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REPORT OF THE INDIVIDUAL REVIEW OF GREENHOUSE GAS INVENTORIES OF NEW ZEALAND SUBMITTED IN THE YEAR 2000[1]

(Desk review)

EXECUTIVE SUMMARY

1. Completeness of reporting

1. New Zealand submitted inventory data for the years 1990 to 1998 using the Common Reporting Format (CRF) of the UNFCCC reporting guidelines on annual inventories (FCCC/CP/1997/7).

2. In the CRF there are some examples where the use of notation keys could be wrong. For example, New Zealand has reported N_2O emissions from industrial processes for the years 1990-1993 as not occurring ("NO"), while for the years 1994 to 1998 the emissions are reported as "0". It is unclear whether the differences reported as "NO" and "0" are based on a wrong use of notation keys.

2. Transparency of reporting

3. New Zealand submitted a National Inventory Report (NIR), which includes greenhouse gas (GHG) inventory data for the years 1990 to 1998 using the CRF, information on methodologies, activity data, emission factors, uncertainties in the calculation of all source categories, and worksheets for the calculation of emission estimates for the year 1998. The New Zealand inventory submission, in general, conforms to the UNFCCC reporting guidelines, and the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines). The NIR included most of the information requested in the UNFCCC reporting guidelines.

4. New Zealand has used a mixture of IPCC default and country-specific emission factors in estimating GHG emissions from different sectors.

[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 (1) indicates that for New Zealand this is a desk-review report.

3. Uncertainties, verification and QA/QC procedures

5. Information on quality control/quality assurance (QA/QC) procedures implemented is not provided. There is no description of how the data supplied by different sector organizations was quality assured to ensure that correct emissions are reported.

6. Self-verification as well as QA/QC procedures applied are not addressed in the NIR. Several mistakes reported in the transcription of data lead to the conclusion that QA/QC procedures have not yet been fully implemented (which is not yet required at this stage).

7. Quantitative estimates of uncertainty are provided at an aggregated level for each GHG, but not at a more disaggregated (that is, individual source categories) level. Uncertainty is defined in the NIR as a combination of activity data and emission factors uncertainties. The estimates are shown but not described or justified.

4. Recalculations

8. New Zealand provided recalculated estimates (CRF tables 8(a)) and explanatory information (CRF tables 8(b)) for these recalculations for the years 1990 to 1997. In addition, the NIR contained additional information on changes in activity data and emission factors for each IPCC sector.

5. Summary of findings for each sector

Energy sector

9. In the energy sector, the Party has covered key source energy categories, viz. CO_2 emissions from the energy industries, manufacturing industries and construction, transport and other sectors (commercial/institutional, residential and agriculture/forestry/fisheries) and oil and natural gas and fugitive CH_4 emissions from coal mining and handling. The information on activity data and emission factors is explained. The NIR also contains separate sections explaining differences and reasons for divergence from IPCC methodology, when necessary.

10. The CO_2 implied emission factor (IEF) for liquid fuels from residential fuel use, and the CO_2 IEF for gaseous fuels from manufacturing industries, seem to be low compared with data from other Parties. Further, the IEF for non-key source sector fugitive emissions of CH_4 from solid fuels (coal mining and handling) was very high compared to the IPCC default emission factors. An explanation of these low and high values would be useful.

11. The CO_2 emissions from liquid, solid and gaseous fuels used in category 1.A.1 Energy industries, and for gaseous fuels used in category 1.A Fuel combustion, varied significantly from year to year. Responses provided by New Zealand do not address the variations in the trends.

12. The NIR provides an explanation as to how feedstocks and carbon stored in products were treated in the inventory. The IPCC Guidelines addresses possibilities of double counting between the energy and the industry sectors if activity data are deliveries (such as in the case of New Zealand). The NIR does not explain how such problems are treated.

13. CO_2 emissions from liquid fuels in manufacturing industries and construction showed a sharp declining trend (-14.9 per cent) compared to previous years. No explanation for this decrease is provided in the NIR.

Industrial processes

14. The industrial processes sector key source category is identified as CO_2 from iron and steel and aluminium production while the non-key source category is CO_2 from the mineral products and chemical industry, and CH_4, HFC, PFC and SF_6 from other industries.

15. The NIR includes most of the information requested in the UNFCCC reporting guidelines. Information on methodologies used is provided and the emission estimates are based mostly on industry-supplied information.

16. The CRF indicates that the methodology used is the tier 1 approach and the emission factors used are country specific, such as for iron and steel production. The IPCC Guidelines encourages Parties to use plant specific data (tier 2 approach) if these are available.

17. The implied emission factor for the period 1990-1998 varies from year to year within a range of 1.8 t/t to 2.1 t/t. This is higher than the IPCC default emission factor which is 1.5-1.6 t/t. In its response to the synthesis and assessment (S&A) report, New Zealand explained that this variation was linked to variations in the reporting of coal sources and coking coal.

18. The IEF used for aluminium production were within the range of IPCC default values, that is, 1.5-1.8 t/t.

19. No emissions of N_2O are reported from industrial processes. The use of the notation keys in the CRF for the years 1990-1998 is not consistent. (According to the calculation tables contained in the NIR, emissions of N_2O are probably "not occurring" in New Zealand.)

20. Emissions of HFCs and PFCs are reported by individual chemical species for the whole time series 1990-1998. For HFCs, only potential emissions are reported for the years 1994 to 1998. Actual emissions are not reported because detailed information on their use is not available. This source category is likely to be a key source category in the future, due to the expected rapid increase of use of these chemicals; hence New Zealand is encouraged to calculate the actual emissions of HFCs.

Agriculture

21. The Party has covered key-source categories, namely CH_4 emissions from enteric fermentation, N_2O from agricultural soils and non-key source categories, viz. CH_4 emissions from manure management.

22. Methane emissions from ruminants were estimated using the IPCC Guidelines tier 1 method, with country-specific emission factors for cattle, sheep, goats and deer. CH_4 emissions from the poultry and swine subcategory were not reported because of a lack of appropriate emission factors. The estimates could have been based on IPCC default emission factors if country-specific values had not been available.

23. New Zealand specific emission factors for cattle, sheep, goats and deer are higher than the IPCC defaults, particularly for sheep, for which New Zealand reported factors higher than those

of all other Parties. The Party responded to this observation by explaining that emission factors given for ruminants include that part of the year when the adults will be accompanied by young whose numbers are not captured in the annual statistics, which are based on animal numbers as at 30 June, the lowest point (winter) in the southern hemisphere livestock production cycle.

