UNITED NATIONS
NATIONS UNIES

FRAMEWORK CONVENTION ON CLIMATE CHANGE - Secretariat
CONVENTION - CADRE SUR LES CHANGEMENTS CLIMATIQUES - Secrétariat

FCCC/WEB/IRI(3)/2000/JPN 30 May 2002

REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY OF JAPAN SUBMITTED IN THE YEAR 2000[1]

(Centralized review)

A. GENERAL OVERVIEW

1. Introduction

1. The Conference of the Parties (COP), at its fifth session, by its decision 6/CP.5, requested the secretariat to conduct, during the trial period, individual reviews of greenhouse gas (GHG) inventories for a limited number of Parties included in Annex I to the Convention (Annex I Parties) on a voluntary basis, according to the UNFCCC guidelines for the technical review of GHG inventories from Parties included in Annex I to the Convention.[2] In doing so, the secretariat was requested to coordinate the technical reviews and to use different approaches for individual reviews, including desk reviews, centralized reviews and in-country reviews.

2. In response to the mandate by the COP, the secretariat coordinated a centralized review of six national GHG inventories (Australia, Canada, Hungary, Japan, the Netherlands and New Zealand) submitted in 2000, which took place from 7 to 11 May 2001. The review was carried out by a team of nominated experts from the roster of experts working at the headquarters of the UNFCCC secretariat in Bonn. The members of the team were: Mr. Ayite-Lo Ajavon (Togo), Mr. Wiley Barbour (United States of America), Mr. Pascal Boeckx (Belgium), Mr. Jose Gonzalez Migues (Brazil), Mr. Tomas Hernandez-Tejeda (Mexico), Mr. Klaus Radunsky (Austria), Mr. Yiannis Sarafidis (Greece), Ms Sirintornthep Towprayoon (Thailand) and Mr. Hristo Vassilev (Bulgaria). The review was coordinated by Mr. Stylianos Pesmajoglou (UNFCCC secretariat). Mr. Wiley Barbour and Mr. Jose Gonzalez Migues were lead-authors of this report and also served as sector experts.

3. The main overall objective of the centralized review of the GHG inventories was to ensure that the COP had adequate information on the GHG inventories. The review should further assess the progress of the Parties towards fulfilling the requirements outlined in the UNFCCC reporting guidelines on annual inventories (FCCC/CP/1999/7). In this context, the review team checked the responses of the Parties to questions raised in previous stages of the

[1] In the symbol of this document, 2000 refers to the year the inventory was submitted, and not to the year of publication. The number (3) indicates that for Japan this is a centralized review report.

[2] Document FCCC/CP/1999/7, in particular the UNFCCC review guidelines (pages 109 to 114), and decision 6/CP.5 (page 121 to 122).

review process and the consistency of the inventory submission with the UNFCCC reporting guidelines and the *Revised 1996 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC guidelines), and identified possible areas for improvement in the inventories of the six Annex I Parties. Each inventory expert reviewed the information submitted for one IPCC sector and each IPCC sector was covered by two experts.

4. The review team has also assessed, to a certain degree, whether the reporting fulfils the requirements included in the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance), although the IPCC good practice guidance had not been published at the time the inventory was submitted and could not, therefore, have been used in the compilation of the inventory.

5. The UNFCCC secretariat provided the review team with all necessary technical guidance, information and data, such as national inventory data reported according to the common reporting format (CRF) submitted in the year 2000, national inventory reports (NIRs) for the year 2000, the synthesis and assessment report (S&A report) of GHG inventories prepared by the secretariat, and comments from the Parties on the S&A report.

2. Overall findings

6. The inventory submitted for Japan did not meet all the standards for inventory preparation and submittal as defined by the UNFCCC reporting guidelines and the IPCC guidelines. Data tables were provided with emission estimates prepared in the CRF, but the absence of a written NIR rendered detailed analysis impossible. The lack of a complete inventory report prevents assessment of comparability and precludes an understanding of the process involved in preparing the inventory.

3. Completeness

7. It was not possible to determine source category completeness due to the absence of an NIR. The CRF tables provide some guidance, but the tables for the industrial sector make frequent use of source categories included elsewhere (IE) and source categories reported as not estimated (NE).

4. Transparency

8. The absence of an NIR resulted in a substantial loss of transparency. However, use of the documentation boxes and inclusion of data in the sectoral background tables in the CRF tables did help to illuminate some details of the methodology used.

5. Data sources used for centralized review

5.1 National greenhouse gas emission inventory report (NIR)

9. Japan did not submit a 1998 NIR. Tier 1 approaches seem to have been used.

5.2 Common reporting format (CRF)

10. Japan submitted inventory data using the CRF for the years 1990 to 1998. The CRF includes summary and sectoral background tables; indicators were used appropriately. In many cases the documentation boxes were used for additional comments or clarification. Many source categories have been reported as NE and others as IE. Recalculations were not reported.

5.3 Synthesis and assessment report (S&A report)

11. The main concern raised in the S&A report was related the fact that no key sources had been identified in the agriculture sector. Many non-key sources have been estimated for CH_4 and N_2O in categories such as enteric fermentation, manure management, agricultural soils and field burning of agricultural residues.

12. The Government of Japan (GOJ) provided provisional comments in response to the S&A report, for the purpose of providing clarification to the review team. Additional comments and information provided by the GOJ in response to the draft centralized review report clarified many technical details and this report has taken these comments into account.

