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REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY OF GREECE SUBMITTED IN THE YEAR 2001[1]

(Centralized review)

I. OVERVIEW

A. Introduction

1. The Conference of the Parties (COP), at its fifth session, by its decision 6/CP.5, adopted guidelines for the technical review of greenhouse gas (GHG) inventories from Parties included in Annex I to the Convention (Annex I Parties), hereinafter referred to as the review guidelines,[2] for a trial period covering GHG inventory submissions for the years 2000 and 2001. The COP requested the secretariat to conduct individual reviews of GHG inventories for a limited number of Annex I Parties. The secretariat was requested to use different approaches to individual reviews by coordinating desk reviews, centralized reviews and in-country reviews.

2. In response to the mandate by the COP, the secretariat coordinated a centralized review of seven national GHG inventories submitted in 2001 (Austria, Belgium, Estonia, the European Community, Germany, Greece and Spain), which took place from 8 to 12 October 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. Charles Russell (New Zealand), Mr. José Ramon Villarin (Philippines), Mr. Hristo Vassilev (Bulgaria), Ms. Irina Yesserkepova (Kazakhstan), Ms. Nadzeya Zaleuskaya (Belarus), Mr. André Van Amstel (the Netherlands), Ms. Punsalmaa Batima (Mongolia), Mr. Rizaldi Boer (Indonesia), Mr. Josef Mindas (Slovakia), Mr. Charles Jubb (Australia) and Mr. Emilio Sempris (Panama). The review was coordinated by Ms. Rocio Lichte (UNFCCC secretariat). Mr. Charles Russell and Mr. José Ramon Villarin were lead authors of this report.

3. The principle objective of the review of the GHG inventories was to ensure that the COP had adequate information on the inventories. The review should also further assess the progress of the Parties toward fulfilling the requirement outlined in the UNFCCC reporting guidelines.[3] In this context, the expert review team (ERT) checked the Parties' responses to questions raised in the previous stages of the review process, and the consistency of inventory submissions with

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[1] In the symbol for this document, 2001 refers to the year in which the inventory was submitted, and not to the year of publication. The number (3) indicates that for Greece this is a centralized review report.

[2] For the UNFCCC review guidelines and decision 6/CP.5, see document FCCC/CP/1999/7, pages 109 to 114 and 121 to 122, respectively.

[3] The guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories (FCCC/CP/1999/7) are referred to in this report as the UNFCCC reporting guidelines.

the UNFCCC reporting guidelines and the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the IPCC Guidelines), and identified possible areas for improvement in the inventories of the seven Annex I Parties. Each IPCC sector was reviewed by two experts.

4. The ERT 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).[4]

5. The UNFCCC secretariat provided the ERT with all necessary technical guidance, information and data, such as national inventory submissions and the results of previous stages of the review process. Sources of data and information used for the review of the inventory of Greece are outlined in paragraphs 7 to 11 below.

6. In accordance with the UNFCCC review guidelines, a draft version of this report was communicated to the Government of Greece.

B. Inventory submission and other sources of information

7. A NIR dated 30 June 2001 was submitted by Greece in electronic form. This was available for the review team in the later stages of the review process but arrived too late for the review team to have adequate time to assess the document thoroughly.[5]

8. In its 2001 submission, Greece provided CRF tables for the years 1990 to 1999 which included all the requested tables; they were provided in electronic format on 8 June 2001, after the due date of 15 April 2001.

9. The status report 2001, the draft synthesis and assessment (S&A) report 2001 and the UNFCCC secretariat's preliminary key source assessment (level and trend)[6] were provided as additional sources of information. In addition, the ERT had access to the UNFCCC secretariat GHG inventory database through the provision of a data search tool. A response to the draft S&A report 2001 was not provided by Greece.

10. Other sources of information used during the review include: the inventory submission of Greece of the year 2000, results of the review of the 2000 inventory submission (S&A report 2000), the preliminary guidance for experts participating in the individual review of GHG inventories, and the UNFCCC reporting and review guidelines (FCCC/CP/1999/7).

11. During the review the Party was not contacted to request additional information.

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[4] According to the conclusions of the Subsidiary Body for Scientific and Technological Advice (SBSTA) at its twelfth session, the IPCC good practice guidance should be applied by Annex I Parties as far as possible for inventories due in 2001 and 2002, and should be used for inventories due in 2003 and beyond.

[5] A hard copy of the NIR was received by the secretariat on 31 August 2001. However, an electronic version of the NIR was received only at the beginning of October, just before the centralized review took place.

[6] The UNFCCC secretariat had identified, for each individual Party, those source categories which are *key sources* in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance. Key sources according to the tier 1 trend assessment were also identified for those Parties which provided a full CRF for the year 1990. The key sources presented in this report are based on the secretariat's preliminary key sources assessment. They might differ from the key sources identified by the Party itself.

C. Emissions profiles, trends and key sources

12. Aggregate GHG emissions (excluding CO_2 emissions/removals from land-use change and forestry (LUCF)) in Greece have increased by 17% since 1990 and increases are noted in the main GHGs carbon dioxide (CO_2) (17%), methane (CH_4) (14%), and the synthetic gases hydrofluorocarbons (HFCs) (300%). The exceptions are nitrous oxide (N_2O), which has a decrease of 1% and perfluorocarbons (PFCs), which have decreased by 91%. In considering the profile of the emissions of CO_2, increases are initially relatively moderate from 1990 to 1994 where the annual increase is in the order of 1,000 Gg; from 1995 to 1998 there is a clear large growth in emissions, in the order of 4,000 Gg per year; and there is a notable decrease, of about 1,000 Gg, in CO_2 emissions between 1998 and 1999. There has been a steady increase in CH_4 emissions over the 1990 to 1999 period with noticeable increases in the years 1991 to 1992, 1995 to 1996 and 1997 to 1998, and a decrease of about 100 Gg between 1998 and 1999. N_2O emissions fall by 6% between 1990 and 1995, increasing to 1990 levels in 1998 and falling slightly (2%) to just below 1990 levels. HFC emissions increase at an exponential level over the period 1992 to 1997, with a slight decrease since 1998 being noted.

