UNITED NATIONS
NATIONS UNIES

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

FCCC/WEB/IRI/2004/ITA 4 March 2005

ITALY

REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY SUBMITTED IN THE YEAR 2004[1]

I. OVERVIEW

A. Introduction

1. This report covers the centralized review of the 2004 greenhouse gas (GHG) inventory submission of Italy, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8 of the Conference of the Parties. The review took place from 11 to 15 October 2004 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalists – Ms. Riitta Pipatti (Finland) and Mr. Pavel Shermanau (Belarus), Energy – Ms. Branca Americano (Brazil), Mr. Dario Gomez (Argentina) and Mr. Mamadou Diarra (Niger), Industrial Processes – Mr. Menouer Boughedaoui (Algeria) and Mr. Alexander Nakhutin (Russian Federation), Agriculture – Mr. Viktor Novikov (Tajikistan) and Mr. Haruo Tsuruta (Japan), Land-use Change and Forestry (LUCF) – Mr. Nagmeldin Goubti Elhassan (Sudan) and Mr. Risto Sievänen (Finland), Waste – Ms. Tatiana Tugui (Republic of Moldova) and Mr. Gao Qingxian (China). Mr. Dario Gomez and Ms. Riitta Pipatti were the lead reviewers. The review was coordinated by Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Annex I Parties", a draft version of this report was communicated to the Government of Italy, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Inventory submission and other sources of information

3. In its 2004 submission, Italy has submitted a complete set of common reporting format (CRF) tables for the years 1990–2002 (except table 5.B) and a national inventory report (NIR). Where needed the expert review team (ERT) also used previous years' submissions, additional information provided during the review and other information. The full list of materials used during the review is provided in annex 1 to this report.

C. Emission profiles and trends

4. In the year 2002, the most important GHG in Italy was carbon dioxide (CO_2), contributing 84.7 per cent to total[2] national GHG emissions expressed in CO_2 equivalent, followed by nitrous oxide (N_2O) – 7.6 per cent – and methane (CH_4) – 6.2 per cent. Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) taken together contributed 1.5 per cent of overall GHG emissions in the country. The Energy sector accounted for 83.1 per cent of total GHG emissions, followed by Industrial Processes (7.3 per cent), Agriculture (7.2 per cent) and Waste (2.2 per cent). Total GHG

[1] In the symbol for this document, 2004 refers to the year in which the inventory was submitted, and not to the year of publication.
[2] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding LUCF, unless otherwise specified.

emissions (without LUCF) amounted to 553,753 Gg CO_2 equivalent and increased by 8.8 per cent from 1990 to 2002.

D. Key sources

5. Italy has reported key source tier 1 and tier 2 analyses, both level and trend assessment. The tier 1 key source analyses performed by the Party and the secretariat[3] produced similar results. The differences are due to different levels of disaggregation used. The tier 2 analysis by the Party identified four more key source categories (by both level and trend assessment) plus two categories by level assessment and one by trend assessment that were not identified by the secretariat.

E. Main findings

6. Italy's inventory conforms to the UNFCCC reporting guidelines, the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines) and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance).

7. Italy presents a good diagnosis of the problems and shortcomings in the development of the NIR and has made efforts to address many of them.

F. Cross-cutting topics

Completeness

8. All years 1990–2002, all gases, all sectors and practically all source/sink categories are covered in the 2004 inventory submission. The following emissions have not been estimated: CH_4 from waste incineration, N_2O from solvents and other product use, and potential emissions of HFCs. Italy reports in the NIR that it plans to estimate and report these emissions in its next submission.

Transparency

9. The NIR and CRF are in general transparent and follow the UNFCCC guidelines. Some country-specific methods and data would, however, need to be described in more detail to enable a full assessment of the assumptions and rationale behind the choices made (see the sectoral sections in this report).

Recalculations and time-series consistency

10. The ERT noted that Italy reports recalculations which match those identified by the secretariat for the year 2001, which is the only year for which Italy has reported recalculations. However, comparison shows that Italy has recalculated the estimates for all years from 1990 to 2001 but only reported recalculations for the year 2001. The ERT recommends that Italy present the recalculations for all years in its next submission.

Uncertainties

11. The NIR states that an IPCC tier 1 uncertainty analysis has been performed, and the results of this analysis are presented at the individual source category level. Qualitative uncertainty estimates are provided in CRF table 7. For many sources very low uncertainty values (3–5 per cent) are reported for both activity data (AD) and emission factors (EFs). Those uncertainties that are reported as high to

[3] The 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 providing a full CRF for the year 1990. Where the Party has performed a key source analysis, the key sources presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key source assessment conducted by the secretariat.

correspond to 50 or 100 per cent. For some sources, such as direct and indirect N_2O emissions from agricultural soils, the reported uncertainties are much lower than the IPCC default values or values reported by other Parties. The assumptions and reasoning behind the values are not given.