B. ENERGY

1. General overview

1.1 Completeness

13. The energy sector seemed to be complete but again, the absence of an NIR makes it difficult to assess completeness. Comparisons with other international databases indicate overall agreement and differences were explained by the response to the S&A report.

1.2 Transparency

14. The energy section appears to have been developed using a combination of IPCC tier 1 and country-specific methods. Some transparency is achieved by the use of documentation boxes and background tables in the CRF, but overall documentation and transparency will be improved by the submittal of a complete NIR.

1.3 National self-verification

15. Japan employs two methods for estimating energy use: A supply based top-down approach and a consumption based bottom-up method. These two approaches appear to match well, with differences in the transportation sector of 2 per cent being well within the expected range of uncertainty associated with this sector. No mention is made of peer review processes or other technical review processes.

2. Reference approach

16. CO_2 emissions from fuel combustion were calculated using both the reference and sectoral approaches. There is a difference of only 0.43 per cent between the estimates. Explanation of this difference is provided in the available documentation box.

(a) The significant difference in liquid fuels consumption estimated by the two approaches is attributed to the non-energy consumption of fuels;

(b) The classification of LPG and heavy fuel oil grades under "Other fuels" in the transport sector can explain part of the difference.

17. The Japanese reference approach for 1998 corresponds well with International Energy Agency (IEA) data (only 0.2 per cent lower). In 1990 however, the CRF energy consumption data were 1.5 per cent higher than the IEA data. This results in differing estimates of the trend in total apparent consumption between the CRF values (7.1 per cent annually) and those reported by the IEA (9.0 per cent). The response provided by the Government of Japan to the S&A report states that "this difference is caused by increase of consumption ratio of naphtha transformed into petro-chemical products".

18. In the background information provided by Japan for the centralized review, it is stated that energy balances are modified in order to account for the non-combustion use of fuels (e.g., naphtha). However, there are differences between the apparent consumption calculated in the reference approach in the CRF and the CO_2-1A98.xls (worksheets: EB-table and S-based-CO_2).

19. In the background information provided by Japan for the centralized review, it is stated that a fraction of fuels (5 per cent for coke production and 80 per cent for the chemical industry) are used for non-combustion purposes. To improve transparency, a reference for these figures should be provided.

3. Feedstocks

20. Feedstocks are recorded together with the additional information required.

21. The fraction of carbon stored for naphtha is 0.8, while the proposed IPCC value is 0.75.

4. Specific findings

4.1 Stationary combustion – CO_2 emissions

22. *Emission trends*: CO_2 emissions from stationary combustion (liquid, solid and gaseous fuels) are key sources for Japan, representing 64 per cent of all reported emissions in 1998 (without land-use change and forestry (LUCF) activities). Japan reports CO_2 emissions from stationary combustion increasing from 836.3 Mt in 1990 to 858 Mt in 1998 (2.6 per cent increase with to 1990):

(a) CO_2 emissions from the stationary combustion of liquid fuels represent 30 per cent of all reported emissions in 1998 (without LUCF) and there was a 12 per cent decrease compared with 1990;

(b) CO_2 emissions from the stationary combustion of solid fuels represent 24 per cent of all reported emissions in 1998 (without LUCF) and there was a 14 per cent increase compared with 1990;

(c) CO_2 emissions from the stationary combustion of gaseous fuels represent 10 per cent of all reported emissions in 1998 (without LUCF) and there was a 35 per cent increase compared with 1990.

23. *Methodology*: The methodologies applied are reported as a combination of the IPCC tier 1 method, the reference approach and country-specific. In the documentation box (table1.A(a)s4) where the methodology is described, a "supply-based top-down calculating method" and a "consumption-based top-down calculating method" are defined. The supply-based method looks similar to the reference approach:

(a) It is stated in the response provided to the S&A report that the reference approach ("supply-based method") "gives more accurate estimation than sectoral approach in such an island country as Japan";

(b) The difference in the emissions estimated by these methods is allocated to "Other sectors". This difference is attributed to the difference between the energy balance and the transport energy statistics and the fuel consumption which can not be distributed to each sectors as well as the statistical error of the energy balance;

(c) The consumption-based method was used for the estimation of CO_2 emissions in the various sectors. However, there is a 2 per cent divergence in the emissions reported for the transport sector (251,132 Gg) compared with the results of the consumption-based method (255,166 Gg). This is attributed to the fact that consumption of each transport mode and fuel type is based not only on Comprehensive Energy Statistics but also on the transport energy statistics. The deviation between the two methods is included in table "1.A5 Others".

24. *Emission factor*: The emission factors (EFs) used are IPCC default values and country-specific. The EFs per fuel used are reported in the background information provided by Japan for the centralized review.

25. The implied emission factor (IEF) for CO_2 emissions from solid fuels in "Other sectors" is the highest across all reporting Parties.

26. The supply-based method for estimating CO_2 emissions makes use of country-specific EFs, while the EFs in the reference approach in the CRF are default values.

27. *Activity data*: Fuel consumption data is provided by "comprehensive energy statistics".

28. Only aggregate information on consumption data and CO_2 emissions for energy industries is provided. There is a note in the CRF that states "Activity data cannot divide for Public Electricity and Heat Production, Petroleum Refining and Manufacture and Solid Fuels and Other Energy Industries".

29. *Recalculations*: No recalculations are reported.

30. *Completeness*: Aggregate information is provided for energy industries.

31. *Uncertainty*: No uncertainty estimates are provided.

