conjunction with its initial report, Japan has submitted an almost complete set of CRF tables for the years 1990–2004, except for table 7 and some estimates of F-gases (see paragraph 5), and the national inventory report (NIR). Where needed the ERT also used previous years' submissions, including the CRF tables for the years 1990–2003, for cross-checking the differences arising from recalculations, and to assess whether the same methods and/or EFs were employed during the recalculations in order to ascertain the justification for the recalculations. Japan submitted revised emission estimates on 16 March 2007 in response to questions raised by the ERT during the course of the in-country visit (see paragraphs 94 and 95).

18. During the in-country review Japan provided the ERT with additional information sources. These documents are not part of the initial report submission but in many cases are referenced in the NIR. The full list of materials used during the review is provided in annex I to this report.

1. Key categories

19. Japan reports in the NIR that it did not perform the key category analysis for the base year. The ERT recommends that Japan perform the key category analysis for the base year.

2. Cross-cutting issues

20. The inventory is 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 Land Use, Land-Use Change and Forestry*

(hereinafter referred to as the good practice guidance for LULUCF). The inventory has also been compiled in accordance with Article 7, paragraph 1, of the Kyoto Protocol and decision 15/CMP.1.

Completeness

21. The inventory covers all categories for the whole period 1990–2004 and it is complete in terms of geographical coverage. Japan has submitted a complete set of CRF tables covering all years, sources/sinks, and almost all gases. Japan reports potential emissions for the 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 significant uncertainties and errors in the inventory. The ERT encourages Japan to estimate actual emissions for the years 1990–1994 years following the IPCC good practice guidance, to the extent possible. The ERT also recommends Japan to complete CRF table 7 for the base year and the latest reported inventory year manually.

Transparency

22. Japan's CRF is generally transparent. However, there are some areas where improvement is needed. Information on the energy sector, for instance, is rather scattered in the NIR. The ERT recommends that Japan structure the presentation for all sectors according to 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). During the in-country review, the ERT was presented with a document explaining relevant parts of Japan's general energy statistics. This document provided valuable explanations for queries from the ERT concerning the energy sector. In order to improve transparency, the ERT recommends that Japan include in its next inventory submission relevant elements of the extensive documentation that is already available.

23. During the in-country review, experts from Japan provided additional information and background documents which enhanced the overall transparency of the emissions estimation. However, the ERT recommends Japan to provide explanations in the NIR of emission trends that are due to changes in waste management practices, agricultural practices, and industrial processes and energy, and where possible to improve the completeness of the CRF tables in those parts that relate to additional and sectoral background information.

Consistency

24. The ERT concluded that Japan's inventory is consistent, as defined in the UNFCCC reporting guidelines, and consistent with the IPCC good practice guidance. The ERT encourages Japan to continue to report on the new categories that are included in the current inventory in order to ensure time-series consistency.

Comparability

25. Japan's inventory is comparable with those of other Annex I Parties. Japan generally allocates its sink/source categories in accordance with the Revised 1996 IPCC Guidelines except for the subcategory waste incineration, which is reported under the waste sector. Even though Japan reports these emissions in a transparent fashion under the waste sector, the ERT recommends that Japan report these emissions under the energy sector, in accordance with the IPCC good practice guidance.

Accuracy

26. Japan's inventory is accurate. In accordance with the UNFCCC reporting guidelines, Japan does not overestimate its emissions. It applies the IPCC good practice guidance for uncertainty estimates and applies these uncertainties in its key category analysis. This analysis provides the basis for Japan's

inventory improvement plans. Japan has QA/QC procedures in place, ensuring that emissions are systematically neither over- nor underestimated, as far as possible.

Recalculations

27. The national system ensures that recalculations of previously submitted estimates of GHG emissions and removals are prepared in accordance with the IPCC good practice guidance. The rationale for these recalculations is provided in the NIR. They are due to methodological improvements, revisions in certain emission factors and activity data, and the inclusion of emissions from categories that were not addressed previously. The effect of recalculations is to increase the estimates of total emissions for the base year (excluding CO_2 emissions and removals from LULUCF) by about 1.9 per cent and estimates of total emissions for 2003 (excluding CO_2 emissions and removals from LULUCF) by about 1.4 per cent. The ERT encourages Japan to continue to report on the new categories that have been included in the current inventory in order to ensure time-series consistency.

28. The ERT noted that the recalculations reported had been undertaken for the whole time series 1990–2003. They also affect the assigned amount and the CPR calculation under the Kyoto Protocol.

29. The major changes include the following. The recalculations in the energy sector have resulted in increases in the estimated 1990 emission levels of CH_4 and N_2O by, respectively, 4.3 and 5.1 per cent. The revision of CO_2 EFs in the energy sector has resulted in the country-specific EFs that were used previously being replaced by IPCC default ones for several fuels. The recalculations in the industrial processes sector have resulted in increases in the estimated 1990 emission levels of CO_2, CH_4 and N_2O by, respectively, 9.3, 5.9 and 11.5 per cent. As noted in the NIR, the main reasons for these changes were the application of new methodologies and revised AD, especially for cement and lime production.

30. Due to recalculations in the agriculture sector, estimates of CH_4 emissions in 1990 have increased by 14.9 per cent, mainly due to manure management, while estimates of N_2O emissions decreased by 38.4 per cent, due to decreases in manure management and indirect emissions from agricultural soils. The recalculations in the waste sector were due to new or revised estimation methods, and have resulted in increases in the estimates of emissions from that sector by approximately 50 per cent in the base year and all subsequent years. Recalculations in the LULUCF sector for the time series 1990–2003 resulted from, inter alia, changes to the method of estimating changes in carbon stock in forest land from the default method to the stock change method in the IPCC good practice guidance for LULUCF, as well as changes in the definition of forest and corresponding parameters. Prior to the recalculations, it was estimated that in 1990 the LULUCF sector offset 7.1 per cent of total national GHG emissions. The recalculations result in an offset of 6.2 per cent in 1990.

Uncertainties

31. Japan provides tier 1 and tier 2 (level and trend) quantitative and qualitative uncertainty estimates for both the entire inventory and all sectors, in accordance with the IPCC good practice guidance. It reports an overall uncertainty for the national total of 2 per cent, and a trend uncertainty of 2 per cent. The ERT noted that the overall uncertainty for the national total is very low. Further consideration needs to be given to the feasibility of applying the Monte Carlo method to categories that have large coefficients of variation. Japan explains in its NIR that the low uncertainty value as compared to those of other Annex I countries is, for example, attributable to the low ratio of Japan's N_2O emissions from agricultural soils (category 4.D). Given that the contribution of N_2O emissions to total national emissions is very minimal, the ERT recommends that Japan improve its estimate of the overall uncertainty of its inventory.