24. The IPCC Guidelines were used in estimating N_2O emissions from agricultural soils. Several parameters and emission factors were drawn from New Zealand sources. New Zealand's locally developed emission factor is 0.01 kg N_2O -N/kg N. This emission factor is at the lower range of the IPCC default emission factors

Land-use change and forestry

25. New Zealand reports on changes in land use and in other woody biomass stocks and forest and grassland conversion (tables 5A and 5B of the CRF). Emissions from the abandonment of managed lands and CO_2 emissions and removals from soils (tables 5C and 5D of the CRF) are not reported because of a lack of data.

26. The estimates of GHG emissions and removals are calculated for the period from 1990 to 1998. CRF Sectoral table 5 provides an overall report on the Land-use change and forestry sector. CRF background tables 5A to 5D were not completed, because a country-specific method for GHG accounting was applied. Calculations of GHG emissions and removals are incorporated in national reporting worksheets attached to the NIR.

27. The GHG inventory of New Zealand in the CRF and NIR is consistent with the IPCC Guidelines and UNFCCC guidelines. In line with the IPCC Guidelines, New Zealand developed a mathematical model to account for CO_2 emissions and removals that is more appropriate for its national circumstances.

28. The main source of activity data for forestry is the National Exotic Forest Description (NEFD) which provides information on age and area of plantations. However, the NIR does not describe how New Zealand obtained the information on wood biomass stock in planted forests and on the wood density factors used.

29. Due to limited data on forest and grassland conversion, only emissions from land clearing for new forest planting were reported. The emissions of non-CO_2 gases are reported for land clearing, prescribed burning of scrublands, and forest fires. As per the IPCC default method, carbon released from burning is assumed to be absorbed during the re-growth.

Waste

30. In the NIR, CH_4 emissions from solid waste disposal on land, and CH_4 and N_2O emissions from wastewater treatment, are presented. Only negligible amounts of waste are incinerated in New Zealand, and therefore the emissions are not estimated. The methodologies in the IPCC Guidelines are used to estimate the GHG emissions from the waste sector in New Zealand. Refinements to the methodologies are made in estimating the emissions from wastewater treatment.

31. A short description of the waste sector and the trends in emissions would add information to the NIR. New information on trends is found only in the CRF tables. The methane emissions were approximately 13 per cent higher in 1990 than in 1998. The decrease in the per capita

emissions is even greater, approximately -23 per cent. The emissions have declined due to increased landfill gas recovery; the disposed amounts are somewhat higher in 1998 than they were in 1990.

32. The emissions per capita are fairly high, but comparable with many other Annex I Parties. A high waste generation rate and a large fraction of waste disposed of at solid waste disposal sites (SWDS) are the probable causes of the high emissions, although the reasons are not addressed in the NIR.

33. More than 20 per cent of the methane generated at SWDS was reported to have been captured by landfill gas recovery. For the years 1990 and 1991, methane recovery was reported as "0". However, if methane recovery did not occur in these two years the indicator "NO" should have been used.

34. The activity data also cover construction and demolition waste. No information is given as to whether industrial solid waste, agricultural waste or municipal and industrial sludges are disposed of at SWDS in New Zealand and whether they are included in the reported estimates.

35. The activity data collection should be described in more detail, especially as it is stated in the report that "limited data is currently available in New Zealand on waste generation".

36. Estimates on CH_4 and N_2O emissions from both domestic and industrial wastewater treatment are provided. The emissions are calculated using a method that can be considered as a refinement of the IPCC method.

A. OVERVIEW

1. Introduction

37. 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 inventories for a limited number of 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 to individual reviews, including desk reviews, centralized reviews and in-country reviews.

38. In response to the mandate by the COP, the secretariat coordinated a desk review of three national GHG inventories (the Netherlands, New Zealand and the United States of America) submitted in 2000, which took place from 30 April to 25 May 2001. The review was carried out by a team of nominated experts from the roster of experts working in their own countries. The members of the team were: Ms. Branca Americano (Brazil), Mr. Sergio González (Chile), Mr. Michael Gytarsky (Russian Federation), Ms. Anke Herold (Germany), Ms. Katarina Mareckova (Slovakia), Mr. Todd Ngara (Zimbabwe), Ms. Astrid Olsson (Sweden), Ms. Riitta Pipatti, (Finland), Mr. Audun Rosland (Norway) and Mr. Taha Zatari (Saudi Arabia). The review was coordinated by Mr. Stylianos Pesmajoglou (UNFCCC secretariat). Mr. Audun Rosland and Mr. Taha Zatari were the lead authors of the report.

39. The main overall objective of the desk review of the GHG inventories was to ensure that the Conference of the Parties had adequate information on the GHG inventories. The review should further assess the progress of the Parties toward fulfilling the requirement 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 review process and their consistency with the UNFCCC reporting guidelines and the IPCC Guidelines, and identified possible areas of improvement in the inventories of the three Annex I Parties. Each inventory expert reviewed the information submitted for one IPCC sector and each IPCC sector was covered by two experts.

40. 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 was not published at the time the inventory was submitted and could not, therefore, have been used in the compilation of the inventory.

41. 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 submitted in the year 2000, National Inventory Reports for the year 2000, the synthesis and assessment report of GHG inventories prepared by the secretariat, and comments from the Parties on the synthesis and assessment report.

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

42. In accordance with the UNFCCC review guidelines, a draft version of this report was communicated to the Government of New Zealand, which provided comments that have been considered and incorporated, as appropriate, into this final version of the report.

2. Data sources

43. The following data sources have been used in the review:

(a) National greenhouse gas emission inventory report in electronic format (MS-WORD file), as reported in April 2000;

(b) Common reporting format for all years 1990 to 1998, available in electronic format (MS-EXCEL file);

(c) Synthesis and Assessment (S&A) Report – Preliminary findings on individual national GHG inventories by the UNFCCC secretariat;

(d) New Zealand's response to the S&A report;

(e) The status report;

(f) Key source assessment on annual inventories by Annex I Parties;

(g) UNFCCC checklist;

(h) Report on the in-depth review of the second national communication of New Zealand, FCCC/IDR.2/NZL, 21 September 1999;

(i) UNFCCC reporting guidelines;

(j) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*;

(k) IPCC *Good Practice Guidance and Uncertainty Management for National Greenhouse Gas Inventories* ;

(l) IEA 2000: CO_2 emissions from fuel combustion 1971 – 1998, IEA statistics 2000 edition.