Verification and quality assurance/quality control approaches

12. Italy states that it has not yet developed a quality assurance/quality control (QA/QC) system. However, a substantial amount of information concerning QC procedures and verification checks is presented in the NIR. Some of them involve comparing national data with data available from international databases and the verification of emissions from the Industrial Processes sector with the emissions data collected through the National Pollutant Emissions Register (EPER).

Follow-up to previous reviews

13. Italy has continued to improve its inventory submission. The CRF tables are now provided for all years (in the 2003 submission the only CRF provided was for 2001) and the contents of the NIR have been improved. Information on recalculations has been provided in the CRF tables, but only for 2001. The NIR provides a summary of the results of the recalculations for all years. However, further work is needed to improve the transparency of the NIR as regards methods and EFs in some sectors.

G. Areas for further improvement

Identified by the Party

14. The NIR identifies areas for improvement under the sector-specific chapters as well as in chapter 9 on recalculations and improvements. General areas for improvement identified by Italy concern improving the completeness of the reporting (gaps identified are potential emissions of PFCs, N_2O from category 3.D Other Solvent Use, and CH_4 emissions from waste incineration). The setting up of the National System and improvement of AD and EFs using data collected under the European emissions trading scheme and the national EPER registry are also addressed as future improvements.

Identified by the ERT

15. The ERT identifies the following cross-cutting issues for improvement. The Party should:

(a) Improve the uncertainty estimates and provide the rationale for its estimates in accordance with the IPCC good practice guidance;

(b) Provide the details of recalculations for all years, showing how the estimates have been improved;

(c) Improve the transparency of its methodological descriptions of country-specific methods and EFs;

(d) Continue and complete the establishment of the QA/QC management system in accordance with the IPCC good practice guidance;

(e) Prioritize and plan systematically for future improvements and provide information on this in the NIR.

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

II. ENERGY

A. Sector overview

17. In the year 2002 the Energy sector accounted for GHG emissions amounting to 460,243 Gg CO_2 equivalent, or 83.1 per cent of total national emissions. This sector includes eight key source categories

from the level and trend assessment, namely: five sources for CO_2 (three stationary combustion sources – coal, oil and gas – together with two mobile combustion sources – road vehicles and waterborne navigation); two sources for N_2O (oil from stationary combustion and road vehicles from mobile combustion); and one source for CH_4 (oil and gas systems from fugitive emissions). In addition, CO_2 emissions from stationary combustion (other fuels), fugitive emissions (oil and gas systems) and mobile combustion (aircraft) were identified as key sources by trend assessment only.

18. The NIR and CRF contain emissions estimates for all direct and indirect GHGs arising from practically all the source categories of the Energy sector. Italy reports in the NIR that emissions from multilateral operations are not estimated because no AD are available. The methodological approach, the AD and the EFs used to estimate emissions for the sector are presented in the NIR in a transparent manner. The national energy balance for the year 2002 is included in annex 5 of the NIR as well as the web site address where the time series of the Italian energy balances for 1994–2002 are available (BEN, 2004). Higher-tier methods are used for most combustion sources while lower-tier methods are used for fugitive emissions. The background studies supporting the country-specific methods are referenced in the NIR, although some of this information is only available in Italian. The EFs applied are country-specific or based on COPERT III, CORINAIR and/or the IPCC Guidelines.

B. Reference and sectoral approaches

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

19. CO_2 emissions from fuel combustion are calculated using the reference and the sectoral approaches. For the year 2002, CO_2 emissions estimated by the sectoral approach are 1.54 per cent higher than those estimated by the reference approach. Italy does not provide an explanation of this difference in the CRF, in line with the reporting requirements. However, the NIR states that a significant part of this difference is related to differences in AD, mainly those of liquid fuels. The NIR states that an assessment of the statistical differences between the fuel supply and fuel consumption data, particularly in the power sector, is planned for the future, provided that resources for the task become available.

International bunker fuels

20. Emissions of CO_2, CH_4 and N_2O arising from jet kerosene used in international aviation show an increasing trend. They peaked in 2000 at a level 92.3 per cent higher than that of 1990. In 2002, they were 70.5 per cent higher than the 1990 level. Italy uses a tier 2 methodology to disaggregate the overall jet kerosene delivery reported in the energy balance. Fuel consumption from military aviation is reported in the *Quarterly Oil Bulletin* (BPT, in Italian). Domestic consumption is estimated on the basis of information on arrivals, departures and passenger kilometres travelled provided by the Ministry of Transport combined with default fuel consumption factors. International consumption is estimated by subtracting domestic and military consumption from the delivery of jet kerosene reported in the national energy balance. Emission and consumption factors for landing/take off (LTO) and cruise are based on the CORINAIR methodology using country-specific information for the year 1999. The NIR reports that these factors may overestimate emissions for recent years because they are based on older aircraft models and a distribution between European and non-European flights that has already changed. Italy states in the NIR that the use of a more detailed model for estimating aircraft emissions is under consideration. The ERT commends Italy on its effort to report aviation emissions according to the IPCC good practice guidance and encourages it to undertake the project to update the estimation model.