4.2 Mobile combustion – CO_2 emissions

32. *Emission trends*: CO_2 emissions from mobile combustion (road transportation and navigation) are key sources for Japan, representing 18 per cent of all reported emissions in 1998 (without LUCF). Japan reports CO_2 emissions from the above-mentioned sources increasing from 197.8 Mt in 1990 to 239.9 Mt in 1998 (21 per cent increase compared with 1990):

(a) CO_2 emissions from mobile combustion – road transportation represented 17 per cent of all reported emissions in 1998 (without LUCF) and there was a 22 per cent increase compared with 1990;

(b) CO_2 emissions from mobile combustion – navigation represented 1 per cent of all reported emissions in 1998 (without LUCF) and there was an 11 per cent increase compared with 1990.

33. *Methodology*: The methodologies applied are reported as a combination of the IPCC tier 1 method, the reference approach and country-specific. Estimations of CO_2 emissions from mobile combustion are based on the fuel consumption of road transportation, navigation railway and aviation. These activity data except road transportation are given from "Transport Energy Statistics". Activity data for road transportation, except diesel oil, are given from the energy balance of "Comprehensive Energy Statistics". Diesel consumption in road transport is calculated by subtraction from the total consumption that of navigation and railway.

34. *Emission factors*: The EFs used are IPCC default values and country-specific. The EFs per fuel used are reported in the background information provided by Japan for the centralized review.

35. *Activity data*: Fuel consumption data is based on “Transport Energy Statistics”, while mileage is based on the "Statistical Yearbook of Motor Vehicle Transport".

36. *Recalculations*: No recalculations are reported.

37. *Completeness*: All subsectors are covered.

38. *Uncertainty*: No uncertainty estimates are provided.

39. The CO_2 IEF for other fuels in “Other sectors” is very high (606.06 kg/TJ). This value may be related to the allocation of emissions to this sector as a result of the different estimations provided by the supply/demand-based methods.

4.3 Mobile combustion – non-CO_2 emissions

40. Vehicles are classified into seven categories and three fuel types. The estimation is based on the mileage per category. There is no information on control technologies. The N_2O IEF for gasoline in road transport is relatively low compared with other Organisation for Economic Co-operation and Development (OECD) countries, but within the range of IPCC defaults. The EF has been kept constant since 1990. In Japan’s response to the S&A report it is mentioned that “due to insufficiency of measurement emission data, we apply constant EFs from 1990 to 1998”. It seems that not only EFs but also penetration of control technologies have been kept constant.

41. According to the response to the S&A report, N_2O emissions from jet kerosene in civil aviation are reported as NE due to the lack of reliable EFs for N_2O from aviation. It is noted by the review team that CH_4 and N_2O EFs for aviation are indeed considered highly uncertain. However, there is a default EF for N_2O from aviation in the IPCC guidelines (2 kg/TJ).

42. Other fuels consumption is reported as not occurring (NO) in “Manufacturing industries and construction”. However, CH_4 and N_2O emissions from other fuels have been reported for many subcategories.

43. Reporting of negative emissions in some categories (CH_4 and N_2O). In some categories negative emissions are masked in the sum totals, giving a low IEF. This makes it impossible to analyse IEFs further for these gases in stationary combustion. Background information for this issue was provided, but only in Japanese (ghgef.xls) and, as a result, it could not be considered by the review team.

5. Bunker fuels

44. Fuel consumption for international navigation and aviation is reported in the 1998 CRF.

45. International and domestic fuel consumption for navigation and aviation are reported separately in the Japanese statistics.

46. Marine bunkers (CO_2 emissions) are slightly higher than those in the IEA statistics.

6. Weather-related adjustments

47. It is presumed that there are no weather-related adjustments of emissions since no such reference occurs in the NIR.

7. Questions and issues from previous review stages

48. Japan provided responses to several issues raised in the draft S&A report, as well as background information to assist the review process. These comments have been taken into account by the review team.

8. Questions and issues from Parties' response to draft centralized review report

49. The GOP provided detailed comments in response to the draft centralized review report and these were taken into account. Some specific areas addressed were energy balancing assumptions related to the transportation sector and national energy balance accounts, and addressing energy balance techniques methods used, data sources, and transportation sector details which were very helpful to the review team

C. INDUSTRIAL PROCESSES

1. General overview

1.1 Completeness

50. Due to the extensive use of NE and IE, the CRF was not complete. The explanation given in table 9 of the CRF is that no reliable data were available either in measurements or surveys. Additional materials were provided to the secretariat during this review in an attempt to overcome the problems found with regard to lack of transparency and completeness. An effort was made by Japan to estimate some source categories indicated as NE.

1.2 Transparency

51. Most of the source categories were reported as IE or NE in the CRF reports. This makes the comparison with other inventories and international statistics very difficult.

1.3 Recalculations

52. Japan did not provide recalculation tables 8(a) and 8(b) in the CRF. However, a comparison with data from the 1999 submission indicates that slight recalculations have been made in some categories.

1.4 Key-sources

53. All mineral product emissions were reported in the CRF under "Limestone and dolomite use". No cement production emissions were reported in the CRF. It should be noted that the S&A report determined that limestone related emissions are a key source for Japan. This is apparently incorrect, since it appears these reported emissions actually include CO_2 from cement, lime and soda ash production, and are not related to limestone and dolomite use. The review team concludes that the analysis of key sources should be undertaken very carefully. If an actual key source is not reported or reported incorrectly (like emissions from cement production being included elsewhere) the key source analysis will provide inaccurate or misleading information.