3. General issues

3.1. Completeness and consistency of reporting

44. New Zealand submitted inventory data for the years 1990 to 1998 using the CRF of the UNFCCC reporting guidelines.

45. In the CRF there are some examples where the use of notation keys could be wrong. For example, New Zealand has reported N_2O emissions from industrial processes for the years 1990 to 1993 as not occurring ("NO"), while for the years 1994-1998 the emissions are reported as "0". It is unclear whether the differences reported as "NO" and "0" are based on a wrong use of notation keys.

3.2. Transparency of reporting

46. New Zealand submitted a NIR, which includes GHG inventory data for the years 1990 to 1998, using the CRF, information on methodologies, activity data, emission factors, uncertainties in the calculation of all source categories, and worksheets for the calculation of emission estimates for the year 1998. The inventory submission, in general, conforms to the UNFCCC reporting guidelines, and the IPCC Guidelines. The NIR included most of the information requested by the UNFCCC reporting guidelines.

47. The Party has used a mixture of IPCC default and country-specific emission factors in estimating GHG emissions from different sectors.

3.3. Uncertainties, verification and QA/QC procedures

48. Information on quality control/quality assurance (QA/QC) procedures implemented is not provided. There is no description of how the data supplied by different sector organizations was quality assured to ensure that correct emissions are reported.

49. Quantitative estimates of uncertainty are provided at an aggregated level for each GHG, but not at a more disaggregated (that is, individual source categories) level. Uncertainty is defined in the NIR as a combination of activity data and emission factors uncertainties. The estimates are shown but not described or justified.

3.4. Self-verification and QA/QC procedures

50. Self-verification as well as QA/QC procedures applied are not addressed in the NIR. Several mistakes reported in the transcription of data lead to the conclusion that QA/QC procedures have not yet been fully implemented (which at this stage is not yet required).

3.5. Recalculations

51. New Zealand provided recalculated estimates (CRF tables 8(a)) and explanatory information (CRF tables 8(b)) for these recalculations for the years 1990 to 1997. In addition, the NIR contained additional information on changes in activity data and emission factors for each IPCC sector.

B. ENERGY SECTOR

1. Assessment of conformity with guidelines

1.1. Completeness

52. Table 1, table 1.A.(a), table 1.A.(b): "0.00" is frequently reported where data were not disaggregated to subsectors and where certain gases were not estimated. The use of notation keys should be more consistent.

53. Table 1.B.2: For flaring, "NA" is used in all subsectors, but emission estimates are reported at an aggregate level.

54. For some tables the lack of disaggregation is explained in the NIR.

55. QA/QC is the only part included in the UNFCCC guidelines which is not reported in the NIR.

56. Sometimes sources are provided but no references (e.g. "The data for the energy sector was compiled by the Ministry of Economic Development (formerly Ministry of Commerce) from its energy database."). In these cases it would be difficult to assess whether the data reported in the CRF are consistent with the sources provided.

1.2. Reference approach for energy use

Comparison between reference and national approach

57. The difference between the reference and the sectoral approach for New Zealand is small (-0.02 per cent). It was explained by New Zealand that the activity data come from a small number of sources which accounts for the close comparison in the numbers, and the emission factors used for both approaches are also similar.

Comparison with international data

58. The S&A report for New Zealand states: "The reference approach energy data for 1998 correspond very closely to the IEA data (only 0.4 per cent lower) and specific differences are highlighted."

1.3. Treatment of feedstocks and non-energy use of fuel

59. The NIR provides an explanation of how feedstocks and carbon stored in products were treated in the inventory. The IPCC Good Practice Guidance addresses possibilities for double counting between the energy and the industry sectors if activity data are deliveries (as in the case of New Zealand). The NIR does not explain how such problems are treated.

60. Non-energy use fuels (table 1.A.(d)) were reported only for bitumen and natural gas, not for other fuels (such as naphtas, lubricants, coal oils). The response from New Zealand to the S&A report explains that “Bitumen” represents an aggregate number for “Bitumen and other petroleum products”. In this case, the notation key "IE" should have been used for the other rows for liquid products.

1.4. Bunker fuels

61. Table 1.C provides only the aggregated emissions and consumption data for marine and aviation data. The NIR provides explanations as to how international bunker fuels have been estimated. It is explained that data on fuel use for domestic transport are collected by the Deliveries of Petroleum Fuels by Industry survey by Statistics New Zealand and that a clear distinction can be made between domestic and international transport. However, it remains unclear why disaggregated fuel data could not be provided in table 1.C since fuel deliveries are usually documented in a more disaggregated way. Only with such a disaggregation is the calculation of IEF and the comparison across Parties possible.

1.5. Weather-related adjustments

62. No temperature adjustments were reported.

1.6. Time series consistency

63. No large annual fluctuations or significant changes were detected other than those already addressed in the S&A report.

1.7. Recalculations

64. New Zealand provided recalculated estimates (CRF tables 8(a)) and explanatory information (CRF tables 8(b)) for these recalculations for the years 1990 to 1997. In addition, the NIR contained additional information on changes in activity data and emission factors for each IPCC sector.

65. In some cases explanations provided could be clarified. (For example, "Co-generation at Te Awamutu was moved to the industry sector". Which industry sector is meant, "1.A.2 Manufacturing Industries and Construction" or "Industrial Processes"?[3]). The section "What we changed since the last inventory submission" does not always explain the recalculations. For example, the comment “The most up to date reference for most of the energy sector is *New Zealand Energy Greenhouse Gas Emissions 1990-1998* (Ministry of Commerce, 1999) and this reference has been added to the list of references which follows” does not clarify whether only the reference list was changed or whether this document provides improved data for the energy sector. In addition, no explanation was provided as to what parts (activity data, emission factors) were improved and how. The CRF tables provide the explanation "more reliable data" for all changes in the energy sector, which is very general and not very transparent.

66. All energy source categories were recalculated. In general for the energy sector, the explanations provided in the NIR do not relate very well with the changes reported in the recalculation tables. The changes reported for biomass should not result in changes in source categories for fuel combustion activities. The different allocation of cogeneration is only relevant for one source category. Thus, it could be assumed that the new reference provided changes in all energy source categories, but it is not clear whether methods activity data or emission factors were changed and how changes relate to the recalculations reported.