13. The energy sector accounts for 77% of Greece's aggregate GHG emissions (excluding CO_2 from LUCF) and shows an overall increase of 18% in GHG emissions over the period 1990 to 1999. Most of this increase occurs in the years 1995 to 1998 with an average annual increase of approximate 4,000 Gg, which corresponds to the CO_2 increases observed in the gas-by-gas analysis. There is an overall increase in industrial processes emissions of 26% over the period, which accounts for approximately 10% of Greece's emissions, the major part of this increase occurring between 1994 and 1996. Waste sector emissions have increased gradually over the period at an average rate of 89 Gg per annum. The land-use change and forestry (LUCF) sector varies over the period, oscillating between 2,800 Gg (emissions) in 1998 and –300 Gg (removals) in 1995; for the year 1999, these emissions fell by 2,500 Gg (240%), which suggests that LUCF emissions vary according to national circumstances such as forest fires and other climate-driven events.

Table 1. GHG emissions by gas, 1990-1999 (Gg CO_2 equivalent)

GHGs	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)									
Net CO_2 emissions/removals	85,600	84,562	86,869	87,520	88,617	87,778	90,208	93,829	101,762	98,646
CO_2 emissions (without LUCF)	84,350	84,128	84,939	86,083	87,464	88,148	90,279	94,757	99,345	98,452
CH_4	9,455	9,479	9,717	9,764	9,933	9,998	10,297	10,439	10,906	10,783
N_2O	10,371	10,260	10,195	9,900	10,013	9,715	10,099	10,239	10,420	10,246
HFCs	935	1,107	908	1,607	2,144	3,253	3,746	3,960	3,744	3,744
PFCs	367	315	222	130	82	78	74	64	54	32
SF_6	0	0	0	0	0	0	0	0	0	0
Total (with net CO_2 emissions/removals)	106,728	105,723	107,911	108,920	110,788	110,822	114,424	118,532	126,886	123,451
Total (without CO_2 from LUCF)	105,479	105,289	105,981	107,483	109,636	111,193	114,495	119,459	124,469	123,257

Table 2. GHG emissions by sector, 1990-1999 (Gg CO_2 equivalent)

GHG SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)									
1. Energy	80,788	80,768	82,685	82,652	84,645	84,385	86,939	91,548	96,441	95,595
2. Industrial processes	9,614	9,520	9,255	10,053	10,053	11,736	12,498	12,683	12,306	12,157
3. Solvent and other product use	191	191	188	174	172	159	163	163	168	168
4. Agriculture	12,092	12,077	11,694	11,593	11,670	11,440	11,608	11,782	11,834	11,835
5. LUCF	576	496	2,166	1,612	1,319	-308	10	-196	2,816	242
6. Waste	2,566	2,641	2,736	2,837	2,943	3,039	3,135	3,208	3,321	3,455

14. Greece did not report on any key source assessment. According to the key source analysis performed by the UNFCCC secretariat (level and trend assessment), the following key source categories were identified for the inventory year 1999:

Table 3. Key sources Greece: Level and trend assessment (UNFCCC secretariat)[(a)]

Key source	Gas	Level assessment %	Cumulative total %	Contribution to trend %
Stationary combustion – coal	CO_2	34.7	35	18.9
Stationary combustion – oil	CO_2	18.0	53	1.8
Mobile combustion – road vehicles	CO_2	12.9	66	9.6
Cement production	CO_2	5.9	72	3.1
HFC-23 from HCFC production	HFC-23	3.0	75	13.5
Animal production	N_2O	3.0	78	2.4
Solid waste disposal sites	CH_4	2.7	80	2.3
Enteric fermentation in domestic livestock	CH_4	2.5	83	2.3
Mobile combustion – waterborne navigation	CO_2	2.2	85	3.1
Stationary combustion – gas	CO_2	2.1	87	11.5
Other transportation	CO_2	2.0	89	3.3
Direct N_2O emissions from agricultural soils	N_2O	1.8	91	5.8
Agricultural soils	CH_4	1.5	92	1.7
Non-CO_2 stationary combustion – coal	N_2O	1.4	94	6.0
Mobile combustion – aircraft	CO_2	1.4	95	
Non-CO_2 stationary combustion – oil	N_2O			6.9
PFCs from aluminium production	CF_4+C_2F_6			2.1

[(a)] See footnote 6 of this report.

D. General assessment of the inventory

1. Completeness and transparency of reporting

15. The inventory covered the direct GHGs CO_2, CH_4 and N_2O and reporting of actual HFC and PFC emissions. Potential emissions were not estimated. The precursor gases CO, NO_X and NMVOC, and SO_2 are also covered. Emissions of sulphur hexafluoride (SF_6) were reported as not estimated (NE).

16. In its 2001 submission Greece provided CRF tables for 1990 to 1999. However, some tables of the CRF were not provided throughout the entire time series 1990-1999, and some of

the tables of the CRF have not been fully completed (table 7, Overview table). The GHG submission includes all the relevant sectoral background tables of the CRF.

17. Notation keys have been used in most instances.

18. No inconsistency was identified between the NIR and the CRF data.

19. The NIR provided in annex II a description of all the methodologies used for calculating emissions and removals or for making any assumptions reflecting their choice; however these explanations were not very clearly reported. Table Summary 3 of the CRF gives an indication of the methodologies used which could also be found in the NIR.

2. Cross-cutting issues

Institutional arrangements

20. The National Observatory of Athens has been contracted by the Greek Ministry for Environment, Physical Planning and Public Works to compile annual GHG inventories.

Verification and quality assurance/quality control (QA/QC) approaches

21. The NIR states that where possible statistical data used in the inventory were cross-referenced among different sources before they were used (for example, fuel consumption was obtained from both the Ministry for Development and from the energy statistics of the International Energy Agency (IEA)). However, there was no detailed QA/QC plan, as outlined in chapter 7 of the IPCC good practice guidance.

22. No information was available on internal and/or external verification processes.

Recalculations

23. Greece provided recalculation sheets showing estimates for 1990 to 1998 using tables 8(a) and 8(b) of the CRF. The effect of the recalculations was an increase of 1.3% in the total CO_2 equivalent emissions in the base year excluding LUCF, and a decrease of 0.01% if LUCF is included.

Uncertainties

24. Uncertainty estimates were not provided. The NIR noted, however, that there was a considerable amount of uncertainty for the non-CO_2 emission factors and that investigation of improved emission factors will be initiated, in order to reflect Greek industry better.

25. The NIR includes some comments on the uncertainty analysis for activity data and emission factors; however uncertainty estimates have not been provided. The NIR indicates that there is a considerable amount of uncertainty due to the fact that the IPCC established factors do not, in most cases, correspond to conditions prevailing in Greece.