1.5 Methodology

54. Default/default, country-specific for CO_2, default/default for CH_4, and default/ country-specific, plant-specific for N_2O. Country-specific/country-specific for HFCs, PFCs and SF_6.

1.6 Uncertainty

55. Only quality assessment of the uncertainty of the estimates (high for CO_2, HFCs, PFCs, and low for CH_4 and N_2O).

1.7 Cross-cutting issues with energy sector

56. A detailed analysis of CO_2 emissions from ammonia production under 2. "Industrial processes", which should be subtracted from 1.A. "Fuel combustion activities", in accordance with the IPCC guidelines, was provided. (Ammonia(Note) CO_2-2).

2. Mineral sector

57. Japan only reported emissions from limestone and dolomite production.

58. The lime and cement production emissions are reported as IE. In table srt-1998, submitted on 11 May 2001, it is noted that CO_2 emissions from cement production total 35,419 Gg, CO_2 emissions from lime production total 4,462 Gg, and CO_2 emissions from soda ash production and use total 776 Gg. No emissions from limestone and dolomite use are reported in the additional submission.

59. Activity data are based on amount of limestone and dolomite consumption obtained from the "Yearbook of Minerals and Non-Ferrous Metals Statistics, and emission factors are based on IPCC default values.

60. The problem of reporting IE for key sources highlights a problem with the key-sources assessment: If an emission source is not evaluated or is mistakenly included elsewhere the remaining emission sources will become more important than they really are.

61. Emissions were not estimated for soda ash production and consumption.

3. Chemical sector

62. CO_2 emissions from ammonia production and N_2O emissions from nitric and adipic acid were reported. CH_4 and NMVOC emissions from carbon black, ethylene, ethylene dichloride, styrene, methanol, and coke were also estimated in the report and disaggregated in tables submitted on 11 May 2001. Activity data and EFs have been reported for nitric and adipic acid production. A detailed analysis of CO_2 emissions from ammonia production under 2. "Industrial processes" which should be subtracted from 1.A. "Fuel combustion activities" in accordance with the IPCC guidelines was provided. (Ammonia(Note) CO_2-2).

4. Metal sector

63. CO_2 emissions from iron and steel production were reported in the CRF as IE, and CH_4 emissions were not estimated (United Nations' information estimates production values of 93,548 kt for steel and 74,279 kt for pig iron). Emissions have not been estimated for ferroalloys, aluminium production, and SF_6 used in aluminium and magnesium foundries.

64. Emissions from aluminium production were not estimated for Japan (United Nations' information of 51,400 t).

65. In table srt-1998 submitted on 11 May 2001, CO_2 emissions from iron and steel production of 10,097 Gg were reported, but no emissions from other subsectors (including aluminum production) of the metal production sector have been reported.

5. Production and consumption of HFCs and SF_6

66. Emissions from production of HFCs, PFCs and SF_6 have not been reported in the CRF. Emissions from consumption of HFCs, PFCs, and SF_6 have been reported as 8. "Other" "all" in the CRF.

67. Potential emissions of HFC-134a, HFC-23 (by-product of HCFC-22 production) and other (HFC-32, HFC-125, HFC-152a, HFC-143a) have been reported in the additional report submitted on 11 May 2001 (table Potential Approach HFCs-2p).

68. Potential emissions of PFC-114, PFC-116 and other (C3F8,c-C4F8, C5F12-C8) have been reported in the additional report submitted on 11 May 2001 (table Potential Approach PFCs-2p).

69. Potential emissions of SF_6 have been reported in the additional report submitted on 11 May 2001 (table Potential Approach SF6-2p).

6. Other (2.G)

70. In the sector 2.G. "Other", NMOVC emissions were reported in the CRF for "carbon black, petrochemical plant, storage facilities, shipping facilities".

7. Solvents

71. N_2O emissions were reported for "use of N_2O for anaesthesia" and NMVOC emissions were reported for all subsectors.

8. Key sources

72. CO_2 emissions from limestone and dolomite use (level assessment of 4 per cent).

73. HFCs Potential emissions from consumption of halocarbons and SF_6 (aggregate) (level assessment of 2 per cent).

74. SF_6 Actual emissions from consumption of halocarbons and SF_6 (aggregate) (level assessment of 4 per cent).

75. PFCs Potential emissions from consumption of halocarbons and SF_6 (aggregate) (level assessment of 1 per cent).

9. Questions and issues from previous stages

76. Japan provided responses to the S&A report and the review team was able to take these comments into account. The S&A report stated the following for "Industrial processes":

Key sources

77. 2.A.3. "Limestone and dolomite use": No disaggregated reporting of 2.A. "Mineral products" – all activity data and CO_2 emissions are included under "Limestone and dolomite use". Japan provided the following answer: "Refer to JNGI category 2 CO_2-2.xls 'Lime' sheet and 'Dolomite' sheet."

78. 2.A. "Mineral products": The international value for annual cement production in Japan is 81,000 kt. This would correspond to a default emission estimated of approximately 40,000 Gg CO_2 or 80 per cent of the emissions from mineral products reported for 1998. Japan provided the following answer: "Refer to JNGI category 2 CO_2-2.xls 'Lime' sheet and 'Dolomite' sheet."

79. Default IPCC methods used for CO_2 from 2.A. "Mineral products". It is not clear which tier has been used. Japan provided the following answer: "'Tier' does not appear in the 'Limestone and dolomite use' category of the IPCC guidelines."