[3] New Zealand, in its response to the above comments, explained that “Co-generation at Te Awamutu was moved to the industry sector” refers to “Manufacturing Industries and Construction” and not “Industrial Processes”.

67. The NIR explains that another method was used for fugitive emissions from the transmission and distribution systems, but the recalculation tables show changes in the aggregate estimates and not in category 1.B.2 Oil and Natural Gas which seems to be the appropriate category for this change.

68. The explanations for recalculations are in some cases statements of what happened, but do not always explain or justify the improvements.

1.8. National self-verification

69. Self-verification as well as QA/QC procedures applied are not addressed in the NIR. Several mistakes reported in the transcription of data lead to the inclusion that QA/QC procedures have not yet been fully implemented (which is not yet required at this stage).

1.9. Uncertainty

70. Quantitative uncertainty estimates are provided at an aggregated level for each GHG, but not at a more disaggregated (for example, individual source categories) level. Uncertainty is defined in the NIR as a combination of activity data and emission factors uncertainties. The estimates are shown but neither described nor justified.

2. Synthesis and assessment report

71. Consistency of information between the CRF and the NIR was addressed in the synthesis and assessment report. The responses to the questions provided by New Zealand explain all inconsistencies.

Time-series consistency

72. The activity data and the CO_2 emissions for liquid, solid and gaseous fuels used in category 1.A.1 Energy industries, and for gaseous fuels used in category 1.A Fuel combustion, varied significantly from year to year. Responses provided by New Zealand do not address the variations in the trends.

National self-verification

73. No information was available on whether the inventory data have been verified nationally. No further information was provided in the responses from New Zealand.

3. Analysis of source categories

74. Key source categories in the energy sector are:

(a) 1.A.1 Energy industries (CO_2);

(b) 1.A.2 Manufacturing industries and construction (CO_2);

(c) 1.A.3 Transport (CO_2);

(d) 1.A.4 Other sectors (commercial/institutional/residential etc.) (CO_2);

(e) 1.B.2 Oil and natural gas (CO_2);

(f) Fugitive emissions: coal mining & handling (CH_4).

75. The review report is not structured according to the key sources. Only the major findings related to methodologies, emission factors and activity data are highlighted according to the major headings in the following sections.

3.1. Methodologies

76. The NIR report contains a separate section, "Where we diverged from IPCC methodology", which explains differences and reasons. This section is very helpful as those divergences do not then need to be addressed during the review if they are minor or if the justifications provided are clear and acceptable.

77. Information on activity data and emission factors is explained.

3.2. Emission factors

78. From comparison tables for energy–stationary combustion provided by the secretariat (pages 18, 20), average CO_2 IEF were calculated for several source categories (see table 1). To calculate the average, all IEF based on GCV were adjusted to NCV according to IEA methodologies. The CO_2 IEF for liquid fuels from residential fuel use and the CO_2 IEF for gaseous fuels from manufacturing industries seem in particular to be low compared with data from other Parties. An explanation for these low values would be useful.

Table 1. Comparison of implied emission factors from New Zealand with the average from Annex I Parties (data from CRF)

Fuel and category	New Zealand	Average of Annex I Parties (without New Zealand)
	t CO_2/TJ	**t CO_2/TJ**
Liquid fuels		
Residential	60.7	70.6
Gaseous fuels		
Manufacturing industries and construction	33.3	54.4

79. For fugitive emissions from solid fuels (coal mining and handling), New Zealand's IEF for CH_4 is very high, with 22.83 kg/t compared with the IPCC default range of 4.5 – 16.75 kg/t.

80. Methods for country-specific emission factors are listed but not explained.

3.3. Activity data

81. CO_2 emissions from liquid fuels in manufacturing industries and construction show a sharply declining trend (-14.9 per cent) as compared to previous years. No explanation for this decrease is provided in the NIR.

3.4. Comparison with other data sets

82. CO_2 emissions in the CRF sectoral reports for energy were compared with data provided by IEA (2000)[4] for some of the key energy sectors. Table 2 provides the results of this comparison. The data show large differences for energy industries, manufacturing industries and combustion as well as for the residential sector. One of the reasons for the differences could be a different allocation between the energy and the industry sector. Even the sum of energy industries and manufacturing industries (where different allocations are less relevant) shows a considerable difference, of almost 20 per cent, between the two sources. A more detailed analysis regarding the reasons for the differences cannot be performed, as IEA data in the quoted material do not provide underlying calculations.

Table 2. Comparison of key energy data with IEA data

Category	**IEA (2000) (Gg CO_2)**	**CRF (2000) (Gg CO_2) -**	**Difference (%)**
Public electricity and heat	3,490	4,044	15.9%
Other energy industries, Manufacturing industries and combustion	10,470	7,195	-31.3%
Sum of Energy industries and Manufacturing industries and combustion	*13,960*	*11,239*	*-19.5%*
Transport	11,850	11,435	-3.5%
Domestic Air/Civil Aviation	860	841	-2.2%
Residential	480	619	28.9%
Commercial	830	863	4.0%

[4] IEA 2000: CO_2 emissions from fuel combustion 1971 – 1998, IEA statistics 2000 edition.

C. INDUSTRIAL PROCESSES

1. General overview

83. The New Zealand NIR includes most of the information requested in the UNFCCC reporting guidelines. One thing that is missing, however, is information on quality assurance and quality control procedures implemented. Information on methodologies used is provided and mostly the emission estimates are based on industry-supplied information. The IPCC Guidelines encourage Parties to use plant specific-data instead of the more generalized methodology.

84. The NIR provides references for the source of activity and emissions data. For non-CO_2 emissions, data are primarily collected through a questionnaire directly to companies by consultants. No information is included in the NIR on how the industries calculate their emissions or whether they are based on measurements and if so what types of measurements. There is no description of how the quality of the data supplied by the industry is assured to ensure that correct emissions are reported.

85. The NIR describes what changes have been made compared to previous submissions, and how they affect the inventory. Data for the year 1997 have been updated and data for the year 1998 have been provided. Actual emissions of PFC from aluminium smelting are now reported in the correct column.

86. Estimates of uncertainty in the calculations are provided. Emission estimates of CO_2 are considered to be accurate within ±5 per cent. For the non-CO_2 gases the uncertainty is higher and the combination of uncertainty in activity data and emission factors is ±80 per cent for CH_4, ±5 per cent for HFCs, ±25 per cent for PFCs and ±10 per cent for SF_6. No description of how these numbers have been derived is provided.