3. Issues relating to previous reviews

26. Greece has not provided a response to the questions raised in the draft S&A report 2001.

4. Areas for further improvement

27. The ERT recommends that Greece undertakes steps to implement the IPCC good practice guidance. More specific recommendations are given under the respective sectoral sections of this report.

5. Conformity with the UNFCCC reporting guidelines and the IPCC Guidelines

28. The CRF tables and NIR are largely consistent with the UNFCCC reporting guidelines. No formal uncertainty analysis has been performed. The Party has not stated whether a key source assessment has been undertaken. Sectoral background tables for agriculture are not complete. The inventory in general conforms to the IPCC Guidelines; however, the IPCC good practice guidance has not been applied and there is no mention of its use in the NIR.

II. ENERGY

A. Sector overview

29. The sector's share of the total aggregate GHG emissions in CO_2 equivalent is 74.7%. The main key sources are illustrated in table 3 above but are given below in order to show their importance in this sector:

(a) CO_2 from stationary combustion (coal)

(b) CO_2 from stationary combustion (oil)

(c) CO_2 from mobile combustion (road vehicles)

(d) CO_2 from mobile combustion (waterborne navigation)

(e) CO_2 from stationary combustion (gas)

(f) CO_2 from other transportation

(g) N_2O stationary combustion (coal)

(h) CO_2 mobile combustion (aircraft).

30. Table 9 was completed, which provided information about the non-energy sector sources.

31. There was a general trend of increasing CO_2, CH_4 and N_2O emissions, at +18.3%, +26.3% and +15.6% respectively from 1990 to 1999.

1. Completeness

32. The emission data reported (for each of the years from 1990 to 1999) was derived in line with the most recent findings on the comprehensive estimation of GHG emissions. The figures presented in the NIR provide substantial additional information on the inventory compilation in Greece. All CRF tables (summary, sector and background) were completed for this sector. Some of the source categories and gases in this sector are reported as not estimated ("NE"). Summary level estimates for indirect GHGs are also reported.

2. Transparency

33. No inconsistencies were identified in the data provided in the CRF tables and the NIR. The CRF tables indicate that confidential data for military fuel use are included in the subsector commercial/institutional; however, there is no mention of this in the NIR.

3. Methodologies, emission factors and activity data

34. Greece uses the CORINAIR (Core Inventory Air) calculation method to quantify its national sectoral CO_2 emissions. The underlying energy source data are derived from the energy balances commonly approved of as official, which are provided on an annual basis by many agencies and organizations, as described in the NIR. For most activity areas the emission factors used were IPCC default values and for the instances where such factors are not available, the corresponding emission factors suggested by CORINAIR were used.

4. Recalculations

35. Large recalculations in the base year took place in the energy sector; these recalculations are reported in the recalculation tables of the CRF. Although the reasons for the recalculations in the energy sector are explained briefly, more details could have been provided.

5. Verifications and quality assurance/quality control (QA/QC) approaches

36. The NIR states that energy statistical data were cross-referenced among different sources before they were used and before CRF table 7 was completed.

B. Reference and sectoral approach

1. Reference approach

37. The reference approach was documented in CRF table 1.A(b). The units used for fuels were kt and TJ.

38. CO_2 emissions from fuel combustion were calculated using both the reference and the sectoral approach. There is a difference of only 0.26% between the estimates.

39. The draft S&A report indicated some differences between the data used in the reference approach and the IEA energy balances, but they are small and not important. For example, the growth rate of overall apparent consumption from 1990 to 1999 is 21.1% in the CRF and 20.8% according to the IEA.

2. Treatment of feedstocks and non-energy use of fuels

40. Feedstocks are reported in the CRF. Refinery feedstock is included in oil sub-products.

3. International bunker fuels

41. Greece reported estimates for marine and aviation bunker fuels. The share of fuel consumption for domestic marine bunkering was 22.1%, and for international was 77.9%.

42. Domestic aviation bunker fuel consumption was 43%; international aviation bunker fuel consumption was 57%.

43. Bunker fuels used were gas/diesel, residual fuel oil, lubricants and jet kerosene.

C. Key sources

1. Stationary combustion: coal and oil – CO_2

44. There are estimates in the CRF for all years 1990-1999.

Emission trends

45. Emissions from stationary combustion represent 52.7% of aggregate GHG emissions in CO_2 equivalent (excluding LUCF).

46. CO_2 emissions from the stationary combustion of coal represent 34.7% of aggregate GHG emissions in 1999 (excluding LUCF), with an increase of 8.1% since 1990.

47. CO_2 emissions from the stationary combustion of oil represent 18% of all reported emissions in 1999 (excluding LUCF), with an increase of 19.3% since 1990.

Methodology and emission factors

48. Emissions estimation is based on the CORINAIR method.

49. The emission factor used for CO_2 emissions estimation was from the CORINAIR methodology. The values are not reported in the NIR but the sources are referenced.

50. The CO_2 implied emission factors (IEFs) from coals has a high value (122.1 t/TJ) compared to other Parties due to the low quality of combusted lignite in energy industries. Notable are the fluctuations in the lower heating value (LHV) of lignite which influence overall CO_2 emissions from coal combustion.

51. The CO_2 IEFs for liquid fuels calculated in 1999 were within the range reported by other Parties.

Activity data

52. The underlying energy source data were derived from the energy balances, commonly approved as official, which are provided on an annual basis by the Greek Public Power Corporation, the Greek Ministry of Development and IEA/OECD (Organization for Economic Cooperation and Development) energy statistics.

53. Emissions in the chemical industry are not reported. Emissions from combustion of oil are, however, included in a transformation subsector as petroleum refining; the reason for this remains unclear.

2. Mobile combustion: road vehicles – CO_2

Emission trends

54. Mobile combustion (road transportation) represented 12.9% of aggregate GHG emissions (excluding LUCF), with an increase of 33.5% since 1990.

Methodology and emission factors

55. Emissions estimation is based on the CORINAIR method and the COPERT III model. The time series are consistent.

56. The emission factors used for CO_2 emissions are from CORINAIR and the COPERT III model. The IEFs were similar to the IPCC tier 1 emission factor.

Activity data

57. Estimation is based on energy consumption data. Transport sector activity is reported in the NIR with the latest changes for cars and some of the reasons for these, which are related partly to the types of vehicles.

58. According to the NIR, the largest growth rate in vehicle population is found in the moped category (< 50cc), which more than quadrupled from 1990 to 1999, from 0.35 to 1.5 million. The growing popularity of this mode of transport suggests that emissions from this vehicle type could be compared with those of other types of vehicles (cars running on gasoline, for example).