3. Areas for further improvement identified by the Party

32. The NIR identifies several areas for improvement. Japan indicates that it will carry out investigations into categories which are currently reported as "not estimated" ("NE") to take these emissions/removals into account in its future submissions. Japan has plans for further work to improve the estimates of emissions/removals from categories where default IPCC values have been used, since default values may not correctly reflect Japan's specific national circumstances, for example, emission factors for N_2O for road transportation. Japan also plans to address the problems of non-availability of data arising from the discontinuity in data collection and/or exclusion of these data from national statistics.

4. Areas for further improvement identified by the ERT

33. The ERT identified the following cross-cutting issues and issues relating to the national system for improvement. The Party should:

(a) Include a reasonable amount of the information that was provided to the ERT during the course of the in-country review in the NIR and provide as necessary additional information in the documentation boxes to the CRF tables;

(b) Provide a transparent explanation of its emission trends to facilitate the understanding of the drivers for these trends;

(c) Improve its quality assurance procedures.

34. Recommended improvements relating to specific source/sink categories are presented in the relevant sector sections of this report.

5. Energy

Sector overview

35. In the base year, total GHG emissions from the energy sector amounted to 1,069,514.73 Gg CO_2 equivalent, accounting for 84.8 per cent of total national GHG emissions. Manufacturing industries and construction was the largest emitting category in the base year, contributing 34.5 per cent to the sectoral total, followed by energy industries, transport and other sectors with contributions of 29.8, 20.2, and 15.2 per cent, respectively. Fugitive emissions, a relatively minor source, accounted for just 0.3 per cent of the sectoral total in the same year.

36. Japan's 2006 submission for the energy sector suggests that considerable improvements have been made compared to earlier reports, and shows that the recommendations of several previous reviews have been appropriately addressed. Both the NIR and the CRF tables are complete in terms of categories and gases. Ample additional background data and information have also been provided through electronic spreadsheets. However, major elements remain to be addressed, mainly issues relating to transparency and, to a lesser extent, consistency, as specified in the relevant sections below. To improve transparency, the ERT recommends that Japan include in its future NIRs relevant information from the extensive national documentation on its general energy statistics that is readily available (see paragraph 45). Additionally, emission trends and their notable features should be clearly explained and, if necessary, documented. Feedstocks and non-energy use of fuels, as well as any category-specific verification studies conducted, also need to be explicitly discussed in the NIR.

37. The recalculations performed in the energy sector are due to methodological improvements, revisions to certain EFs and AD, and the inclusion of emissions from categories not previously addressed. The effect of these recalculations on the base year energy sector emission estimates is increases in the estimated emission levels of CO_2, CH_4 and N_2O by 1.0 per cent, 4.3 per cent and

5.1 per cent, respectively. The rationale for replacing the country-specific EFs that were used previously by (usually higher) IPCC default values, which was explained during the in-country review, should be included in Japan's next inventory submission to increase transparency.

Reference and sectoral approaches

38. Emissions of CO_2 from fuel combustion have been calculated using both the reference and the sectoral approaches. For the base year, the difference between these approaches was –1.1 per cent for CO_2 emissions. For energy consumption the corresponding difference appearing in CRF table 1.A(c) (+9.3 per cent) is not identical with that shown in the NIR (–0.7 per cent). During the review Japan explained that this discrepancy is due to the fact that the energy consumption figures in the CRF table include non-energy use and feedstocks, while the corresponding NIR figures exclude those amounts. In addition, Japan indicated that the CRF figures were incorrect. The ERT recommends that Japan correct these discrepancies and provide consistent information as between the CRF tables and the NIR in its next inventory submission.

39. The NIR addresses the differences in the emission estimates under the reference and the sectoral approaches, and provides explanations for the discrepancies, one of them being that stock changes are not reflected in the emission estimates in the reference approach. However, stock changes are reported in the CRF tables. During the review Japan explained that the figures reported under stock changes refer to what it calls "stockpile changes", that is, changes in stocks in the energy supply sector. What Japan calls "stock changes", on the other hand, is meant to be stock changes in the energy conversion and final consumption sectors; it is these latter changes that are not reflected in the calculations of emissions. The ERT encourages Japan to report stock changes as recommended in the Revised 1996 IPCC Guidelines. Any deviations from this recommendation, as well as the role of stock changes in explaining the differences between the reference and the sectoral approach, should be clearly explained in Japan's next inventory submission.

40. The ERT noted several discrepancies between the data reported in the CRF tables and the statistics in the International Energy Agency (IEA) report for the base year. In particular, exports of liquid fuels are 48 per cent lower in the IEA data; the differences are due in particular to differences in the figures for jet kerosene and residual fuel oil. Imports of jet kerosene have been reported to the IEA for 1990, but are shown as zero in the CRF tables, while imports of gas/diesel oil in 1990 are about 30 per cent lower in the CRF than in the IEA figures. Furthermore, the figures for imports of coking coal are lower in the CRF tables than those in the IEA statistics, and the figures for stock changes disagree for liquid and gaseous fuels. During the review Japan attributed most of these discrepancies to differences of definition as between the CRF and the IEA statistics, particularly with regard to the way in which bonded export and import of jet kerosene and diesel/fuel oil are treated in these statistics. The ERT recommends that Japan provide a clear explanation for the discrepancies between the data in the CRF tables and the IEA statistics in the next submission.

International bunker fuels

41. Japan allocates emissions from all aircraft and ships engaged in international transport as emissions from international bunkers based on the bonded fuel concept (bonded export/import fuels are fuels that are exempt from certain taxes on domestic fuel used in Japan because they are used for the purposes of international aviation/navigation). During the review, Japan informed the ERT that in Japan, all the aircraft and ships that depart from Japan for another county do not drop off passengers or freight when they stop inside Japan. Therefore, the domestic segment as defined in the IPCC good practice guidance does not exist in Japan. The ERT recommends that Japan document the methodology and assumptions for estimating emissions from international bunkers, including the information provided to the ERT during the review, in its next inventory submission.

42. The ERT noted that the notation key used for residual fuel oil in CRF table 1.C is "included elsewhere" ("IE"), but no information is provided in CRF table 9(a) or in the documentation box of CRF table 1.C. The ERT recommends that Japan provide an explanation indicating where these data are included.

Feedstocks and non-energy use of fuels

43. This part of the inventory is not discussed in the NIR, despite the recommendations of previous review teams that elaboration was needed. Data related to feedstocks and non-energy use of fuels are reported in CRF table 1.A(d). The country-specific fractions of carbon stored vary considerably from the default values provided by the Revised 1996 IPCC Guidelines. Japan explained during the review that the country-specific fractions of carbon stored were derived by dividing the total amount of non-energy use by the amount of total energy supply, defined as domestic primary energy supply plus production. However, this equation indicates the fraction of carbon in non-energy use, rather than the carbon actually stored under non-energy use. The ERT recommends that Japan review its calculation methodology in the light of the guidance available in the Revised 1996 IPCC Guidelines, and include explicit discussion on this issue in its future NIRs, along with documentation justifying the fractions of carbon stored that it has adopted.