21. Italy uses the CORINAIR methodology to estimate emissions from waterborne navigation according to coastal, naval, international marine navigation and fishing, and assigns these emissions to IPCC categories. The sources of AD are explained and referenced in the NIR. To facilitate follow-up of the data used, it is recommended that Italy present an English translation of the names of the fuels and sectors used in the national energy balance and provide the data in table 3.2.4 of the NIR expressed in energy units.

Feedstocks and non-energy use of fuels

22. For the reference approach, the amounts of carbon stored in non-energy use of fuels are calculated on the basis of a country-specific approach that uses annual energy statistics published by the Ministry of Production Activities that include information on fuel inputs to petrochemical plants, amounts of fuel returned to the market and internal consumption of fuels. The overall amount of fuels stored in products estimated by this approach (5.3 Gg) is 25 per cent lower than the figure that results from using the IPCC default values for the fraction of carbon stored. Italy reports in the NIR that an analysis of the national methodology, undertaken within the framework of the European Non-Energy Use – CO_2 Emissions project, confirmed that the data reported were reliable. For the sectoral approach, the NIR reports that emissions from the non-energy use of fuels are estimated and reported in the Industrial Processes sector. However, the ERT recommends that in future submissions Italy improve the information on how it deals with the demarcation between energy-related, non-energy-related and Waste sector emissions.

C. Key sources

Stationary combustion: solid, liquid fuels – CO_2

23. Italy has developed a specific methodology to avoid double counting of CO_2 emissions related to the extensive recovery of coal gases from blast furnaces, coke ovens and oxygen converters for electricity generation in the iron and steel industry. This methodology is summarized in section 3.5.1 of the NIR and discussed in more detail in annex 3. However, the discussion is not straightforward. The ERT encourages Italy to improve the presentation in annex 3 by, for example, including an illustrative diagram of the carbon flows within the industry and by making the energy balance available in English to facilitate the understanding of the figures presented in the explanatory tables.

24. The trend in the CO_2 implied emission factors (IEFs) for liquid fuels in non-ferrous metals production shows significant oscillations. In its response to previous review stages, Italy reported that the lowest IEF value (62.4 t/TJ) is associated with a significant use of liquefied petroleum gas (LPG); however, no explanation was provided for the highest figure (79.4 t/TJ). This value is higher than the EFs for most liquid fuels reported by Italy in table 3.7 of the NIR, except those for petroleum coke and tar. To improve the transparency of the reporting it is recommended that Italy include, for the relevant source categories, information concerning the types of fuel used and their relative shares.

Road transportation: liquid fuels – CO_2, N_2O

25. Concerning some oscillations in the trend of the CO_2 IEF, in response to previous review stages, Italy explained that fuel consumption calculated by the COPERT III model is slightly different from that published in the national energy balance and reported in the CRF. To improve the transparency of the reporting, it is recommended that Italy provide an explanation on how the fuel use balance is worked out within the framework of the COPERT III model. Where N_2O emissions are concerned, it is suggested that Italy include in the NIR an explanation of the way in which catalyst deterioration is modelled.

Fugitive emissions from oil and gas operations – CH_4

26. Some notation keys are not used in the CRF. However, the rationale behind the values reported and not reported is explained in the NIR. To improve the completeness of the reporting, the ERT recommends that the CRF use the appropriate notation keys according to the information reported in the NIR.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

27. In 2002, the Industrial Processes sector accounted for 7.3 per cent of total national CO_2 equivalent emissions (without LUCF). CO_2 represented 60.6 per cent of the sector's emissions in 2002,

N_2O 18.5 per cent and fluorinated gases (F-gases) 20.6 per cent. Over the period 1990–2002, CO_2 equivalent emissions from the sector increased by 16.5 per cent. However, CO_2 levels decreased by 6.7 per cent and N_2O increased by 28.5 per cent, whereas F-gas emissions increased by 232.3 per cent.

28. CO_2 and non-methane volatile organic compounds (NMVOC) emissions from the Solvent and Other Product Use sector are reported. CO_2 emissions from solvent and other product use decreased by 28.4 per cent from 1990 to 2002.

29. The methodological descriptions are very brief and the ERT encourages Italy to provide more detailed information on the methodology used, including underlying assumptions, as well as information on how data obtained from industry are used in the inventory, for each source category.