80. 2.F. "Consumption of halocarbons and SF_6"– HFCs, PFCs, and SF_6: Only potential emissions have been reported. Actual emissions were reported as NE. The potential emissions may be considerably larger than the actual ones. This may affect the identification of other key sources. Japan provided the following answer: "Satisfactory. At present, the Government of Japan is preparing country-specific actual emissions data for these chemical substances."

Non-key sources

81. Reported as NE: Other production, aluminium production, soda ash, asphalt roofing, road paving with asphalt, carbide production, ferroalloys production, production of halocarbons

and SF_6. Japan provided the following answer: "The Government of Japan will estimate emissions from the source categories reported as NE through investigation by experts."

82. "Metal production" – CO_2 and CH_4: No numerical information was reported for this category. All activity data were reported as IE or NE. It is not clear where emissions from these sources have been included. Japan provided the following answer: "Refer to table 9s1 of CRF. Refer to JNGI 2000, category 2 CO_2-2.xls 'Lime' sheet and 'Dolomite' sheet. Emissions data from limestone and dolomite use in iron and steel production are included under 'Limestone and dolomite use'."

83. 2.C.3 "Aluminum production" – PFCs: International statistics indicate aluminium production, but no PFC emissions were estimated (reported as NE). Japan provided the following answer: "NE is correct. The Government of Japan will make an effort to estimate emissions from source categories reported as NE through investigation by experts."

D. AGRICULTURE

1. General overview

1.1 Completeness

84. It was not possible to determine source category completeness due to the absence of an NIR.

1.2 Transparency

85. The absence of an NIR resulted in a loss of transparency.

1.3 National self-verification

86. There was no indication whether a self-verification process had been performed at national level.

1.4 Trends

87. There is a gradually decreasing trend (1990 to 1998) in CH_4 emissions from agriculture, mainly due to a decrease in enteric fermentation and rice cultivation. A slight decrease in N_2O is noticed as well.

2. Key sources

2.1 Methodology

88. The GHG inventory submitted to the secretariat by Japan seemed to be based on UNFCCC guidelines and IPCC methodology according to decision 3/CP.5 and the estimates of GHG emissions have been reported according to the UNFCCC guidelines, using the CRF adopted by the COP.

89. Emissions from the agriculture sector were estimated using the IPCC guidelines. But there are significant differences in the IEF values compared with IPCC default values for the region.

2.2 Activity data (AD) and emission factor (EF)

90. In general, IEFs were relatively high for CH_4 emissions from enteric fermentation in the categories of dairy and non-dairy cattle, while low for sheep compared with IPCC default values. Some other differences occurred as noted below in "specific assessment".

2.3 Good practices

91. Not enough data on key sources is reported in the agriculture sector to determine whether the level of disaggregation recommended by the IPCC good practice guidance has been applied.

2.4 Completeness

92. The information provided by the Japan is incomplete.

2.5 Uncertainty

93. Only quality assessment of the uncertainty of the estimates has been made (low for CH_4 and N_2O) in the agriculture sector.

2.6 Recalculations

94. Japan provided table 8(a) which seems to show that no recalculations have been performed for 1998.

2.7 Emission estimates

95. Japan provided emissions estimates for the agriculture sector which need further explanation.

2.8 Assumptions

96. The assumptions used to perform the GHG inventory in the agriculture sector were not documented.

2.9 National self-verification

97. No information was provided in the submission on whether the inventory data and estimates have been verified at national level.

2.10 Recalculations

3. Trends

98. Japan provided CH_4 and N_2O trends for the agriculture sector in the CRF according to UNFCCC guidelines. CH_4 increased from 842.04 Gg (1990) to 854.69 Gg (1993) and then decreased to 771.44 Gg (1998); while N_2O decreased regularly from 9.25 Gg (1990) to 8.13 Gg (1998).

4. Weather-related adjustments

99. In the submission to the UNFCCC secretariat, there is no indication of any adjustments for climate variability.

5. Questions and issues from previous stages

100. Japan provided some preliminary responses to remarks in the S&A report, as well as justifications for the differences between its own and IPCC values where appropriate. It also recognized that there were some errors in the report and gave assurances that the missing NIR was an oversight.

6. Specific assessment

Enteric fermentation (table 4.A)

101. The IEF for cattle is higher than the default EF. No explanation is given. The others are in the same range as the default EF. All EFs are, however, referenced in the background calculation tables provided by Japan.

Methane emissions from manure management (table 4.B(a))

102. The IEF for cattle is low, the IEF for swine is high and the others are normative. However, in the background calculation tables provided by Japan EFs were given for dairy and non-dairy cattle that differed from those in the CRF. Japan's response to the S&A Report clarified that the composting practices used for non-dairy cattle generate more CH_4 than manure management systems used for dairy cattle.

Nitrous oxide emissions from manure management (table 4.B(b))

103. No activity data are provided for the sheep population in this table. They are, however, given in the previous tables. The nitrogen excretion values are country-specific and low compared with IPCC values. No explanation is available. All animal waste management systems (AWMS) are put under "Others" and no reason is given. In comments provided to the review team the GOP explained a transcription error for nitrogen excretion that treated "population" not as 1000 head, but as individual head. This resulted in an IEF that was much higher than the IPCC default value. The corrected IEF for Japan is 0.0044, compared to the IPCC default value of 0.005.

Rice cultivation (Table 4.C)

104. The IEF seems satisfactory. The methodology appears to allow for disaggregation by soil type to calculate CH_4 emissions from rice fields. This is positive.