Country-specific issues

Duplication adjustment

44. Japan reports negative emissions under the category manufacturing industries and construction: other (CRF table 1). This results from the use of a duplication adjustment in the energy statistics, aimed at rectifying an overlap of CO_2 emissions from enterprises that operate in two or more industrial modes. The ERT recommends that Japan explain the rationale for the use of this adjustment in the documentation box to CRF table 1 in its next inventory submissions.

Key categories

Stationary combustion: liquid, solid, gas – CO_2

45. Estimates of emissions from stationary combustion are based on Japan's general energy statistics and EFs that are largely country-specific. To improve transparency, the ERT recommends that Japan include in the NIR elements of the available documentation on the general energy statistics, particularly those related to choice of methodology and the rationale for that choice in the compilation of the energy inventory.

46. The ERT noted that the CO_2 implied emission factor (IEF) for solid fuels for manufacturing industries and construction for the years 1990–2004 (84.04–92.49 t/TJ) is among the lowest of reporting Parties and lower than the IPCC default range (94.60–106.7 t/TJ). During the in-country review Japan explained that this is most likely due to the use of country-specific values for solid fuel, which are generally lower than those of the IPCC. However, this seems to contradict the fact that for some solid fuels the country-specific EFs were replaced by (higher) IPCC EFs. Another possible explanation suggested by Japan was the use of blast furnace gas, which is classified as solid fuel; its EF value is estimated based on carbon flow analysis. To improve the transparency of the inventory, the ERT recommends that Japan explain in its future NIRs the reason for the relatively low CO_2 IEF in this category.

47. Japan reports emissions from waste used as an alternative fuel under the waste sector and not under the energy sector as required by the Revised 1996 IPCC Guidelines. During the in-country review Japan explained that this is because national practices make it difficult to estimate accurately the amount of waste used as fuel. In the case of moisture-containing waste such as paper and food waste, for example, the operation of recovery units attached to incineration units is often discontinued depending on

the moisture content of the waste or the level of hazardous releases occurring during incineration. The ERT recognizes the difficulties involved in differentiating waste fuel types in these cases, but encourages Japan to report emissions from fuel derived from non-moisture-containing waste (such as tyres and waste oils) under the energy sector.

Navigation: liquid – CO_2

48. Japan explains in the NIR that emissions from the consumption of residual fuel oil in navigation are reported under other liquid fuels, and are therefore denoted as "IE" in CRF table 1.A(a). The same information should be provided in the documentation box and in table 9(a).

Non-key categories

Stationary combustion: liquid, solid, gas – CH_4, N_2O

49. Estimates of N_2O and CH_4 emissions from stationary combustion for 1990 are based on information on the technological level of industrial enterprises gathered through the so-called MAP survey of 1989 (noted in the NIR as Research of Air Pollutant Emissions from Stationary Sources). Such surveys were conducted in Japan on a three-yearly basis from 1989. However, the MAP survey has not been used since 2002 because a rule was implemented which prohibits the use of the MAP survey for purposes other than that originally intended. Being unable to use such data and a lack of updated information on technological developments in the various industries within this sector will eventually result in less accurate estimates of CH_4 and N_2O emissions. Japan informed the ERT that it will make efforts to be able to use the 2008 MAP survey data.

50. During the in-country review Japan elaborated on the way data from the MAP surveys are used in order to calculate activity data per category, furnace type and fuel type in the energy inventory. The ERT recommends that Japan include an outline of such methodological information in its future NIRs.

Stationary combustion: other – CO_2, CH_4, N_2O

51. Fuel combustion in mining is the only subcategory reported under 1.A.5 other. As this source is not discussed in the NIR, it is recommended that Japan provide information on this subcategory in its next inventory submission.

Road transportation: liquid – N_2O

52. Japan uses a country-specific methodology to assess N_2O emissions from road transportation. This methodology is consistent with the IPCC tier 3 approach. The resulting IEF for N_2O for gasoline from road transportation exhibits an unusual trend compared to that of other Annex I Parties: there is a steady decline from the 1990 value of 6.82 kg/TJ to 3.91 kg/TJ in 2004. The trend of the N_2O IEF in other Annex I Parties is either a steady increase since 1990, or increases in the early 1990s and decreases from then onwards. During the in-country review Japan explained that the specific profile of the N_2O IEF in the early 1990s is a result of the implementation of the 1978 Emission Regulation on Gasoline Automobiles: regulations were introduced much earlier than they were in other Annex I Parties. As this regulation required the installation of three-way catalytic converters in gasoline automobiles, it follows that the peak of N_2O emissions in Japan must have appeared before or around 1990, followed by a steady decline due to stricter regulations introduced in subsequent years.

53. Emissions of N_2O from gaseous fuels are reported in CRF table 1.A(a), but AD are denoted as "not occurring" ("NO"). Although these emissions are negligible, Japan should delete the notation key and report the actual consumption figure instead.

Navigation: liquid – N_2O

54. Japan explains in the NIR that emissions from the consumption of residual fuel oil in navigation are reported under other liquid fuels, and are therefore denoted as "IE" in CRF table 1.A(a). This information should be provided in the respective documentation box and in table 9(a).

Railways: solid – CH_4, N_2O

55. Emissions of CH_4 and N_2O from the consumption of coal in steam locomotives are estimated, but AD are denoted as "NO" in CRF table 1.A(a). Even if emissions in this category are negligible, Japan should report the actual consumption figure.

6. Industrial processes and solvent and other product use

Sector overview

56. In the base year, emissions from the industrial processes sector in Japan accounted for 9.7 per cent of total national emissions (122,129.45 Gg CO_2 eq.). The largest category in the sector was mineral products (47.0 per cent of emissions from the industrial processes sector) followed by consumption of halocarbons and SF_6 (23.0 per cent) and production of halocarbons and SF_6 (18.8 per cent). The recalculations in the industrial sector have resulted in increasing the estimates of emissions of CO_2, CH_4 and N_2O in the base year by, respectively, 9.3 per cent, 5.9 per cent and 11.5 per cent. As noted in the NIR, the main reasons for these changes were the application of new methodologies and revised AD, especially for cement and lime production.

57. The following categories are reported as "NE": asphalt roofing – CO_2; road paving with asphalt – CO_2; ammonia production – CH_4; and aluminium production – CH_4. Actual emissions of HFCs, PFCs and SF_6 have not been estimated for the period 1990–1994, mainly because of lack of data. The ERT encourages Japan to estimate these categories and include the estimates in its next inventory submission.