87. In the CRF, disaggregated emissions are reported and in the background tables activity data are reported and the implied emission factors are derived. Calculation sheets are provided for CO_2 as well as for non-CO_2 emissions.

88. Emissions of HFCs and PFCs are reported by individual chemical species for the whole time series 1990-1998. For HFCs only potential emissions are reported for the years 1994 to 1998. Actual emissions are not reported because detailed information on their use is not available. For PFCs, actual emissions from the production of aluminium for the whole time series is included. The consumption of PFCs is reported only as potential emissions for the years 1995 to 1998.

2. Key source category analyses

2.1. Iron and steel production – CO_2

89. The implied emission factor for the period 1990-1998 varies from year to year within a range of 1.8064 t/t to 2.0714 t/t. This is higher than the IPCC default emission factor which is 1.5-1.6 t/t. In its response to the S&A report New Zealand explained that this variation in the implied emission factor was linked to variations in the reporting of coal sources and linked to the reporting of coking coal. The emissions from steel production are direct measurements.

90. The CRF indicates that recalculations in this sector are due to more reliable data`s becoming available.

2.2. Aluminium production – CO_2

91. Emission estimates and production data are provided by the aluminium industry in New Zealand. The NIR does not describe how the emissions are calculated by the industry and what assumptions are used. Use of information directly from the plant, if available, is in line with the recommendations in the IPCC Guidelines. The CRF indicates that the methodology used is tier 1 and that the emission factors used are country specific.

92. The implied emission factor is the same for the period 1990-1996, 1.73 t/t. For the year 1997 it is 1.62 t/t and for 1998 1.70 t/t. This is in line with the IPCC default emission factor, which is 1.5-1.8 t/t.

93. Emissions from aluminium production are reported in the subcategory 2.C.2 Ferroalloys for the year 1998.

94. The emissions have increased by 18 per cent from 1990 to 1998.

95. The CRF indicates that recalculations in this sector are due to more reliable data becoming available.

3. Non-key source category analyses

3.1. Emissions of CO_2

Mineral Products - 2A

96. The CRF indicates that the methodology used is tier 1 and that the emission factors used are country specific. Emissions are reported for sub-categories 2.A.1 Cement production and 2.A.2 Lime production. The emissions have increased by 28 per cent from 1990 to 1998.

Chemical Industry - 2B

97. The CRF indicates that the methodology used for Chemical industry is tier 1 and the emission factors used are country specific. Emissions from ammonia production are indicated as "not estimated" for the years 1990 to 1996. For the years 1997 and 1998, emissions are included in the sectoral report. When checked with the background tables, the values for CO_2 emissions are the same as the activity data given in the background table. In the background table the CO_2 emissions are "not applicable" for 1997 and "not occurring" for 1998. In the sectoral table for 1997 the emissions from ammonia production are included in the sum for Chemical industry. Emissions from this source category come from subcategory 2.B.5 Other – hydrogen". The emissions have increased by 15 per cent from 1990 to 1995.

Other production - 2D

98. For the years 1990, 1991 and 1993, the emissions are reported as "not estimated". For the other years in the time series, emissions are reported as "0".

Other - 2G

99. The emissions are reported as "0" for the whole time series.

3.2. Emissions of CH_4

100. Only emissions from ammonia production are reported. They do not vary much from year to year.

3.3. Emissions of N_2O

101. No emissions of N_2O are reported from industrial processes. For the years 1990 to 1993 they are reported as "not occurring", while for the years 1994 to 1998 the emissions are reported as "0". It is unclear whether the differences reported as NO and "0" are based on a wrong use of notation keys. (According to the calculation tables contained in the NIR, emissions of N_2O are probably "not occurring" in New Zealand.)

3.4. Emissions of HFC

102. Only potential emissions are estimated due to lack of detailed information on the use of different HFCs. Methodology according to tier 1a has been used to estimate the potential emissions.

3.5. Emissions of PFC

103. As for HFCs, only potential emissions from the use of source category 2F Consumption of halocarbons and SF_6 are estimated with tier 1a methodology. Emissions from the aluminum industry are provided by the industry and are estimates of actual emissions. Whether these emissions are measured or calculated is not described.

3.6. Emissions of SF_6

104. For SF_6, both actual and potential emissions are reported. The actual emissions result from magnesium foundries and from the use of SF_6 in, for example, switchgear. Potential emissions are reported as NE for the years 1990 to 1993, and for these years the same value is reported for actual emissions. This emissions estimate is from magnesium foundries and the same value is reported through the whole time series.

4. Synthesis and assessment report

105. The synthesis and assessment report raises a few issues regarding the industrial processes. Some inconsistency was found between information provided in the National Inventory Report and the CRF for 1998. For the key source categories the issue raised is that the implied emission factor for CO_2 from the iron and steel industry varied from year to year within a range of 1.81 to 2.1 for the time series. These implied emission factors are higher than the IPCC default emission factors. New Zealand provided responses to the issues raised in the synthesis and assessment report, and explanations were given.

106. Even though the source category 2.F Consumption of halocarbons and SF6 is not a key source category, the synthesis and assessment report notes that only potential emissions of HFCs

and PFCs are reported from this source category. By using the trend assessment, this source category is likely to be a key source category due to an expected rapid increase in the use of these chemicals.

5. Areas for further improvement

107. The NIR is well structured but the description of methodologies used could be developed further and could include some information as to how the industry collects the emission data, what measurements lie behind the emissions and how the emissions are calculated. A comparison of the emission factors used with the IPCC default emission factors could be useful, and any large differences should be explained. Because of the probable importance of emissions from halocarbons and SF_6, a survey should be started to try to estimate actual emissions from the consumption of halocarbons and SF_6.

D. AGRICULTURE

A. General overview

108. New Zealand's inventory submission conforms to the UNFCCC reporting guidelines and with the IPCC Guidelines. New Zealand has provided the following information required by the COP:

(a) A complete NIR and a complete set of CRF tables;

(b) Disaggregated estimates of all greenhouse gases and sources not controlled by the Montreal Protocol using methods that are consistent with the IPCC Guidelines;

(c) Complete and consistent time series for all sources and all years (1990 – 1998);

(d) A clear description of all methodologies used for calculating emissions and removals;

(e) References for sources of information relating to emission factors and activity data and the rationale for selection;

(f) Recalculated estimates (CRF tables 8(a), and explanatory information (CRF tables 8(b)), for these recalculations for the years 1990 to 1997. In addition, the NIR contained additional information on changes in activity data and emission factors for each IPCC sector;

(g) Estimates of uncertainty for all source categories.