Agricultural soils (table 4.D)

105. Only N_2O from synthetic fertiliser use is reported. It is mentioned in table 9 of the CRF that not enough data are available. However, manure N could be deduced from table 4.B(b). Also indirect N_2O emissions could have been calculated using data of synthetic fertiliser use and manure N data from table 4.B(b) in combination with IPCC default EF. Moreover, the IEF is low. In the background data provided by Japan, an EF of 0.92 per cent is put forward. A

transcription error was discovered in the cell of "References". The reference should be replaced with "Average of the ratio of N_2O emission to amount of nitrogenous fertilizer used in upland agriculture soils…". The activity data is calculated by the subtraction of the amount of nitrogenous fertilizer used in rice field from the amount used in all the agricultural soils. The emission factor corresponds to this activity data.

Agricultural residue burning (table 4.F)

106. For cereals, not including rice, IE is mentioned. However, the data are then reported under "Others" in the same table. No explanation is available for that.

7. Quality Assessment/Quality Control (QA/QC)

107. No information on QA/QC procedures was available.

8. Uncertainty

108. No information on uncertainties was available.

E. LAND-USE CHANGE AND FORESTRY (LUCF)

1. General overview

109. No NIR was available at the time of this review.

110. No information was provided on any additional categories in the LUCF sector. No explanation has been provided for the choice of a particular methodology. No explanation has been provided for the choice of emission and conversion factors.

2. Findings

2.1 Changes in forest and other woody biomass stocks (table 5.A)

111. *Completeness*: Data have been provided on CO_2 removals for this category and for temperate forests for the years 1990 to1995. The reported estimates show that changes in forest and other woody biomass stocks may have compensated for approximately 7.4 per cent of total GHG emissions in 1995. However, no data have been estimated for the years 1996, 1997 and 1998 due to a lack of activity data as explained by the Government of Japan in its comments on the S&A report of GHG inventories.

112. 5.B.4 "Grasslands/tundra" are reported as NO, although Japan has regions with grasslands as about 2 per cent of the country are permanent pastures.

113. However, harvested wood products are being used in Japan and therefore the indicator NE seems more appropriate than NO.

114. In the years 1990 to 1995, Japan also reported under category 5.A.5, CO_2 removals related to parks and green space conservation zones. In 1998 this sink was estimated to be 129.54 Gg CO_2 and in 1995 it corresponded to 0.005 per cent of total GHG emissions.

115. *Consistency*: It is acknowledged that information related to subsectors 5.A, 5.B, 5.C and 5.D has been provided in a consistent manner.

116. The information provided according to table 5 indicates that the LUCF data are internally consistent over the period 1990 to 1995, with reasonable fluctuation and a robust increase in the sink related to category 5.A.2, and a corresponding increase in category 5.B.2. The same methods were used for calculations throughout the period. However, it is noted that consistency from 1990 to 1998 cannot be assessed due to a lack of data for the years 1996, 1997 and 1998.

117. For the years 1996, 1997 and 1998 it is noted that table 5 indicates NE for category 5.A.2, whereas the corresponding sectoral background table includes some estimated data.

118. It is noted that for the years 1990 to 1995 the data for net CO_2 emissions/removals included in table 5 do not correspond to the data included in table 5.A. The Government of Japan has indicated in its comments on the S&A report of GHG inventories that the data in table 5 are correct.

119. It is noted with interest that "natural forests" are included in the calculations. This is not consistent with the IPCC guidelines, where it says in chapter 5 (Land-use change and forestry), p. 11 of the Reference Manual, that "Natural, unmanaged forests are not considered to be either an anthropogenic source or sink, and are excluded from the calculations". Table 5.A is incorrect and therefore the implications for the data submitted in table 5 cannot be assessed.

120. *Recalculations*: No recalculations have been indicated in table 11 of the CRF for the LUCF sector.

121. *Transparency*: Limited transparency has been achieved by providing information according to sectoral background table 5.A of the CRF.

122. Table 5.A includes the relevant information corresponding to the data provided. It is apparent that the carbon uptake in the years 1990 to 1995 is mainly due to uptake in so-called "intensively managed forest" (single-storied forest of the species sugi cedar, etc.) and "natural forest" (species such as beech, oak, etc.).

123. It is noted that data for the years 1996 to 1998 data may not have been provided due to a lack of activity data on the above-mentioned categories with the largest contribution in the previous years.

124. It is also noted that the figure provided for the average annual growth rate for the category "Other" is misleading because it is the sum of the figures provided for the various categories instead of a (weighted) mean value that would be appropriate. However, the carbon uptake increment (38,798.80 Gg C for the year 1995) is consistent, as is the implied carbon uptake factor (1.53 t C/ha).

125. *Comparability*: Supported by the use of IPCC default methodologies and the provision of information according to the sectoral background data.

126. Comparability should be further improved by checking/explaining the inclusion of natural forests in section 5.A, and by providing background information on country-specific EFs.

127. It is recommended that the decay of above-ground biomass related to the conversion of natural forests be used to estimate CO_2 emissions, or the reasons for the absence of an estimate be explained.

128. *Methodology*: According to summary table 3, the IPCC default method has been used in combination with some country-specific EFs.