Key categories

Cement production – CO_2

58. For the first time, Japan has used the IPCC good practice guidance tier 2 method in its 2006 inventory submission for calculating emissions from this category by multiplying the amount of clinker produced (an intermediate product of cement production) by a country-specific EF. Japan has been developing a country-specific EF since 2000 taking into consideration the amount of waste used as raw material. Japan's cement industry takes in large amounts of waste and by-products from other industries and recycles them as substitutes for other raw materials in the production of cement. The EF changes from 2000 onward; the same value of the CO_2 IEF is reported for the period 1990–1999. The reason for this is that data for waste used as a raw material have been collected since 2000. The average lime content in waste used as a raw material for the years 2000–2003 has therefore been used for the years 1990–1999. Due to a lack of statistics on clinker production from 1990 to 1999, estimates have been made by extrapolating past clinker production (1990–1999) using the average value of the 2000–2003 ratios of clinker production and limestone consumption. All relevant data are provided by the Japan Cement Association. The ERT agrees with this approach.

Lime production – CO_2

59. For the first time, Japan has used the IPCC methodology and default emission factors in its 2006 inventory submission for high-calcium lime and dolomite lime. In Japan's previous submissions a country-specific method was applied using sales of limestone and dolomite as raw material as the basis for AD on lime production. Recalculations have been made and the methodology has been revised because the amount of limestone sold for lime production, which was previously used as AD, has not

been published since 2001. The recalculations have led to an increase in estimated emissions for the base year of 45.9 per cent (the amounts involved were 5,052.59 Gg according to the 2005 submission and 7,371.02 Gg according to the 2006 submission). Estimated CO_2 emissions have increased for the whole time series. During the review Japan provided a clear explanation for the differences in CO_2 emissions as between the two submissions. The main reason for the difference is the change in AD. In the 2006 submission, Japan used high-calcium lime and dolomitic lime production as AD. Japan considered that data on "quicklime" produced published in the *Yearbook of Chemical Industries* are more appropriate to use as AD in estimating CO_2 emissions than the data on "limestone" and "dolomite" published in the *Yearbook of Minerals and Non-Ferrous Metals*. The ERT recommends that Japan continue to use quicklime production data for calculating CO_2 emissions in this category, but encourages Japan to provide more transparent and clear explanations and description of the methods and AD used in the next inventory submission.

Non-key categories

Ammonia production – CO_2

60. CO_2 emissions have been calculated by multiplying the amounts of fuel consumed as ammonia feedstock by the EFs used in the energy sector. The IEF is lower in 2004 than that for 1990. During the review Japan explained that the reason for this is that the share of carbon-intensive fuels used was much higher in the base year than in later years in the time series. The ERT encourages Japan to provide a clear explanation of this in its next inventory submission.

7. Agriculture

Sector overview

61. In the base year, emissions from the agriculture sector in Japan amounted to 32,328.36 Gg, or 2.6 per cent of total national emissions (excluding LULUCF). In response to a request by the ERT during the in-country review, Japan submitted revised estimates for N_2O emissions from agricultural soils (see paragraph 68). According to these estimates, in the base year emissions from the agricultural sector amounted to 32,217.84 Gg. Emissions decreased by 14.3 per cent between the base year and 2004. In the base year, CH_4 contributed 55.4 per cent to emissions from the sector and N_2O 44.6 per cent; these proportions are quite stable throughout the time series (the shares were 56.4 per cent and 43.6 per cent, respectively, in 2004). Due to recalculations since the 2005 submission, estimated CH_4 emissions increased by 14.9 per cent in 1990, mainly due to increases in emissions from manure management, while N_2O emissions decreased by 38.4 per cent, due to decreases in emissions from manure management and indirect emissions from agricultural soils. The 2006 submission shows a significant improvement compared to the 2005 submission, mainly due to changes of methodology, the use of new country-specific EFs and consideration of the findings of the 2005 review.

62. The treatment of some categories, especially manure management and agricultural soils, in the NIR was found to be difficult to follow and understand. The ERT recommends Japan to improve this part of the NIR in time for its next inventory submission, providing a clearer description of these categories.

Key categories

Enteric fermentation – CH_4

63. Japan estimates emissions from this category using a method similar to the IPCC tier 2 method for cattle, tier 1 with country-specific emission factors for sheep and swine, and tier 1 and default EFs for the remaining animal species. The tiers applied and the development of country-specific EFs, based on dry matter intake and supported by references given in the NIR, are in line with the IPCC good practice

guidance. As Japan excludes animals younger than five months from its calculations, this fact needs to be addressed properly in the documentation box of CRF table 4.A.

Manure management – CH_4, N_2O

64. Japan estimates emissions from manure management by applying a country-specific method along with country-specific EFs for cattle, swine and poultry, and tier 1 with default EFs for buffalo, sheep, goats and horses. This approach is in line with the IPCC good practice guidance as it takes into account the national circumstances in relation to the management of animal populations and the significance of each animal type.

65. Supporting information and references are provided in the NIR and additional information was provided during the in-country review, but more information is needed to explain the country-specific EFs for grazing animals included in table 6-11 of the NIR. The ERT suggests that the Party include adequate information in the documentation box of table 4.B(b) in order to illustrate the different animal waste management systems (AWMS) included under "other". The ERT also encourages Japan to treat CH_4 and N_2O emissions separately in the NIR to make it easier to understand the issues and to improve the transparency of the submission.

66. N_2O emissions from grazing animals, which should be reported under animal production, are reported under manure management. The ERT recommends Japan to reallocate these emissions, at least for cattle which are explicitly estimated, and to gather information for the remaining animals in order to be able to allocate these emissions correctly.

Rice cultivation – CH_4

67. Japan estimates CH_4 emissions from rice cultivation based on the IPCC method along with country-specific emission factors, which is in line with the IPCC good practice guidance. CRF table 4.C needs to be filled in with AD that will enable for organic amendment.

Agricultural soils – N_2O

68. Japan estimates direct N_2O emissions applying a national approach that is based on the IPCC tier 1 method, bottom–up-derived AD and country-specific EFs based on national research which is referenced in the NIR. Taking into account the response provided by Japan after the in-country visit, the ERT requested Japan to revise the AD for nitrogen (N) applied to soils as synthetic fertilizers in order to correct the inconsistency found when the bottom–up-derived AD are compared with the total annual synthetic fertilizer nitrogen applied in the country. In response to this request, Japan recalculated direct and indirect N_2O emissions due to usage of synthetic fertilizer N using the total N consumed in the country as the AD and using the bottom–up approach to disaggregate this total figure between specific crops and groups of crops to allow the use of country-specific EFs.

69. 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 in its next inventory submission, especially if the AD are available.

Non-key categories

Field burning of crop residues – CH_4, N_2O

70. Japan estimates emissions from this category following default methods and using a mixture of country-specific and default AD. To get crop production values, a bottom–up approach is followed. CRF table 4.F has been partly filled in, although the data that are missing are provided in the NIR and in

the additional Excel files provided by Japan as part of its submission. The ERT encourages Japan to submit the CRF files filled in with the complete AD.