109. There is no information on quality assurance/quality control (QA/QC) procedures.

110. New Zealand should provide estimates of emissions for the missing source categories, i.e. poultry and swine. A consistent set of animal population statistics was used to estimate CH_4 emissions from enteric fermentation, CH_4 and N_2O emissions from manure management, N_2O emissions associated with manure production and N_2O direct emissions (animal waste).

111. Emissions from the agricultural sector were estimated using the IPCC Guidelines, with either country-specific emission factors and parameters, where available, or default emission factors and other parameters given for the Oceania region.

112. Divergence from the guidelines occurs only in the estimation of methane emissions from enteric fermentation and manure management, which are not estimated for poultry and swine as appropriate emission factors are not available. The estimates could be based on IPCC default emission factors if country-specific values are not available.

2. Source-specific analysis

2.1. Enteric fermentation: Key source - 4.A

113. The reporting of emission estimates for this source category conforms to the UNFCCC reporting guidelines.

Methodologies

114. Methane emissions from ruminants were estimated using the IPCC Guidelines with country-specific emission factors for cattle, sheep, goats and deer. The tier 1 method was used.

Recalculations

115. New Zealand provided recalculations for the years 1990 to 1997. Use of a three-year average for animal numbers has resulted in small changes in CH_4 emissions for 1995 to 1997.

Emission factors

116. New Zealand specific emission factors for cattle, sheep, goats and deer are higher than the IPCC defaults, particularly for sheep, for which New Zealand reported the highest of all Parties. New Zealand responded to this observation by explaining that emission factors for ruminants take into account part of the year when the adults are accompanied by young. This is not captured in the annual statistics, which use the reference period 30 June (winter in the southern hemisphere) which is the lowest point in the annual livestock production cycle. Country-specific emission factors are not available for poultry and swine.

Activity data

117. Animal numbers are converted to three-year averages. Statistics New Zealand collects activity data through four-year censuses with the intervening years estimated from smaller surveys. Estimates from the Ministry of Agriculture and Forestry are used in the absence of data from Statistics New Zealand.

Completeness

118. CH_4 from enteric fermentation from livestock classes other than cattle, sheep, goats and deer has not been estimated. New Zealand emission factors are not available for other livestock classes. The most significant emissions are captured by the livestock classes recorded.

Uncertainty

119. The nutritional performance of ruminant livestock has been studied for many years in New Zealand and the factors controlling methane emissions are empirically well understood. Uncertainty is estimated to be around ±20 per cent.

2.2. Agricultural soils, N_2O estimates: Key source - 4.D.1

120. The IPCC Guidelines were used in estimating emissions from agricultural soils. Several parameters and emission factors were drawn from New Zealand sources.

121. N_2O emissions from agricultural soils are estimated from (a) non-organic soils (synthetic fertilizer use, spreading animal waste as fertilizer, nitrogen fixing in soils and crop residues left on fields), (b) direct N_2O emissions from organic matter, (c) manure deposited by grazing livestock on pasture ranges and paddocks, (d) N_2O emitted indirectly through fertilizer and animal waste spread on agricultural soils, and (e) N_2O emitted indirectly from agricultural soils through leaching and runoff. N_2O estimates are the totals from all these source categories.

Methodologies

122. IPCC default methods were used in estimating N_2O emissions from agricultural soils. Documented research results are used together with IPCC defaults.

Recalculations

123. New Zealand provided recalculations for the years 1990 to 1997. Revised activity data for poultry numbers has resulted in changes in N_2O emissions.

Emission factors

124. Mainly IPCC default emission factors were mainly used. In some cases, for example manure deposited by grazing livestock on pasture ranges and paddocks, a mixture of a locally-derived emission factor of 0.01kg N_2O-N/kgN and IPCC default emission factors was used. This value is at the lower range given by IPCC.

Activity data

125. The activity data used were provided by Statistics New Zealand and/or the Ministry of Agriculture and Forestry. Compared to the other 23 Parties, New Zealand ranks seventh lowest in the use of synthetic fertilizers (kg N/year).

Uncertainty (qualitative)

126. The uncertainty associated with these emissions is thought to be considerable (there is no numerical estimate as yet). The reasons provided are:

(a) Fertilizer statistics are not reliable;

(b) No data are collected on the area of cultivated organic soils (the value given is only a rough estimate);

(c) Some country-specific values are not considered to be accurate;

(d) The application of the IPCC Guidelines and their default values to New Zealand agricultural practices causes inaccuracies since these are not often representative of New Zealand's conditions.

3. Other remarks

127. Summary level estimates for indirect greenhouse gases are provided.

128. There is complete geographic coverage of the national GHG inventory for the whole country.

129. The key source analysis is consistent with the trends of the source categories.

130. The NIR explains that the country-specific emission factors are a result of experimental research and are therefore expected to be more appropriate.

E. LAND-USE CHANGE AND FORESTRY

1. General overview

1.1. Introduction

131. The land-use change and forestry (LUCF) sector constitutes a net sink which, in absolute terms, is equivalent to almost 28 per cent of New Zealand's total GHG emissions. Changes in forest and other woody biomass stocks constitute a sink of CO_2 (29 per cent of total GHG emissions), whereas forest and grassland conversion is a source of CO_2 and non-CO_2 emissions equivalent to 1 per cent of national GHG emissions.

1.2. Institutional arrangements

132. The GHG inventory in the LUCF sector is a part of the NIR and CRF tables which were prepared by New Zealand's Ministry for the Environment. Other governmental authorities which participate in the inventory compilation are: the Ministry of Agriculture and Forestry (MAF) and the National Rural Fire Authority. The Forest Research Institute and Landcare Research (both of which are Crown-owned research institutes) cover scientific and technical inventory matters in the LUCF sector.

1.3. National self-verification and QA/QC

133. The NIR does not include information on national verification and quality assessment and quality control procedures for the LUCF sector.

1.4. Completeness

134. New Zealand reports on changes in land use and other woody biomass stocks and forest and grassland conversion (as in tables 5A and 5B of the CRF). Emissions from the abandonment of managed lands and CO_2 emissions and removals from soils (as in tables 5C and 5D of the CRF) are not reported because of the lack of data.