129. *Emission and conversion factors*: The following information has been taken from table 5.A sectoral background data for land-use change and forestry – changes in forest and other woody biomass stocks:

Category	Average annual growth rate (t dm/ha)	Implied carbon uptake factor (t C/ha)
Intensively managed forest (sugi cedar etc.)	4.96-5.03*	2.48-2.52*
Natural forest (beech, oak, etc.)	1.94-2.05*	0.97-1.03*
Square parks	2.00	0.19
Neighbourhood parks	2.00	0.30
Community parks	2.00	0.33
Comprehensive parks	2.00	0.39
Sports parks	2.00	0.29
Large scaled parks	2.00	0.43
Specific parks	2.00	0.37
National government parks	2.00	0.39
Buffer greenbelts	2.00	0.33
Ornamental green spaces	2.00	0.33
Greenways	2.00	0.60
Specified community parks	2.00	0.32
Green space conservation zones	2.00	1.00

* This figure relates to the base year 1990 whereas for all the other years the lower figure was used.

130. It is noted that:

(a) A lot of detailed information has been provided;

(b) No explanation has been provided for the change in the average annual growth rate and the implied carbon uptake factor between the base year and the following years;

(c) The figures for the annual growth rate are reasonable for a country with temperate conditions. However, it is difficult to compare the average annual growth rate and the implied carbon uptake factor with other data owing to a lack of information on the species in the various categories, as well as a lack of underlying information on expansion and conversion factors. The average annual growth rate seems to be reasonable for temperate conditions. The same is valid for harvesting;

(d) Although the average annual growth rate has been assumed to be the same for all categories, the implied carbon uptake factor differs significantly.

131. *Activity data*: Activity data for total biomass removed from stocks through commercial harvesting, traditional fuelwood consumption, total other wood use and total biomass consumption, have been provided in terms of kt C dm in table 5.A (sectoral background data for land-use change and forestry – changes in forest and other biomass stocks). Data for total biomass consumption from stocks range from 12,176.66 Gg C in 1995 to 16,817.60 Gg C in 1990 (no data are included for 1996, 1997 and 1998). The same table also includes figures for the total annual growth increment in Gg C. However, due to double counting (probably due to the inclusion of data in the row for "Other") the data need to be corrected. The correct data range from 38,790.44 Gg C in 1994 to 39,858.20 Gg C in 1990.

132. Information about the source of the activity data, as well as the methodology used, including an explanation of the trend in activity data, would be welcome.

133. The data seem to be reasonable and compare well with other international data (Food and Agricultural Organization of the United Nations (FAO) statistics).

134. *Uncertainty*: Owing to the lack of information on uncertainty, there was nothing to be reviewed under this heading.

2.2 Forest and grassland conversion (table 5.B)

135. *Completeness*: Data have been provided for category 5.B.2 "Forest and grassland conversion - temperate forests" for emissions of CH_4, N_2O, NO_x and CO. However, no data have been estimated for the years 1996, 1997 and 1998.

136. Again, it is reasonable that categories 5.B.1 "Tropical forests", 5.B.3 "Boreal forests" and 5.B.4 "Grasslands/tundra" are not applicable to Japan. The emissions in section 5.B account for about 0.05 per cent of total GHG emissions in 1995.

137. It is noted that no conversion from grassland into, e.g., cultivated land, streets or houses as a result of urban development has been included in the estimate. It is recommended that such data be added.

138. *Consistency*: It is noted that the data for total emissions included in table 5.B do not correspond to those data included in table 5. This is due to double counting because the data for the "Natural forests" category have been included a second time under "Other".

139. *Transparency*: Transparency has been achieved by providing relevant information in table 5.B of the CRF for the years 1990 to 1995.

140. *Methodology*: According to Summary table 3, the IPCC default method has been used in combination with some country-specific EFs.

141. *Emission and conversion factors*: The following information has been taken from table 5.B sectoral background data for land-use change and forestry – forest and grassland conversion:

Category	Implied emission factor CO_2 (t/ha)	Implied emission factor CH_4 (t/ha)	Implied emission factor N_2O (t/ha)	Average annual net loss of biomass per hectare (t dm/ha) *
Natural forests	64.35-67.32	0.28-0.29	0.00202	0.127-0.129

* This value has been calculated by dividing the annual loss of biomass (which was by mistake included in table 5.B in the column "average net loss of biomass" as indicated by the response of the Government of Japan to the comments prepared by the secretariat) by the average area converted. The value 0.127 t dm/ha is valid for the year 1995 whereas for the years 1990 to 1994 0.129 t dm/ha is valid. An explanation for the change of this parameter was not provided.

142. Additional assumptions in all years reported (according to table 5.B):

- Fraction of biomass burned (average) 0.30
- Fraction that oxidizes during burning (average) 0.90
- Carbon fraction of above-ground biomass (average) 0.50
- Fraction left to decay 0.00
- Nitrogen-carbon ratio 0.01

143. It has been assumed that there is no off-site burning of the cleared biomass. CO_2 emissions from decay (70 per cent of the removed biomass) have not been estimated.

144. It is noted that the IPCC guidelines propose 0.50 as a default value for the fraction of biomass burned (see page 5.30 of the Reference Manual). According to footnote 18 (see page 5.24 of the Reference Manual) the fraction which oxidizes during burning seems to be on the low side.

145. *Activity data*: Activity data on conversion of natural forests have been provided in terms of area converted annually (kha), annual net loss of biomass (kt dm) and quantity of biomass burned (kt dm) as a result of on- and off-site burning, and in terms of average area converted (kha) and average annual loss of biomass (t dm/ha) as a result of decay of above-ground biomass as shown in table 5.A (sectoral background data for land-use change and forestry – changes in forest and other biomass stocks). Data on the area converted annually range from 14 kha in 1995, 1994, 1993, 1992 and 1991 to 9 kha in 1990 (no data included for years 1996, 1997 and 1998). No information has been provided on the basis for these data.