8. Land use, land-use change and forestry

Sector overview

71. Japan reports emissions/removals of CO_2, CH_4 and N_2O for all land-use categories in the LULUCF sector in accordance with the reporting requirements and following the IPCC good practice guidance for LULUCF for the entire period 1990–2004. Carbon emissions from agricultural lime application and N_2O emissions from drainage of soil have not been reported due to lack of data. Non-CO_2 emissions from biomass burning (including wildfires) have been reported following the IPCC good practice guidance for LULUCF. Key category analysis has been carried out for LULUCF, following the IPCC good practice guidance for LULUCF. Japan has provided recalculations for the LULUCF sector for the entire time series, but has not shown how the LULUCF categories map on to the categories of the Revised 1996 IPCC Guidelines.

72. Japan has provided uncertainty estimates for all the land categories, indicating a combined uncertainty of 6 per cent for the sector. The lowest uncertainty (6 per cent) was estimated for the category forest land remaining forest land, while the highest (14,486 per cent) was estimated for land converted to other land. Uncertainties have also been provided for land converted to forest land (22 per cent), land converted to grassland (21 per cent) and land converted to cropland (42 per cent). The ERT notes the high value for the estimate for land converted to other land and recommends that Japan review this figure. Given these uncertainties, the ERT recommends that Japan not only provide the methodology to estimate the uncertainties, but also explain how its use could lead to a combined uncertainty of 6 per cent for the sector.

73. During the period 1990–2004, the LULUCF sector was a net removal of emissions, the size of which increased from 74,621.68 Gg CO_2 equivalent in 1990 to 94,879.19 Gg CO_2 equivalent in 2004, offsetting 5.9 per cent and 7.0 per cent, respectively, of total national emissions.

74. Japan's inventory for the LULUCF sector has improved significantly compared to the 2005 submission, but there are still several areas for improvement. In particular, the AD in the land-use transition matrices (areas maintained or converted to and from categories in between inventories) 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, Japan should justify the amount of land annually converted to and from the category other, since this is not entirely clear, taking into consideration the definition of the category other in the IPCC good practice guidance for LULUCF.[3] During the in-country review, Japan indicated that the data for the transition matrices will be continuously refined through the use of more reliable sources and methods. The ERT also noted a lack of consistency between the annual areas reported for the national territory and the total area under the different land-use categories, and recommends Japan to ensure consistency here in its next inventory submission.

75. Japan has extensive forest data acquired during repeated forest inventories (every five and 10 years, under the Forest Status Survey and for the World Census of Agriculture and Forestry, respectively) and the ERT encourages it to provide information on the methods used for data collection. Although Japan explained that national data for stem volume, basic wood density, biomass expansion factor (BEF), and root-to-shoot ratio are stratified on the basis of the major tree species, age classes or geographical conditions based on field studies conducted in all the 47 prefectures, in order to take into account local variables such as different climate zones, the ERT recommends that Japan clarify how

[3] The category other includes bare soil, rock, ice and all unmanaged land areas that do not fall into any of the other categories. It allows the total of identified land areas to match the national area, where data are available.

these variables are included in its estimates of changes in carbon stocks in above-ground biomass in the next inventory submission.

76. Japan recognizes that there are areas that require further development, including consistency in the land area data, improving the parameters needed to estimate emissions from biomass burning, the inclusion of emissions from dead organic matter (DOM) and soil using a tier 2 method or higher, and the inclusion of data on settlements.

77. The ERT recognized several specific areas for improvement, including providing the methods used to interpolate or extrapolate data, and explaining how losses from felling and disturbance are accounted for during years that are not covered by national inventories. Additionally, more transparency should be provided on how land areas in transition (converted less than 20 years ago) are incorporated into a permanent land category. Some of the notation keys used by Japan need to be modified, in particular the use of "not applicable" ("NA") instead of "NE" or a zero value (as in changes in the soil organic carbon pool in mineral soils for forest land), and explanations provided in the documentation boxes. The ERT encourages Japan to explain in a more transparent way the equations for and definitions of the variables relating to the method used to estimate changes in biomass in land converted to forest land in accordance with the IPCC good practice guidance for LULUCF.

Key categories

Forest land remaining forest land – CO_2

78. Japan estimates carbon stock changes in living biomass in forest land remaining forest land using the carbon stock change method from the IPCC good practice guidance for LULUCF, which is deemed to be appropriate given the existence of detailed data from the national forest inventory that is regularly conducted by Japan (every five and 10 years). National data for volume, basic wood density, BEFs and root-to-shoot ratio exist for the major tree species, climate zones and age classes. The values seem reasonable. Japan needs to clarify how land converted to forest land more than 20 years ago is finally aggregated into the category forest land remaining forest land (e.g. sources of data). Japan applies a tier 1 method to estimate carbon stock changes in DOM and in mineral soil, which assumes zero change. Japan indicates that data on carbon stock in DOM and soil are being collected, so that a tier 2 or tier 3 method can be applied in the next inventory submission.

Land converted to forest land – CO_2

79. Japan estimates changes in carbon stock in biomass and in mineral soils using national data. For DOM Japan applies a tier 1 method that assumes zero change in carbon stock. The value used for grassland biomass before conversion is low (2.7 tonnes dry matter per hectare) compared to the IPCC good practice guidance for LULUCF. Japan also does not include below-ground biomass in its estimate. The ERT recommends that Japan use the value provided in table 3.4.9 of the IPCC good practice guidance for LULUCF, which is equal to 13.5 tonnes dry matter per hectare, in the absence of country-specific data or more accurate data than the default data form the IPCC good practice guidance for LULUCF. This value already includes the carbon stored in below-ground biomass. In addition, Japan assumes that the biomass stocks for wetland, settlements and other land, prior to conversion, are zero, following the IPCC good practice guidance for LULUCF. Japan should verify whether this tier 1 assumption in the IPCC good practice guidance for LULUCF holds for other land. Japan assumes that there are no changes in carbon stock in DOM, following the tier 1 method. For the changes in the soil organic carbon pool, Japan uses nationally derived carbon stock for each of the land-use categories. Values for cropland are averaged over the values for rice field, crop field, and orchards.

Land converted to cropland – CO_2

80. Japan estimates changes in carbon stock in biomass and in mineral soils using national data. The IPCC good practice guidance for LULUCF does not provide a methodology for estimating changes in carbon stock in DOM. Since most of the land area converted to cropland is converted from other land, Japan should verify whether the assumption of zero biomass that is assumed for other land applies. The ERT recommends that distinct values for forest biomass be used, as appropriate, for the climate zone, soil type, forest species and stand age. The ERT also recommends that Japan reproduce the equations of the IPCC good practice guidance for LULUCF as far as possible, and use the same definitions for the variables, to avoid confusion.

Land converted to grassland – CO_2

81. Japan estimates changes in carbon stock in biomass and in mineral soils using national data. The IPCC good practice guidance for LULUCF does not provide a methodology for estimating changes in carbon stock in DOM. The same comments as those made above for land converted to forest land, regarding the grassland and other land carbon stock prior to conversion, apply here.