3. Mobile combustion: waterborne navigation – CO_2

Emission trends

59. CO_2 emissions from mobile combustion (waterborne navigation) represented 2.2% of aggregate GHG emissions (excluding LUCF). Greece reported that CO_2 emissions rose by 51.4% during the years 1990 to 1999.

Methodology, emission factors and activity data

60. Emissions estimation is based on the CORINAIR method.

61. The emission factors used for CO_2 emissions estimation are from CORINAIR.

62. The underlying energy source data were derived from the same energy balances as used in the above key sources.

4. Stationary combustion: gas – CO_2

Emission trends

63. CO_2 from stationary combustion (gas) is a key source representing 2.1% of aggregate GHG emissions (excluding LUCF); this figure, in 1999, is more than nine times that of 1990.

Methodology, emission factors and activity data

64. Emissions estimation is based on the CORINAIR method. The time series are consistent.

65. The emissions factors used for CO_2 emissions are from CORINAIR.

66. The CO_2 IEF is lower by 25% due to data for food and especially for other industries, although there is no explanation for this. The previous IEF was 0.06 t/TJ; it is not clear whether this value is correct.

67. Estimation is based on energy consumption data as noted above.

5. Other transportation – CO_2

Emission trends

68. CO_2 emissions from other transportation represent 2.0% of aggregate GHG emissions (excluding LUCF), with a decrease of 6.9% since 1990.

Methodology, emission factors and activity data

69. Emissions estimation is based on the CORINAIR method. The time series are consistent. The emission factors used for CO_2 emissions are from CORINAIR.

70. Estimation is based on energy consumption data as noted above.

6. Stationary combustion: coal – N_2O

Emission trends

71. N_2O from stationary combustion (coal) is a key source representing only 1.4% of aggregate GHG emissions (excluding LUCF), with an increase of 3.5 times the 1990 figure.

Methodology, emission factors and activity data

72. Emissions estimation is based on the CORINAIR method. The time series are consistent.

73. The emission factors used for CO_2 emissions are from CORINAIR.

74. Estimation is based on energy consumption data as noted above.

7. Mobile combustion: aircraft – CO_2

Emission trends

75. CO_2 emissions from mobile combustion (aircraft) represent only 1.4% of all reported emissions (excluding LUCF), with an increase of 15.2% as compared to the 1990 figure.

Methodology, emission factors and activity data

76. Emissions estimation is based on the CORINAIR method. The time series are consistent.

77. The emission factors used for CO_2 emissions are from CORINAIR.

78. Estimation is based on energy consumption data as noted above.

D. Non-key sources

79. Non-key sources were commented on in the draft S&A report 2001. They were:

(a) N_2O emissions from energy industries (solid and liquid fuels)

(b) N_2O emissions from road transportation

(c) N_2O emissions from manufacturing industry

(d) CH_4 from fugitive emissions (oil and gas).

1. Emission trends

80. N_2O from energy industries (solid fuels) increase from 1990 - 1999 by a factor of about 6.

81. N_2O from energy industries (liquid fuels) decrease from 1990 - 1999 by 72.9%.

82. N_2O from road transportation increase from1990 - 1999 by a factor of about 2.2.

83. N_2O from manufacturing industry decrease from 1990 - 1999 by 8.3%.

84. CH_4 from fugitive emissions (oil and gas) increase from 1990 - 1999 by a factor of about 9.

2. Methodology and emission factors

85. Emissions estimation was based on CORINAIR methods.

86. The IEFs for N_2O from energy industries (solid and oil fuels) were higher than those of other Parties.

87. The IEF for CH_4 from fugitive fuel emissions (oil and gas – gas distribution) was ten times less than the IPCC recommended values. There is no explanation for this in the documentation box of the relevant CRF tables.

88. The IEF for CH_4 from fugitive fuel emissions (oil and gas – oil production) appears to be incorrect.

3. Activity data

89. The underlying energy source data are derived from the energy balances and statistics, as noted in the NIR.

90. Activity data for CH_4 from fugitive fuel emissions – oil and gas (gas production) are not provided but they are included in the reference approach table. Gaseous fossil (natural gas (dry)) is a very small quantity (105 TJ) compared with 50,918 TJ of imported natural gas.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

91. Greece reported 1990-1999 emissions data for industrial processes and solvent and other product use, using all relevant tables of the CRF for these sectors.

92. The contribution of industrial processes to total aggregate GHG emissions in 1999 was 6.4%, compared to 9.1% in 1990. There was a significant increase in emissions in this sector during 1990-1999, from 9,614 to 12,157 Gg of CO_2 equivalent, or approximately 21% (table 10s5).

93. The main contribution to the emissions trend of Greece's industrial sector comes from HCFC-22 production. 1999 emissions of HFC-23, which is a by-product of HCFC-22 production, were four times those of 1990.

94. PFC emissions in table 10s5 are indicated as 32.04, whereas in table 2(II)s2 they come to 28.46. This should be explained.

95. In relation to the trend tables of the CRF, in particular table 10s5, it is not quite clear why, for industrial processes, only CO_2 emissions appear in the second column of this table (base year); this is assumed to be an aggregate GHG base estimation for industrial processes. For solvents and LUCF also, CO_2 emissions only are indicated in the base year column, but for the other sectors this column is not filled in at all.

96. CO_2 and NMVOC emissions from solvent and other product use are reported. These estimations are very approximate because they are based on old data and estimated consumption. They are not officially accepted and were submitted only as an indication of the possible level of CO_2 and NMVOC emissions. Total CO_2 emissions from this sector are estimated at 167.54 Gg, which is about 0.1% of total aggregate GHG emissions.

1. Completeness

97. Almost all the major IPCC source categories are covered in the industrial processes sector. Emissions are provided from mineral products (cement and lime production), the chemical industry (nitric acid production), metal (aluminium) production and the production of halocarbons. Some industrial source subcategories, such as limestone and dolomite use, asphalt roofing, road paving with asphalt, ferroalloy production, consumption of halocarbons and SF_6, are not estimated, and are reported by using the notation key "NE". In previous years there has been ammonia production in Greece. In 1999 this source of emissions disappears and is indicated as not occurring ("NO") without any notes in the NIR as to whether ammonia production no longer occurs in Greece. Emissions from the category "Other production" are indicated as "NO". According to United Nations data there was steel production in Greece in 1999 (960 kt), but the CRF indicates "NA" for this subcategory.