135. The estimates of GHG emissions and removals are calculated for the period from 1990 to 1998. CRF sectoral table 5 provides an overall report on the LUCF sector. CRF background tables 5A to 5D were not completed, because a country-specific method for GHG accounting was applied. Calculations of GHG emissions and removals are incorporated in national reporting worksheets attached to the NIR.

1.5. Transparency and use of indicators

136. New Zealand used a national method (mathematical modelling) and reporting worksheets to account for GHG emissions and sinks in the LUCF sector. These are described in the NIR. The use of indicators differs from that suggested in the provisions of the UNFCCC reporting guidelines. Instead of "NE", the value "0" is inserted for emissions that were not estimated.

1.6. Recalculations

137. Recalculations of emissions and removals for changes in forest and other woody biomass stocks and forest and grassland conversion were made for 1990 to 1997 to incorporate new data on changes in forest plantations. These are documented in appropriate CRF tables and explained in the NIR.

1.7. Uncertainties

138. The NIR provides uncertainty estimates for specific components of the LUCF sector. The proportional error for carbon sequestration is likely to be +16 per cent. The accuracy of activity data seems rather high (+5 per cent). The model provides more uncertain results of CO_2 emission and removal estimates (+25 per cent). No uncertainty estimates are available for unsustainable harvesting in natural forests and for forest and grassland conversion.

2. Consistency with the IPCC Guidelines and the UNFCCC reporting guidelines

139. The GHG inventory of New Zealand in the CRF and NIR is consistent with the IPCC Guidelines and the UNFCCC reporting guidelines. In line with the IPCC Guidelines, New Zealand developed mathematical models more appropriate for its national circumstances to account for CO_2 emissions and removals.

3. Specific sources

3.1. Changes in forests and other woody biomass

140. Changes in forests and other woody biomass constitute a sink of CO_2 (equal to 29 per cent of total GHG emissions for New Zealand). The estimates refer to carbon stock changes in planted forests only. Harvesting in natural forest is included in accounting for overall emissions from the LUCF sector.

141. The overall CO_2 removals for the years 1990 and 1998 have changed insignificantly (2.4 per cent). The values display higher variations in mid-term, however, due to annual changes in the areas of forest planting and harvesting.

Methodology

142. The C-change and FOLPI mathematical models have been developed and applied to account for CO_2 emissions and removals in the LUCF sector. C-change provides estimates of growth rate and stock increase in a forest stand. However, the NIR does not include a clear indication of activity data used in the C-change model to calculate carbon biomass stock. FOLPI makes projections on forest biomass for harvesting purposes.

143. Model estimates include emissions of carbon from on-site stemwood harvesting and non-stemwood decay in a long-term decay process. The release of carbon from harvesting in the natural and planted forests is accounted in aggregate. Stemwood removed at harvest is assumed to become CO_2 emissions in the year of harvest. The latter is consistent with the IPCC methodology.

Activity data

144. The main source of activity data is the Ministry of Agriculture and Forestry National Exotic Forest Description (NEFD), which provides information on age and area of plantations. However, the NIR does not indicate how the information on wood biomass stock in planted forests is obtained.

145. Areas of forest plantations and national yield tables are the input data for model calculation of CO_2 sequestration. CO_2 emissions are calculated based on wood harvesting records for planted and natural forests. Forest management practices in natural forests are regulated by national legislation (Forest Act 1993).

Conversion and emission factors

146. For planted forests, the NIR does not include a description of wood density factors used to convert stemwood volume to an oven-dry total biomass. Total biomass is converted to carbon with the use of an IPCC default conversion factor. The estimates are made with an assumption that the exotic species Radiata pine constitutes 100 per cent of the planted forests.

147. To account for CO_2 emissions from harvesting in natural forests, an expansion factor of 2.04 is applied, which is higher than the IPCC default value (1.75).

3.2. Forest and grassland conversion

148. Net emissions from forest and grassland conversion**,** in absolute terms, is equivalent to about 1 per cent of total equivalent GHG emissions for New Zealand. Annual fluctuations of –55 per cent to +56 per cent are found for the period from 1990 to 1998. They are driven by annual variations in areas of scrub clearing and subsequent planting.

Methodology

149. Due to limited data on forest and grassland conversion, only emissions from land clearing for new forest planting are reported. The emissions of non-CO_2 gases are reported for land clearing, prescribed burning of scrublands, and forest fires. As per the IPCC default method, carbon released from burning is assumed to be absorbed during the re-growth.

Activity data

150. The activity data on new forest planting is provided by the Ministry of Agriculture and Forestry. The National Rural Fire Authority provides the data on forest wildfires and prescribed burning.

Conversion and emission factors

151. For calculation purposes it is assumed that 25 per cent of scrub biomass is burnt on site and the remainder left to decay. The NIR does not include clear evidence as to what emission factors were applied for the portion of biomass left to decay and to account for non-CO_2 emissions due to wildfires and prescribing burning.

Response to previous reviews

152. The draft synthesis and assessment report identified annual fluctuations of –55 per cent to +56 per cent for forest and grassland conversion. In response, New Zealand provided a clear explanation that these are the function of annual variations in areas of scrub clearing and subsequent planting.

4. Areas for further improvement

4.1. Planned or ongoing work by Party

153. New Zealand annually updates data from the NEFD and improves the forest models. To address the need in accounting for CO_2 emissions and removals from some source categories not included in the current inventory, New Zealand initiated a research programme with the aim of obtaining an accurate account of changes in carbon stocks in soil and natural forests and of reporting on abandonment of managed lands and CO_2 emissions and removals from soils. This research project was reviewed by a panel of international experts which concluded that the systems under development are in line with forest inventory practices in other countries. In addition, they should result in significant advancements in soil inventories and subsequent improvement to the IPCC default methods. The relevant work includes using remote sensing for developing the New Zealand Land Cover Database which will improve the accuracy of data on land cover and land use.

4.2. Issue identified by the GHG Desk Review

154. New Zealand is encouraged to provide further explanation as to what method (national or IPCC default) was applied to account for GHG emissions from land clearing for new forest planting to allow for more transparent reporting on GHG emissions and sinks in the LUCF sector.

155. New Zealand is encouraged to provide further information on activity data and emission/conversion factors used to account for CO_2 emissions due to changes in woody biomass and forest and grassland conversion. This will allow for more accurate estimation of GHG emissions and sinks in the LUCF sector.