Land converted to other land – CO_2

82. Japan estimates changes in carbon stock in biomass and in mineral soils using national data. The IPCC good practice guidance for LULUCF does not provide a methodology for estimating changes in carbon stock in DOM. Since most of the land converted to other land is cropland, the ERT recommends that Japan identify the subcategories of cropland converted (rice fields, crop fields, orchards). Japan applies the IPCC good practice guidance for LULUCF methodology using nationally derived data averaged for each land-use category.

Non-key categories

Cropland remaining cropland – CO_2

83. For cropland remaining cropland, the IPCC good practice guidance for LULUCF method for estimating changes in biomass includes both annual gains and annual losses from harvested or removed crops (as part of the maturity cycle). Japan, however, accounts only for increases in biomass in perennial crops. The ERT recommends that Japan provide an estimate of the average annual area of established perennial woody crops and the annual area of perennial woody crops that are harvested or removed. A tier 1 method can be applied using the default values in table 3.3.2 of the IPCC good practice guidance for LULUCF.

Settlements remaining settlements – CO_2

84. Although Parties do not have to report under this category, Japan provides estimates of changes in carbon stock in living biomass, following the preliminary guidance in the IPCC good practice guidance for LULUCF. Japan applies the crown cover area method (tier 1a). The ERT acknowledges Japan's effort to provide estimates of the total tree crown area for various types of parks, which is an improvement compared with the previous year's reporting. It does, however, recommend that Japan develop removal factors for the dominant climate zones and tree species, and include loss of biomass in estimating the changes in carbon stocks (using, for instance, a loss term).

Biomass burning – CH_4, carbon monoxide (CO), N_2O, nitrogen oxide (NO_X)

85. Japan provides estimates of non-CO_2 emissions from biomass burning, following the IPCC good practice guidance for LULUCF methodology and applying default EFs and nitrogen-to-carbon ratios.

9. Waste

Sector overview

86. In the base year, total GHG emissions from the waste sector amounted to 37,182.33 Gg CO_2 equivalent, or 2.9 per cent of total GHG emissions. Waste incineration contributed 64.5 per cent of total waste sector emissions in the base year, while solid waste disposal on land, waste-water handling and other accounted for 24.4, 9.2 and 1.9 per cent, respectively. CO_2 is the dominant gas, contributing 61.0 per cent of emissions from the sector.

87. According to information provided in the NIR and the CRF, recalculations in the waste sector have been made for each year in the period 1990–2003 due to new or revised estimation methods. The recalculations have resulted in increases in the emissions estimates by approximately 50 per cent in the base year and all subsequent years. Sector-specific QA/QC procedures have not been applied in the waste sector.

Key categories

Solid waste disposal on land – CH_4

88. In comparison to Japan's previous (2005) submission there has been a significant increase in the total amount of municipal solid waste (MSW) disposed, and industrial solid waste disposed used for emission calculation, and consequently in the estimates of CH_4 emissions. This is due to the introduction of sludge as a new subcategory in the 2006 submission, as the NIR explains. For the first time, Japan has used the tier 3 first order decay (FOD) model from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines), with some country-specific parameters, in the 2006 inventory submission, compared to the country-specific model used in the previous submissions. Japan explained that the rationale for the use of the FOD model rather than the country-specific model was that the FOD model included in the 2006 IPCC Guidelines was revised and improved compared to the former FOD method, in particular by the introduction of delay time. As a result, this revised FOD model was considered to have same level of applicability to Japan's national circumstances as the country-specific model previously used. The ERT recommends Japan to provide the rationale for the use of this model rather than the country-specific model previously used in its next inventory submission.

Waste incineration – CO_2, N_2O

89. Emissions in the base year have been estimated in line with the methodology described in the IPCC good practice guidance, and country-specific carbon contents of different waste types and EFs have been applied. Emissions from waste incineration with energy recovery and use of waste as an alternative fuel are reported in the waste sector, in line with Japan's waste management policy and due to the fact that temporal variations of the moisture content in the MSW have a direct effect on incinerator efficiency, thus preventing continuous energy recovery. The ERT recommends Japan to provide a technical explanation, in line with the explanation provided to the ERT during the review visit, as to why emissions from incineration of MSW, where some energy recovery occurs, are reported in the waste sector.

Waste-water handling – N_2O

90. A country-specific methodology and country-specific EFs have been used for estimating N_2O emissions from industrial and domestic/commercial waste-water handling; this is adequately explained in the NIR. However, additional information has not been provided in the NIR, which was also pointed out in the 2005 review report. The ERT recommends Japan to provide this information in the next inventory submission.

Non-key categories

Waste-water handling – CH_4

91. CH_4 emissions from industrial waste water have been estimated on the basis of a country-specific EF which equals 0.0049 kg CH_4/kg biochemical oxygen demand (BOD). This value is much lower than the recommended IPCC default value, which is 0.6 kg CH_4/kg BOD. The methane recovered from treating domestic and commercial waste water in the 2006 submission is reported for reference purposes only and is not included in the emission totals. This is because Japan's country-specific EF is calculated based on the results of measurement of actual CH_4 emissions to the atmosphere. This value represents the net emission which takes into consideration the amount of methane recovery. The ERT encourages Japan to improve its emissions estimates by applying the chemical oxygen demand (COD) value for different types of waste water or to provide a clear explanation of its use of the BOD-based EF 8.2.2.1 Sewage Treatment Plant.

Other – CO_2, N_2O

92. Japan reports N_2O emissions from composting and CO_2 emissions from the decomposition of petroleum-derived surfactants which are used for various industrial and domestic/commercial cleaning activities, and which are discharged into waste-water treatment facilities. The ERT encourages Japan to explore the potential interdependence between emissions from petroleum-derived surfactants and industrial/domestic waste-water treatment.

C. Calculation of the assigned amount

93. The assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol has been calculated in accordance with the annex to decision 13/CMP.1.

94. Japan's base year is 1990 and the Party has chosen 1995 as its base year for HFCs, PFCs and SF_6. Japan's quantified emission limitation is 94 per cent as included in Annex B to the Kyoto Protocol. Based on Japan's original base year emissions of 1,261,441,934 tonnes CO_2 equivalent and its Kyoto Protocol target of –6 per cent, the Party calculates its assigned amount to be 5,928,777,090 tonnes CO_2 equivalent.

95. In response to inventory issues identified during the review (see paragraph 68), Japan submitted revised estimates of its base year inventory of 1,261,331,418 tonnes CO_2 equivalent, which resulted in a recalculation of the assigned amount. Based on the revised estimates, the Party calculates its assigned amount to be 5,928,257,666 tonnes CO_2 equivalent. The ERT agrees with this figure.

D. Calculation of the commitment period reserve

96. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1. Based on its originally calculated assigned amount (5,928,777,090 tonnes CO_2 equivalent), Japan originally calculated its CPR to be 5,335,899,381 tonnes CO_2 equivalent.