98. CO_2, N_2O, PFC (CF_4, C_2F_6) and HFC (HFC-23) emissions are reported. SF_6 emissions are estimated as having been very low (10 t of SF_6, or 0.23 kt of CO_2 equivalent) during the last 20 years, as indicated in the NIR. Therefore, "0" is reported in the CRF for SF_6 emissions. HFC/PFC fugitive emissions are estimated with great uncertainty. This explains their exclusion from the national totals.

2. Transparency

99. The reporting of industrial emissions is mostly transparent, and information provided in the NIR sufficiently backs up the data in the CRF. The activity data for aluminium production are not reported, apparently because of confidentiality, although the United Nations data indicate 161 kt in 1998. The data on HCFC-22 production are also reported as being confidential.

3. Methodologies, emission factors and activity data

100. Greece predominantly used the CORINAIR methodology for calculations of GHG emissions in the industrial processes sector. The National Statistical Service of Greece provided activity data. There was an absence of official data for 1999 for the majority of industrial products, which should have been reported in the industrial production data. This is indicated in the NIR and therefore production for some industry categories is assumed to be at the level of 1998.

4. Recalculations

101. Recalculations have been carried out for the base year, but there are no significant differences (less than 0.01% for mineral products and 0.14% for solvents and other product use).

5. Uncertainties

102. Indication of uncertainty for industrial emissions is mentioned in relation to emission factors used (section 2.4.2 of the NIR) but not in detail.

B. Key sources

1. 2.A.1 Cement production – CO_2

Emissions trends

103. CO_2 emissions from mineral products, including cement and lime production, increase slightly from 6,984 to 7,328 Gg from 1990 to 1999. The share of CO_2 emissions from lime production is minor and amounts to 237.5 Gg compared to the share of emissions from cement production. CO_2 emissions from cement production contribute 6.4% to the total aggregate GHG emissions in 1990 and 5.9% in 1999. The contribution from the trend assessment is 3.1% in 1999.

Methodology, emission factors and activity data

104. For emissions calculations Greece used the CORINAIR methodology. The IEF was 0.4985 t CO_2/t for cement production.

105. For 1999, the same data on cement production as for the year 1998 are reported (see table 10 of the CRF). Emissions are 5.4% higher than the United Nations data (approximately 14,700 kt in the CRF compared to 13,908 kt in the United Nations Statistical Bulletin). Cement production data for the years 1995-1999 were estimated by the TITAN Cement Company. It is indicated in table 7 of the CRF that all sources of cement production have been taken into account. However, the quality of this data has not been estimated.

2. 2.E.1 HCFC-22 production – HFC-23 emissions

Emissions trends

106. Emissions of HFC-23 are estimated from only one industrial unit. Emissions increased from 935 in 1990 to 3,744 Gg CO_2 equivalent in 1999. The NIR indicates that these estimations should be considered to be approximate.

107. This source contributed 0.9% of the total emissions in 1990 with its share increasing to 3.0% in 1999.

Methodology, emission factors and activity data

108. The calculation method was tier 1 and the emission factor used was the IPCC default. No activity data on HCFC-22 production is provided because this is confidential; however HFC-23 emissions are estimated as being 320 t (table 2(II) C, E).

C. Non-key sources

109. There are several non-key sources in this sector in 1999:

(a) N_2O emissions from nitric acid production (567.3 Gg CO_2 equivalent)

(b) CO_2 emissions from aluminium production (247.9 Gg)

(c) CO_2 emissions from lime production (237.5 Gg)

(d) PFC emissions from aluminium production (28.46 Gg CO_2 equivalent).

1. 2.B.2 Nitric acid production – N_2O

Emissions trends

110. Emissions from this source were 567.3 Gg CO_2 equivalent in 1999. This is the third largest source of emissions in this sector. N_2O emissions resulting from nitric acid production decrease by 20% from 1990 to 1999 and the statistical data for the production of nitric acid also decreases.

111. There is a wide difference between the reported activity data for 1992 compared with the other years in the 2001 submission. This difference is in the order of 1000% (0.44 kt in 1992 and about 400 – 420 kt of nitric acid production for the other years). The level of emissions in 1992, however, correspond to the level of emissions from this type of activity for the other years. The IEF for N_2O for 1992 is reported as being 4.51 compared to 0.002-0.009 t N_2O/t. (IPCC default value). This explains why the emissions in 1992 are not too different from the level of emissions for the other years. This should be corrected.

Methodology, emission factors and activity data

112. The CORINAIR methodology was used for the calculations. All the sources are estimated but the quality is not estimated.

2. 2.C.3 Aluminium production – CO_2

Emissions trends

113. CO_2 emissions from aluminium production are the fourth largest source in Greece from industrial processes. The share of this source to total emissions is 2% in 1999. The emissions increase slightly (by 7%) from 232 to 248 Gg from1990 –1999.

Methodology, emission factors and activity data

114. The CORINAIR methodology was used for the emissions estimations and for the emission factor. The activity data are reported as being confidential due to there being only one aluminium producer in Greece; therefore a comparison with United Nations data is not possible.

3. 2.C.3 Aluminium production – PFCs

Emissions trends

115. PFC emissions from aluminium production include actual CF_4 (28.07 Gg of CO_2 equivalent) and C_2F_6 (0.40 Gg of CO_2 equivalent) emissions. There is a substantial negative

trend in these emissions after 1990. This is due primarily to the efforts of Aluminium of Greece SA to reduce PFC emissions from the aluminium production process. The total reduction is 12-fold (from 367 to 28 Gg of CO_2 equivalent) over the whole period 1990-1999.

Methodology, emission factors and activity data

116. The CORINAIR methodology was used for the emission estimations and for the emission factor. Emissions of CF_4 are estimated as 4.32 t, and C_2F_6 emissions as 0.04 t (table 2(II) C, E). Emission factors for PFCs were obtained directly from Aluminium of Greece SA.

D. Areas for further improvement

Planned or ongoing work by the Party

117. In its NIR, Greece reported possible improvements in emissions factors used for industrial emission calculations in industry, which will result in the situation in Greek industry to be better reflected. The National Observatory of Athens, in collaboration with other contracted organizations, has undertaken these investigations.

Issues identified by the ERT

118. The industrial processes sector lacks information on activity data for 1999 and there are also a few mistakes in compiling the CRF. The 1992 emission factor for N_2O emissions should be corrected and the data for the base year in table 10 should be completed. PFC emissions in table 10s5 are indicated as being 32.04 Gg, whereas in table 2(II)s2 they are 28.46 Gg; this difference should be explained or corrected.