156. It is recommended that New Zealand include accounting for the abandonment of managed lands and CO_2 emissions and removals from soils source categories in its national GHG inventory. The ongoing research on carbon stocks in soil and natural forests, together with the use of remote sensing, form a good background for implementation of these tasks in the future.

E. WASTE

1. General overview

157. The NIR of New Zealand , including the CRF tables and calculation sheets, is very clear, transparent and informative. The description of the compilation of the inventory (methods, activity data collection and emission factors) is, however, somewhat brief. Time series for the different gases and sectors are not presented and discussed in the NIR, although they are included in the CRF tables.

158. In the NIR, CH_4 emissions from solid waste disposal on land and CH_4 and N_2O emissions from wastewater treatment are presented. Only negligible amounts of waste are incinerated in New Zealand, and therefore the emissions are not estimated. The methodologies in the IPCC Guidelines are used to estimate GHG emissions from the waste sector in New Zealand. Refinements to the methodologies are made in estimating the emissions from wastewater treatment.

159. The entire time series 1990–1998 for CH_4 emissions from solid waste disposal on land, and CH_4 and N_2O emissions wastewater treatment, has been recalculated. Some refinements in the emission factors have also been made. The new data were partly used in the previous submissions (for the year 1997) and the recalculations provide consistent time series for 1990-1998.

160. The N_2O emissions from industrial wastewater treatment are reported for the first time in the New Zealand inventory. The reason for the recalculations are given in the NIR and the quantitative information on the size of the recalculation can be found in the CRF tables (table 8, provided for all relevant years).

161. Quantitative uncertainty estimates are provided. The origin or type of the uncertainty is not discussed.

2. Key sources

162. The secretariat identified one key source in the waste sector in the New Zealand inventory, namely methane emissions from solid waste disposal on land (SWDS).

2.1. CH_4 emissions from SWDS

Trend in emissions

163. A short description of the waste sector and the trends in emissions would add information to the NIR. New information on trends is found only in the CRF tables. The methane emissions were approximately 13 per cent higher in 1990 (136.5 Gg CH_4) than in 1998 (118.9 Gg CH_4). The decrease in the per capita emissions is even greater, approximately -23 per cent. The emissions have declined due to increased landfill gas recovery; the disposed amounts are somewhat higher in 1998 than they were in 1990.

164. The emissions per capita are fairly high, but comparable with many other Annex I Parties. A high waste generation rate and a large fraction of waste disposed of at solid waste disposal sites are the probable causes of the high emissions, although the reasons are not discussed in the

NIR. More than 20 per cent of the methane generated at the SWDS was reported to be captured by landfill gas recovery. No landfill gas figures were reported for the year 1990.

Activity data

165. The municipal solid waste (MSW) generation rates, and the composition and percentage of MSW deposited at SWDS are obtained from the National Waste Data Report (1997) and Waste Analysis Protocol (WAP) surveys for the period 1993 to 1995. These sources are not listed in the reference list, however. The report SCS Wetherill Environmental and Bruce Wallace Partners Ltd (1998) is also given as the report upon which the emission estimates from the waste sector in New Zealand are based. It appears from the reporting that the mean annual MSW landfilled per capita is estimated based on these sources. The waste amounts deposited in each year during the period 1990-1998 are then calculated based on changes in population. This method is compatible with the guidance given in the IPCC Guidelines and the IPCC Good Practice Guidance when data on the actual annual amounts are not available. It does not, however, detect the impact which changes in, for example, consumption and waste management practices might have on the amounts and composition of disposed - of MSW.

166. The activity data also covers construction and demolition waste. No information is given as to whether industrial solid waste, agricultural waste or municipal and industrial sludges are disposed of at SWDS in New Zealand, and whether they are included in the reported estimates.

167. The activity data collection should be described in more detail, especially as it is stated in the report that "limited data is currently available in New Zealand on waste generation".

Method and emission factors

168. The IPCC default method has been used for estimating CH_4 emissions from SWDS in New Zealand. The method and parameters used in the calculation are transparently reported in the calculation sheets included in the NIR. The implied emission factor is in the lower range of values reported by Annex I Parties. The reason for this can be traced to the values used in the calculation; for example, the fraction of carbon that degrades in the SWDS is chosen as 0.5 when the IPCC default value is 0.77. All parameters used in the calculation are in good agreement with the values and ranges given in the IPCC Guidelines and the IPCC Good Practice report.

3. Non-key sources

3.1. Wastewater treatment

169. Estimates on CH_4 and N_2O emissions from both domestic and industrial wastewater treatment are provided. The emissions are calculated with a method that can be considered as a refinement of the IPCC method. The data on the method, activity data and emission factors are very clearly reported in the calculation sheets. The CH_4 emissions per capita are rather high, but this is explained by the large fraction of wastewater treated in, for example, anaerobic lagoons or septic tanks, which produce much more CH_4 than, for example, the aerobic methods used frequently in many Annex I countries.

170. The value of 4.75 kg/person/year nitrogen data obtained from sewage treatment plants was used instead of the IPCC method of calculation based on average per capita protein intake.

171. Estimation of methane emissions from industrial wastewater was based on the biological oxygen demand (BOD) data rather than the chemical oxygen demand (COD) data recommended by the IPCC Guidelines. Use of BOD was quite reasonable and justified.

172. The N_2O emissions from industrial wastewater treatment are reported for the first time in the New Zealand inventory.

3.2. Waste incineration

173. No emissions from waste incineration are reported as only very small amounts of waste are incinerated in New Zealand. This subject may be discussed in a future communication. It should be explained in more detail; for example, whether there are any incineration plants in New Zealand or whether only small-scale burning of waste takes place.

4. Areas for further improvement

174. The IDR of the second national communication of New Zealand presented no specific requirements for improving reporting of emissions from the waste sector. The inclusion of estimates from private septic tanks in the estimates for wastewater treatment was noted. In general, the IDR noted also that the use of the IPCC Guidelines for reporting by New Zealand was commendable.

175. A method to estimate annual/periodic changes in amount and composition of waste disposed of at the SWDS should be developed. This would also be important for monitoring the policies and measures described in the second national communication of New Zealand.

176. Surveys on information regarding the past and estimated volume of solid waste received at the SWDS in New Zealand have been made. The use of this information for the implementation of the first order decay (FOD) method should be explored.

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