146. *Uncertainty*: See comment under 5.A above.

2.3 Abandonment of managed lands (table 5.C)

147. *Completeness*: No data have been provided for this sector. This relates to category 5.C.2 "Temperate forests". In order to avoid any inconsistency in table 5, it is recommended that the indicator NO in the line pertaining to C. "Abandonment of managed lands" be deleted and that NE be substituted for NO in the line pertaining to category 5.C.2 "Abandonment of managed lands – temperate forests".

148. Again, it is reasonable that categories 5.C.1 "Tropical forests", 5.C.3 "Boreal forests" and 5.C.4 "Grasslands/tundra" are not applicable to Japan.

149. *Transparency*: It is acknowledged that sectoral background table 5.C has been filled in although no data has been submitted. The information submitted indicates that data on

grasslands and temperate natural ecosystems have not been estimated while other categories have been classified as not applicable to Japan, which seems reasonable. No explanation has been provided as to why data have not been estimated.

150. *Comparability*: Owing to a lack of information it was not possible to check the comparability of data/methodologies for this category.

151. *Methodology*: Owing to a lack of data and information relating to methodologies under section 5.C, methodological issues for those sectors could not be reviewed.

152. *Emission and conversion factors*: Owing to a lack of information relating to section 5.C, emission and conversion factors for those sectors could not be reviewed.

153. *Activity data*: Owing to a lack of information relating to section 5.C, activity data could not be reviewed.

2.4 CO_2 emissions and removals from soil (table 5.D)

154. *Completeness*: No data have been provided for this sector.

155. *Transparency*: It is acknowledged that sectoral background table 5.D has been filled in although no data have been submitted. The information submitted indicates that data on the cultivation of mineral soils, cultivation of organic soils for Warm Temperate and Liming of Agricultural Soils have not been estimated, whereas other categories have been qualified as NO which seems reasonable for Japan. No explanation has been provided as to why data have not been estimated.

156. *Comparability*: Owing to a lack of information it was not possible to check for comparability of data/methodologies for this category.

157. *Methodology*: Owing to a lack of data and information relating to methodologies under section 5.D, methodological issues for those sectors could not be reviewed.

158. *Emission and conversion factors*: Owing to a lack of information relating to section 5.D, emission and conversion factors for those sectors could not be reviewed.

159. *Activity data*: Owing to a lack of information, activity data for this category could not be reviewed.

2.5 Reporting

160. Japan did not submit an NIR. As a consequence, the review could not address issues like QA/QC, inventory improvement, archiving of data and identification of key sources. It is noted that according to the in-depth review (IDR) of the NC 2, an internal verification of the data on LUCF within Japan has been carried out.

2.6 Feed-back on in-depth review

161. No information is available relating to feed-back on the IDR in the LUCF sector. However, the latest IDR did not include any recommendations for further improvements in this sector.

2.7 Areas for improvements

162. Improvements in documentation, NIR submittal, and attention to the consistency of the data and information provided should be considered.

F. WASTE

1. General overview

163. The largest emission source in the waste sector was CO_2 from incineration. This is a notable difference from most other developed countries where landfills are more common, but in Japan incineration of waste is more common due to a lack of available landfill area. Waste incineration is identified as a key source.

1.1 Completeness

Key sources: waste incineration

164. Country-specific methodologies were used, but only brief details provided in the CRF are available to document completeness.

Non-key source: solid waste disposal on land

165. No NIR was submitted; assumptions and details of the model are not known.

Non-key source: wastewater handling

166. The activity data were indicated as NE. The estimate from industrial wastewater handling was omitted despite Japan's industrialized economy. Further explanation is recommended.

1.2 Methodology

Key sources: waste incineration

167. For the waste incineration subsector, the amount of waste processed in the waste incinerator designated by the Air Pollution Control Law was multiplied by country-specific EFs.

Non-key source: solid waste disposal on land

168. The waste generation rate is within normal limits: 0.71 kg/capita/day. It is noted that the time lag for calculating CH_4 emissions spans a considerable time horizon (10 to 103 years). In order to assess comparability, the review team used the reported data and applied tier 1 of the IPCC good practice guidance methods to calculate methane emissions from solid waste disposal using an assumed average DOC equal to 0.3. The result is 117.6 Gg, which is about 3 times less than the result of the country-specific model. We suggest additional clarification of appropriate country-specific DOC to explain more clearly the estimates provided.

Non-key source: wastewater handling

169. The methodology used did not make use of COD or BOD information. Emissions from domestic wastewater (7.51 Gg of CH_4) were calculated based on country-specific EFs and

volumetric flow data (which were not provided). Emission estimates appear very low for such a populous country.

1.3 Emission factor (EF)

Key source: waste incineration

170. No information is provided on the actual EFs used.

Non-key source: solid waste disposal on land

171. The IEF from solid waste disposal systems (SWDS) was very high (0.37 t/t MSW). A detailed explanation is recommended.

Non-key source: wastewater handling

172. The CRF reports that the country-specific values for wastewater handling EFs range from 263.6-900.7 mg-CH_4/m^3. To estimate emissions, the inventory is based on the median value of this range. The IEF of wastewater handling could not be calculated since data on carbon content are not reported.

1.4 Activity data

173. Activity data are incomplete.

1.5 Recalculation

174. No information on recalculations was provided.

1.6 Trends

175. Emission trends for CO_2 and CH_4 are reasonable; increases in the key source category (incinerated solid waste) are accompanied by decreases in CH_4 emissions from land-based SWDS (non-key source).

- - - - -