IV. AGRICULTURE

A. Sector overview

Table 4.1 Summary overview: Provision of information for the agriculture sector

Sectoral report tables	Available
Notation keys	Available
Sectoral background tables	No
National inventory report	Yes
Methods	T1
Emission factors	IPCC defaults
Explanation of non-IPCC method	-
Uncertainty	No
Emission trends	Yes (1990-1999)
Procedure for QA/QC	No
Complete set of CRF tables for agriculture	No
Plans for future improvements	No information

119. Information is provided on CH_4 emissions from enteric fermentation of domestic livestock, N_2O emissions from animal production, direct emissions of N_2O from agricultural soils, and CH_4 emissions from agricultural soils. No information is provided on N_2O from

indirect emissions from agricultural soils; CH_4 from this source is reported as "NE". The source category savanna burning is reported as "NO".

120. The share of the agriculture sector in total aggregate GHG emissions in CO_2 equivalent decreased slightly from 10.6% in 1990 to 9.5% in 1999.

121. The National Statistical Service of Greece provided the activity data for agriculture.

1. Completeness

122. Sectoral (table 4) as well as sectoral background tables (4.A-4.F) are provided for the years 1990 to 1999, but not all the activity data, and consequently the IEFs, are provided.

2. Transparency

123. The inventory has been found to be not entirely transparent, because not all the activity data, emission factors and underlying assumptions are given in the NIR.

3. Methodologies, emission factors and activity data

124. The tier 1 methodology was used with IPCC default emission factors.

4. Conformity with the UNFCCC reporting guidelines and the IPCC Guidelines

125. Conformity with the UNFCCC reporting guidelines and the IPCC Guidelines, including the agriculture sector, is referred to in the overview section of this report (paragraph 28).

B. Key sources

126. The percentage contribution of the four identified key sources from the agricultural sector to national total emissions has decreased from the base year to 1999.

Table 4.2 Key sources in the agriculture sector

Key source	Gas	Level assessment (%)	
		1990	1999
Animal production	N_2O	3.4	3.0
Enteric fermentation	CH_4	2.8	2.5
Agricultural soils (direct)	N_2O	2.7	1.8
Agricultural soils	CH_4	1.7	1.5

1. 4.D Agricultural soils, direct soil emissions – N_2O

Emissions trends

127. According to table 10s3, N_2O emissions from agricultural soils decrease from 1990-1996, and then start to increase, but by 1999 these emissions are 7.8% lower than they were in 1990. The decrease in N_2O emissions is explained in the NIR as being due to a reduction in the amount of fertilizer used for agricultural purposes.

Methodology, emission factors and activity data

128. The methodology used was tier 1 with IPCC default emission factors. Disaggregated data is provided in table 4.D.

Findings from the draft S&A report 2001

129. The following was noted in the draft S&A report with regard to agricultural soils - direct N_2O emissions (4.D.1):

(a) *N_2O IEF*. The IEF for animal wastes is higher by a factor of 100 compared to the other Parties and the IPCC default. The IEF for N-fixing crops is the highest value among 16 reporting Parties;

(b) *Trends in IEF*. The N_2O IEF for N-fixing crops increases by 14% from 1990 to 1999;

(c) *For 4.D.1.4 Crop residue*, no emissions estimate is provided, although activity data is reported; thus no IEF is calculated;

(d) No information is provided on 4.D.1.5 Cultivation of histosols.

130. The following was noted in the draft S&A report with regard to agricultural soils, animal production – N_2O (4.D.2):

(a) *Trends in N_2O IEF*. Values of the N_2O IEF for pasture range and paddock oscillate between 0.2 and 1.0 kg N_2O-N/ha between 1990 and 1999.

131. The lack of background information meant that no assessment of the reasons for these findings could be made.

2. 4.A Enteric fermentation – CH_4

Trends

132. Total CH_4 emissions increase by 2.3% from the base year to 1999 (table 10s2).

133. Enteric CH_4 emissions contribute 2.5% of national total emissions in 1999. The share has increased for swine and sheep but has decreased for dairy and non-dairy cattle. The decrease is mainly because of declining cattle numbers.

Methodology and emission factors and activity data

134. The tier 1 methodology was used with IPCC default emission factors.

135. Activity data for dairy and non-dairy cattle and for sheep, goats, horses, mules and asses, swine and poultry are documented.

Findings from the draft S&A report 2001

136. The following was noted in the draft S&A report with regard to CH_4 from enteric fermentation:

(a) *Activity data*. The swine population was 35% higher than the corresponding Food and Agriculture Organization of the United Nations (FAO) value (1,424 versus 933 thousand head).

(b) *CH_4 IEF*. IEFs for dairy and non-dairy cattle are similar to IPCC defaults for Eastern Europe (81 and 56 for dairy and non-dairy cattle, respectively).

(c) *Trends in activity data and CH_4 emissions*. For all livestock types the same data are reported for 1998 and 1999.

(d) *CH_4 emissions* from swine increase by 43% from 1990 to 1999, with some annual changes being over 10%.

137. It is recommended that the Party verifies the animal numbers for swine.

3. Agricultural soils, indirect emissions

Emissions trends

138. According to table 10s2 of the CRF**,** total CH_4 emissions increase from 1990 to 1992 and then decrease slightly annually until 1999. In 1999, emissions are 1.1% lower than in 1990.

Methodology and emission factors and activity data

139. The methodology was tier 1 with IPCC default emission factors. No disaggregated activity data is provided in the NIR.

C. Non-key sources

1. 4.B Manure management – CH_4 and N_2O

Methodology, emission factors and activity data

140. The methodology was tier 1 with IPCC default emission factors. Activity data are provided.

Findings from the draft S&A report 2001

141. The following was noted in the draft S&A report with regard to manure management:

(a) *CH_4-IEF*. IEFs are similar to IPCC defaults for temperate- Eastern Europe. The IEF for non-dairy cattle is the highest value among the reporting Parties.

(b) *N excretion rates*. Values for dairy and non-dairy cattle are similar to IPCC defaults for Eastern Europe; values for sheep and swine are similar to those of IPCC defaults for Asia.

(c) *Consistency checks*. There are differences of 18% when comparing the sum of nitrogen excretion over all animal waste management systems (AWMS) per livestock to the corresponding N excretion rates per animal multiplied by the corresponding animal population (for dairy and non-dairy cattle).