97. In response to inventory issues identified during the review (see paragraph 68), Japan submitted revised estimates of its base year inventory, which resulted in a recalculation of the commitment period reserve. Based on the revised estimates, the Party now calculates its CPR to be 5,335,431,899 tonnes CO_2 equivalent. The ERT agrees with this figure.

E. National registry

98. Table 5 shows which of the mandatory reporting elements on the national registry system, as stipulated by decisions 15/CMP.1, are provided in Japan's initial report. These mandatory elements

provide a description of how the national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1.

Table 5. Summary of reporting on the national registry system

Reporting element	Provided / referenced	Comments
Registry administrator		
Name and contact information	Yes	Updated during the in-country review[a]
Cooperation with other Parties in a consolidated system		
Names of other Parties with which the Party cooperates, or clarification that no such cooperation exists.	Yes	No arrangements for cooperation with other Parties in place
Database structure and capacity of the national registry		
Description of the database structure	Yes	
Description of the capacity of the national registry	Yes	
Conformity with data exchange standards (DES)		
Description of how the national registry conforms to the technical DES between registry systems	Yes	Covered in the Independent Assessment Report (IAR)[b]
Procedures for minimizing and handling of discrepancies		
Description of the procedures employed in the national registry to minimize discrepancies in the transactions of Kyoto Protocol units	Yes	Further information provided to ERT
Description of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction	Yes	Further information provided to ERT
Prevention of unauthorized manipulations and operator error		
An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error	Yes	Covered in the IAR
An overview of how these measures are kept up to date	Yes	Further information provided to ERT
User interface of the national registry		
A list of the information publicly accessible by means of the user interface to the national registry	Yes	Covered in the IAR
The Internet address of the interface to Japan's national registry	Yes	<http://www.registry.go.jp>
Integrity of data storage and recovery		
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	Yes	Covered in the IAR
Test results		
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems	No	Not available at the time of the in-country review Test results covered in the IAR

Note: ERT = Expert review team.

[a] The registry administrators, according to the information provided to the ERT during the in-country review, are Mr. Akira Amari, Minister of Economy, Trade and Industry (METI), and Mr. Masatosji Wakabayashi, Minister of the Environment (MOE). Contact points are Mr. Makato Saito (Global Environment Affairs Office, Environmental Policy Division, Industrial Science and Technology Policy and Environment Bureau, METI, Tel: +81 3 5521 1679, E-mail: kyomecha-tourkubo@meti.go.jp; and Mr. Ryota Kondo, Climate Change Policy Division, Global Environmental Bureau, MOE, Tel: +81 3 5521 8354, E-mail: kyomecha-registry@env.go.jp.

[b] Pursuant to decision 16/CP.10, the administrator of the international transaction log (ITL), once registry systems become operational, is requested to facilitate an interactive exercise, including with experts from Parties to the Kyoto Protocol not included in Annex I to the Convention, demonstrating the functioning of the ITL with other registry systems. The results of this exercise will be included in an independent assessment report (IAR). They will also be included in the annual report to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

99. The ERT noted that Japan has provided practically all the information on the national registry system as required by the reporting guidelines under Article 7, paragraphs 1 and 2, of the Kyoto Protocol (decision 15/CMP.1). This information is broadly transparent and in accordance with the guidelines. However, the ERT noted that some of the information is provided at a highly aggregated level, for example, the description of the database structure and capacity of the national registry. The ERT recommends that Japan provide more detailed information in its next annual report.

100. During the initial review and the follow-up to it, the ERT was provided with additional and updated information on the national registry of Japan, which is reflected in table 6. In addition, the ERT was informed that the internal operational test for network connection was completed in December 2006. The initialization process was completed on 6 July 2007 and the registry is ready for full operation with the ITL.

101. The ERT welcomed Japan's efforts to put in place adequate security measures for the national registry to minimize and handle discrepancies, terminate transactions where discrepancy is notified and correct problems, and prevent unauthorized manipulation. The server of the registry is located at the NTT Data Corporation, which is maintaining it under contract to the Japanese Government. During the visit to the NTT Data Corporation, the ERT was informed of its seismic performance, fire-resistant features, and the emergent captive power facilities of the building. This allows the registry to remain in operation for more than 24 hours without a power supply in the event of a blackout. The ERT acknowledged the multiple security measures in place at the NTT Data Corporation, including registration at the entrance to the building, with guards, baggage checks, biometrics authentication at the entrance to the machine room, and the locking and unlocking of the server rack by the operator. The ERT found that overall Japan has attached high importance, and allocated sufficient resources, including human resources, to the development, operation and maintenance of the registry.

102. During the in-country review, the ERT noted that a thorough technical review of the national registry as stipulated by the Article 8 review guidelines, part V: Review of national registries, paragraph 115 ((b), (c) (e), (f) and (g)) of the Annex will be undertaken in the context of the initialization of the national registry of Japan and reflected in the independent assessment report (IAR).

103. The ERT took note of the results of the technical assessment of the national registry, including the results of standardized testing, as reported in the IAR that was forwarded to the ERT by the administrator of the international transaction log, pursuant to decision 16/CP.10, paragraph 6(k), on 9 July, 2007.

104. The ERT reiterates the main findings of this report, including that the registry has fulfilled all of its obligations regarding conformity with the DES. These obligations include having adequate transaction procedures; adequate security measures to prevent and resolve unauthorized manipulations; and adequate measures for data storage and registry recovery.

105. Based on the results of the in-country review visit and the technical assessment, as reported in the IAR, the ERT concluded that Japan's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding operational performance or public availability of information prior to the operational phase.

F. Land use, land-use change and forestry parameters and election of activities

106. Table 6 shows the Party's choice of parameters for forest definition as well as its elections for Article 3, paragraphs 3 and 4, activities in accordance with decision 16/CMP.1.

107. Japan's choice of the parameters to define forest are within the range specified by decision 16/CMP.1. In addition, Japan has adopted the minimum width of 20 metres to define its forests, following the IPCC good practice guidance for LULUCF. The ERT noted that the values for tree crown cover and minimum land area used by Japan to report to the Food and Agriculture Organization of the United Nations (FAO) (table 2.2 in initial report of Japan), are consistent with the values that define forest under the Kyoto Protocol. It noted that Japan may include in its reporting to the FAO not only the values for tree crown cover and minimum land area but also the other elements that define its forests for purposes of reporting under the Kyoto Protocol.