(d) Trend in emissions. N_2O emissions increase by 40% from 1990 to 1999. While for 1990-1991 and 1998-1999 no annual changes in estimates are noted, for the years between 1996 to 1998 the annual percentage changes are greater than 10%.

142. The ERT recommends that the consistency in the trend be ascertained by Greece.

2. 4.C Rice cultivation – CH_4

143. Even though the contribution is small compared to the other sources, by 1999 the quantity of emissions has increased by 57% as compared to 1990.

Findings from the draft S&A report 2001

144. The following was noted in the draft S&A report with regard to CH_4 from rice cultivation:

(a) *CH_4-IEF*. The value for irrigated fields – continuously flooded (0.29 g CH_4/m2/yr), is the lowest value among the seven reporting Parties and lower by a factor of 100 compared to other reporting Parties (values range from 22 to 40 g CH_4/m2/yr).

(b) *Trend in emissions*. CH_4 emissions increase by 58% from 1990 to 1999, with some large annual changes: -10% for 1990-1991, +38% for 1992-1993, +15% for 1993-1994, +12% for 1994-1995, +11% for 1995-1996 and –13% for 1997-1998; for 1999 the same value as for 1998 is reported.

145. The review team assumes that there was a mistake in the emission factor used.

3. 4.F Field burning of agricultural residues – CH_4 and N_2O

146. According to the inventory, 50% of agricultural waste in Greece is usually burned.

Findings from the draft S&A report 2001

147. The following was noted in the draft S&A report with regard to field burning of agricultural residues:

(a) *Trends in emissions.* There are high annual changes for CH_4 and N_2O emissions for 1990-1991 (+45%) and 1991-1992 (-20%).

148. The values for residue burning are very uncertain.

D. Areas for further improvement

149. Animal numbers used from the national statistical service were averaged over three years, and therefore they were not the same as the yearly statistics from FAO. In future, Greece could use the yearly statistics.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

Table 5. Summary overview: Provision of information for the LUCF inventory

Sectoral report tables	Available
Notation keys	Available
Sectoral background data	Available
National inventory report	Available
Methods	IPCC
Emission factors	IPCC
Explanation of non-IPCC method	-
Uncertainty	Results are marked as "Not enough sufficient official data are yet available, in order to provide an accurate estimation"
Emission trends	Yes (1990-1999)
Procedure for QA/QC	No information
Complete set of CRF tables (LUCF)	Yes
CO_2 reported	Yes
Non-CO_2 gases reported	Yes
Plans for future improvements	No information

150. Forests are an important land use category in Greece since 49% of the country is forested; however, the LUCF sector represents a low emission level for Greece. The LUCF sector is equivalent to about 1% of total non-LUCF CO_2 emissions. In table 5 Greece reports emissions and removals from three categories: 5.A Changes in forest and other woody biomass stocks, 5.B Forest and grassland conversion, and 5.D CO_2 emissions and removals from soil. The net CO_2 emissions/removals show high annual changes, ranging from –370.3 Gg (1995) to 2,416.9 Gg (1998). These large fluctuations are connected to changes in emissions, mainly emissions from forest fires. The estimations of CO_2 emissions and removals from soils are reported only for agricultural lands that were afforested after 1994, according to EC Regulation No. 2080/92. Detailed information about LUCF activities is provided in the NIR.

1. Completeness

151. Estimates of GHG emissions and removals are provided for the whole period 1990-1999. CRF sectoral table 5 gives overall estimates for the LUCF sector, including 5.A Changes in forest and other woody biomass stocks, 5.B Forest and grassland conversion and "other" under 5.D CO_2 emissions and removals from soils (since 1994). Sectoral background data tables (5.A, 5.B, 5.D) provide detailed relevant data. Data relating to 5.C Abandonment of managed lands are not reported, but afforested land is included under category 5.D.

2. Transparency

152. Most of the data are transparent. The information in the NIR supports the data in the CRF tables.

3. Methodology and emission factors

153. The calculation of the emissions and/or removals from the LUCF sector was carried out according to the IPCC methodology (NIR).

154. Mostly country-specific factors were used, especially in category 5.A Changes in forests and other woody biomass stocks. Some of these factors were outside the range of the IPCC default values, but the sources of the data are documented in the NIR. For non-CO_2 emissions from forest fires, the IPCC default emission factors were used.

4. Activity data

155. The input activity data were based on results from the National Survey of Forests in Greece, but in some cases, the sources of data were unable to specify the year to which information referred. For the main LUCF processes, the reported activity data were sufficient (annual increase of biomass, commercial and other biomass harvest, forest area burned and area reforested).

5. Recalculation

156. The previous submission (2000) did not include the LUCF sector; therefore it was not possible to compare any changes. The NIR did not provide any information about the recalculation process.

6. Uncertainties

The NIR contains "Comments on the uncertainties of emission estimates" (Part 2.4). The estimate for the LUCF sector is mentioned as being only provisional. In the table "The status of emission inventories" *(*table 2.6 of the NIR) for the years 1990-1999, the LUCF emission data are marked as "Ns" which means "Not enough sufficient official data are yet available, in order to provide an accurate estimation".

7. Conformity with the UNFCCC reporting guidelines and the IPCC Guidelines

157. The emission estimates are consistent with the IPCC methodology. Data are reported in CRF tables according to the UNFCCC reporting guidelines. The NIR contains chapter 8 "Land-Use Change and Forestry" with the relevant information relating to the sector.

B. Source and sink categories

1. 5.A Changes in forest and other woody biomass stock

158. Gross emissions and removals are reported for the period 1990-1999 in the category of temperate forests. CO_2 removals are reported for temperate forests in the removal column and the value of – 4,004.9 Gg CO_2 is the same for each year. Emissions are reported separately in two sheets, for temperate forests and for harvested wood (other). The reason for this is unknown. Average annual growth rates reported range from 0.71 to 5.90 t dm/ha/yr, for a set of evergreen species, and from 0.27 to 1.58 t dm/ha/yr, for a set of deciduous species. Lowest values for growth rates are below the IPCC default values for the respective forest types, but sources of the data are documented in the NIR. Net emissions in this category fluctuate as a consequence of changes in gross emissions (harvest data). In table 5.A the area of forest biomass stocks is reported for temperate and deciduous temperate commercial forests (3,359 kha) and this value corresponds with the data in the NIR. In addition, the area of 3,154 kha for other temperate forests is reported, but without carbon uptake calculations (average annual growth rate is marked as "not applicable" ("NA")). It is not clear why, although one reason could be that this category represents the natural forests without forest management practices. The total forest area for temperate evergreen and deciduous commercial forests documented in table 5.A remains at a

constant value, but in the table 5.D the afforested area is reported (since 1994). These data should be harmonized.

2. 5.B Forest and grassland conversion

159. The data for CO_2 emissions from burning off-site biomass are different compared to the data for similar forest types, but it seems that the data relating to biomass burning (forest fires) in Greece are based on field surveys. Average quantities of biomass left to decay are given, but are not supported by activity data. CO_2 emissions fluctuate in a wide range from 552 Gg (1999) to 3,682 Gg (1998), but these values correspond well with the information about forest fires in the NIR.

3. 5.C Abandonment of managed lands

160. The data for this category are not reported. Since 1994 afforestation activities in Greece have been reported, but only in part 5.D (CO_2 emissions and removals from soils); this category is included in the calculations. CO_2 removals should also be taken into account.

4. 5.D CO_2 emissions and removals from soil

161. Large annual changes for CO_2 removals were identified, from –84.3 Gg (1998) to -507.8 Gg (1997). These changes are connected with the annual changes in area of afforested lands. The IEF for average annual rate of soil carbon uptake/removal was a constant for the whole period (2.31 Mg C/ha/yr) and corresponds with the IPCC default values. Only CO_2 removals from afforestation of agricultural lands are reported in this category. Information about other land-use change activities is not available.

C. Areas for further improvement

1. Planned or ongoing work by the Party

162. Chapter 10.2 “A view to the future” is included in the NIR, but does not mention the LUCF sector. There is no information about planned improvements to future LUCF inventories.

2. Issues identified by the ERT

163. Under the review process the following areas were identified for improvement: harmonization of the land use category data within the source and sink categories, and completion of the sectoral CRF table for category 5.C. It is necessary to improve the quality of the activity data with the aim of changing the status of the emission inventory for the LUCF sector from “Ns” to “F” (final). We recommend that a calculation of CO_2 removals for abandonment of managed land (category 5.C) should be made, and the land use category data (5.A, 5.C, and 5.D) should be clarified in the next submission. Also, any additional information on methods or techniques used to estimate or develop emission factors (e.g. expert judgement, field measurements, remote sensing) should be reported in order to improve the quality and comprehensibility of the estimates.

VI. WASTE

A. Sector overview

164. Emissions from the waste sector contribute 2.8% of total aggregate GHG emissions in 1999 compared with 2.4% in 1990. CH_4 emissions, the main GHG from this sector, increase by

34.6% from 1990 to 1999. Category 6.A Solid waste disposal on land is the major source of emissions and the only key source within the waste sector comprising 2.7% of total emissions in 1999 (compared with 2.3% in 1990). In 1999, around 52% of these emissions arise from managed waste disposal sites and 48% from unmanaged waste disposal sites. From 1990 to 1999, emissions from solid waste disposal increase by 36.3%. 6.B Wastewater handling contributes 0.1% of emissions in 1999 (unchanged from 1990).

1. Completeness

165. All CRF tables specific to the waste sector contain data and notation keys. The only minor omission is that the additional information table in table 6.B has not been completed. Where a source is not estimated, an explanation has been provided in table 9s1. Summary 3s2 (Methods and emissions factors) and table 7s3 include entries for waste, although notations where information is "NA" have been omitted.

166. A detailed discussion of waste is included in the NIR (Section 9). It includes a table indicating that the solid waste data are provisional (subject to change in the future) and that wastewater data are not adequate to provide an accurate estimate of emissions (p. 16). The NIR outlines the constraints on obtaining accurate data, and notes areas for improvement in the future.

167. Methane recovered is shown as 0.00. There is no comment in the NIR as to whether methane recovery is negligible or not estimated.

168. There is no estimate of N_2O emissions from human sewage. The IPCC default emission factor could be used to obtain an estimate and this needs to be considered.

169. Industrial wastewater emissions are shown as "NE". This requires further explanation.

2. Transparency

170. The inventory is transparent. The NIR provides a comprehensive explanation of the relevant decisions made regarding activity data and emission factors.

3. Recalculation

171. It is assumed that there have not been any recalculations. Tables 8(a)s2 and 8(b) have not been completed for the waste sector, and there is no information on recalculations in the NIR. It would assist if a brief comment were to be made in the NIR on whether there had been recalculations. Further, it is noted that since the data for solid waste are provisional and the wastewater data are indicated as "Ns", there are likely to be recalculations in the future. The Party should ensure that these are fully documented.

4. Uncertainties

172. Uncertainties have not been quantified. They were addressed qualitatively in the NIR for some activity data and emission factors.

B. Key sources

1. 6.A Solid waste disposal on land – CH_4

Emissions trends

173. According to the key source determination made by the UNFCCC secretariat, solid waste disposal on land is a key source, contributing 2.7% of total aggregate GHG emissions.

Methodology, activity data and emission factors

174. The methodology used is the IPCC default methodology. The NIR provides a discussion of the data used and the problems associated with improving data quality. A specific emission factor is not relevant to the methodology for solid waste. The emission factor is implied from the total quantity of waste and estimated emissions.

Results from previous reviews

175. The methane correction factor (MCF) for unmanaged deep solid waste disposal was reported as 0.6, which is lower than the IPCC default (0.8). This problem has been raised in both the S&A report 2000 and the draft S&A 2001. In the latter, it was noted that activity data for industrial wastewater was not estimated. The Party has not responded to either of these concerns.

C. Non-key sources

176. 6.B Wastewater handling and 6.C Waste incineration are non-key sources. Emissions from domestic and commercial wastewater have been estimated using the IPCC default methodology. Emissions from industrial wastewater and waste incineration are shown as "NE". The CRF notes that insufficient data are available to estimate emissions from these subsectors. The NIR provides a brief comment on wastewater but does not explain why there are no estimates for industrial wastewater and waste incineration. No comment is made as to whether action is being taken to obtain data. Further explanation would be helpful.

D. Areas for further improvement

177. The following improvements to the inventory should be undertaken:

(a) An explanation on the status of methane recovery from solid waste and wastewater should be provided.

(b) Emissions of N_2O from human sewage using the IPCC default methodology should be estimated.

(c) Greece should ensure that all cells in the CRF include either data or a notation key.

(d) An explanation should be provided for the use of a lower MCF (0.6) than the IPCC default (0.8) for unmanaged deep solid waste disposal.

(e) It should be ensured that recalculations (if any) are clearly documented and explained in the NIR.

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