Table 6. Selection of LULUCF parameters

Parameters for forest definition		
Minimum tree cover	30%	
Minimum land area	0.3 ha	
Minimum tree height	5 m	
Elections for Article 3, paragraphs 3 and 4, activities		
Article 3, paragraph 3, activities	**Election**	**Accounting period**
Afforestation and reforestation	Mandatory	Commitment Period
Deforestation	Mandatory	Commitment Period
Article 3, paragraph 4, activities		
Forest land management	Elected	Commitment Period
Cropland management	Not elected	Not applicable
Grazing land management	Not elected	Not applicable
Revegetation	Elected	Commitment Period

III. Conclusions and recommendations

A. Conclusions

108. The expert review team concluded that the information provided by Japan in its initial report is complete and submitted in accordance with the relevant provisions of paragraphs 5, 6, 7 and 8 of the annex to decision 13/CMP.1, section I of the annex to decision 15/CMP.1, and other relevant decisions of the CMP; that the assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol is calculated in accordance with the annex to decision 13/CMP.1, and is consistent with the Party's reviewed and submitted revised inventory estimates; and that the calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1.

109. Japan has made significant improvements since last year's submission, most of them in response to recommendations made by the 2005 ERT. Some major improvements include: recalculations for some main sectors and categories for all years from 1990 to 2003 (the recalculations only go up to 2003); improvements in completeness; improvements in the transparency of the methodological descriptions of country-specific methods and EFs for certain categories, even though some further work is still needed; and the provision of planned improvements for almost all source categories.

110. Japan's national system is prepared in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1) and can perform the general and specific functions required by these guidelines. In its initial report, Japan has submitted a complete set of CRF tables for the years 1990–2004 and a comprehensive NIR. The inventory covers all categories for the whole period 1990–2004 and it is complete in terms of geographical coverage.

111. Based on Japan's base year emissions (1,261,331,418 tonnes CO_2 equivalent, including the revised estimates provided in the agriculture sector) and its Kyoto Protocol target of –6 per cent, the Party calculates its assigned amount to be 5,928,257,666 tonnes CO_2 equivalent and its commitment period reserve to be 5,335,431,899 tonnes CO_2 equivalent. The ERT agrees with these figures.

112. Japan's choice of the parameters to define forest are in accordance with decision 16/CMP. This includes minimum tree crown cover of 30 per cent, minimum land area of 0.3 ha and minimum tree height of 5 metres. Japan also uses a minimum width of 20 metres to define its forests, following the

IPCC good practice guidance for LULUCF. Japan has chosen to account for Article 3, paragraph 3, and the selected Article 3, paragraph 4, activities for the entire commitment period.

113. Based on the results of the in-country review visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that Japan's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1.

B. Recommendations

114. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of Japan's GHG inventory submission. Several of the recommendations have been implemented during the review process and the potential problem that could have led to an overestimation of emissions has been resolved. The remaining key recommendations[4] are that Japan:

(a) Improve its QA/QC system by using experts who are not involved at all in the inventory process to undertake quality assurance of its inventory;

(b) Improve the transparency of the inventory by:

(i) Structuring the presentation of all sectors according to the UNFCCC reporting guidelines on annual inventories;

(ii) Providing an explanation of the emission trends of the sectors, indicating their main drivers in the "Trends in Greenhouse Gas Emissions" section of the NIR;

(iii) Improving the completeness of the CRF tables in the parts related to additional and sectoral background information, where possible, and completing CRF table 7 for the base year and the latest reported year;

(iv) Providing better documentation on the methodologies, EFs and AD used for the specific categories that are mentioned in the corresponding sector sections of this report above, and including in future NIRs elements of the extensive documentation that is already available;

(v) Continuing to report the new categories that were included in the current inventory to ensure time-series consistency;

(c) Improve its reporting on recalculations by reporting any changes of emissions and removals compared with previous inventories, regardless of their magnitude, and clearly indicate the reasons for the changes (error correction, statistical or editorial changes, or reallocation of categories) using the corresponding CRF tables 8(a) and 8(b). Whenever changes result from changes of methodology, improved AD and EFs, or the inclusion of new categories, this should also be clearly explained in the NIR.

C. Questions of implementation

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

[4] For a complete list of recommendations, the relevant sections of this report should be consulted.

Annex I

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

IPCC. Good practice guidance for land use, land-use change and forestry, 2003. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

IPCC/OECD/IEA. Revised 1996 IPCC Guidelines for national greenhouse gas inventories, volumes 1–3, 1997. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

UNFCCC. 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/2004/8. Available at <http://unfccc.int/resource/docs/2004/sbsta/08.pdf>.

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UNFCCC. Guidelines for review under Article 8 of the Kyoto Protocol. FCCC/KP/CMP/2005/8/Add.3. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

UNFCCC secretariat. Status report for Japan. 2006. Available at <http://unfccc.int/resource/docs/2006/asr/jpn.pdf>.

UNFCCC secretariat. Synthesis and assessment report on the greenhouse gas inventories submitted in 2006. FCCC/WEB/SAI/2006. Available at <http://unfccc.int/resource/docs/webdocs/sai/sa_2006.pdf>.

UNFCCC secretariat. Japan: Report of the individual review of the greenhouse gas inventory submitted in the year 2005. FCCC/WEB/IRI/2005/JPN. Available at <http://unfccc.int/resource/docs/2006/arr/jpn.pdf>.

UNFCCC secretariat. Japan: Independent assessment report of the national registry of Japan. Reg_IAR_JP_2007_1. Will be available at <www.unfccc.int>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Baba (Ministry of Environment) including additional material on the methodology and assumptions used.

Energy

Explanation of General Energy Statistics, entitled Tentative Translation Version2006Dec15

Industrial processes

YBofMineral1990J.pdf, Related part of *Yearbook of Minerals and Non-Ferrous Metals* in 1990 (only in Japanese).

YBofMineral1990E.doc, Related part of *Yearbook of Minerals and Non-Ferrous Metals* in 1990 (in English).

YBofMineral2001EJ.pdf, Related part of *Yearbook of Minerals and Non-Ferrous Metals* in 2001 (in both English and Japanese).

YBofChemical1990J.pdf, Related part of *Yearbook of Chemical Industries Statistics* in 1990 (only in Japanese).

YBofChemical1990E.doc, Related part of *Yearbook of Chemical Industries Statistics* in 1990 (in English).

YBofChemical2005EJ.pdf, Related part of *Yearbook of Chemical Industries Statistics* in 2005 (in both English and Japanese).

z070220_Lime_1.0.xls, Estimation Process of Stoichiometrical Analysis.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
BEF	biomass expansion factor
CH_4	methane
CO_2	carbon dioxide
CO_2 eq.	carbon dioxide equivalent
CRF	common reporting format
DOM	dead organic matter
EF	emission factor
EIT	economy in transition
EF	emission factor
ERT	expert review team
EU	European Union
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GIO	Greenhouse Gas Inventory Office of Japan
GJ	gigajoule (1 GJ = 10^9 joule)
HFCs	hydrofluorocarbons
IAR	independent assessment report
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1 thousand grams)
LULUCF	land use, land-use change and forestry
Mt	million tonnes
MSW	municipal solid waste
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SF_6	sulphur hexafluoride
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change

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