B. Key sources

Limestone and dolomite use – CO_2

30. The IEF (0.10 t/t) is the lowest among reporting Parties and also lower than the IPCC value of 0.44 t/t. In its response to previous review stages, Italy indicated that this category includes emissions from the use of limestone and dolomite in the production of bricks, tiles and ceramics, and iron and steel, as indicated in the NIR. The EF is reported to be country-specific in the NIR but reported as default in CRF table summary 3. According to the references cited in the NIR (personal communications, Associazione nazionale degli industriali dei laterizi and Associazione nazionale dei prodettori di piastrelle di ceramica e di materiali reffrattari), the EF is basically estimated on the basis of expert judgement and on general statistics produced by the two industrial associations. The ERT recommends the Party to report more information on the methodology used to estimate the EF. The ERT also encourages Italy to compare its AD and EF with the national EPER data.

Aluminium production – PFCs

31. Italy has used the tier 1 methodology for the years 1990–1999 and tier 2 for 2000–2002. The ERT encourages Italy to provide information in the NIR on how the time series is made consistent, as two different methodologies are used to estimate the emissions.

32. There is no information related to the methodology used for uncertainty estimation and data collection after 2000. The Party is encouraged to report on the QA/QC and verification procedures in this subcategory.

Nitric acid production – N_2O

33. The NIR states that AD are taken from national statistics and that the industry provides the EF. The ERT encourages Italy to provide more information on how the EF and the estimates are derived and how the information from the national EPER is used.

Ammonia production – CO_2

34. The methodologies used for estimating this source category and for data collection are not reported in the NIR and the default EF of 1.5 t/t is used. The ERT recommends Italy to provide this information in its future submissions.

35. The ERT also encourages the Party to indicate the kind of fossil fuel used in the process of ammonia production and to indicate whether quantities of oil or gas used have been subtracted from the quantity reported under Manufacturing Industries and Construction in the Energy sector in order to avoid double counting.

Consumption of halocarbons and SF_6

36. Italy reports actual emissions of HFCs, PFCs and SF_6 but does not report potential emissions of PFCs. The ERT encourages Italy to estimate potential emissions of PFCs.

C. Non-key sources

SF_6 used in magnesium foundries – SF_6

37. There is only one magnesium foundry in Italy and data are not declared as confidential. AD are reported as zero for the years 1990–1995. Italy clarified that the emissions for the year 1990–1995 are equal to zero as reported in the CRF. SF_6 consumption in magnesium foundries started only in 1996. The emissions estimate is based on the consumption of SF_6. The ERT recommends that Italy provide the information about the emissions for the years 1990–1995 being equal to zero in the NIR.

Other (chemical industry)

38. The CO_2 IEF for titanium dioxide production during 1992 is 1.88 t/t – much higher than for the other years reported. The Party should give an explanation for this high value. Italy indicated that an error had occurred in the input of the data for 1992 and that it would be corrected in the next submission.

IV. AGRICULTURE

A. Sector overview

39. In 2002, emissions from the Agriculture sector in Italy amounted to 39,694 Gg CO_2 equivalent, or 7.2 per cent of total national emissions (without LUCF). CH_4 emissions contributed 48.2 per cent of total CH_4 emissions and are calculated from enteric fermentation, manure management, rice cultivation, and field burning of agricultural residues. N_2O emissions from the sector accounted for 54.9 per cent of total N_2O emissions and are calculated from manure management, agricultural soils (direct, indirect, and from animal production) and field burning of agricultural residues. Prescribed burning of savannas does not occur in Italy.

40. The trend in total emissions from the sector for the period 1990–2002 is stable. The slight decrease in sectoral emissions – by 1.7 per cent – from 1990 to 2002 is mostly due to a decrease in CH_4 emissions from enteric fermentation.

41. Italy identified seven key sources based on level and/or trend assessment – CH_4 from enteric fermentation, manure management, and rice cultivation, and N_2O from manure management and agricultural soils (direct, indirect, and from animal production).[4]

42. Italy has used a country-specific methodology and EFs, although some of them, especially for agricultural soils and field burning of agricultural residues, are not reported in a transparent manner in the NIR.

43. Recalculations have been carried out in the Agriculture sector because, since the 2004 submission, a tier 2 method is being applied to estimate CH_4 emissions from enteric fermentation, and the correct value of $Frac_{GASM}$ (0.39) is now being used to estimate direct N_2O emissions from agricultural soils. These recalculations have resulted in decreases in the estimates of emissions from the sector by 5.6 and 3.8 per cent in 1990 and 2001, respectively.

44. The NIR reports in the section on waste incineration (page 88) that "emissions from removable residues from agricultural production are included in the same IPCC category. They refer mainly to olives and wine residues: the total residues amount and carbon content have been estimated by both IPCC and national factors." This means that some residues of agricultural wastes such as olives and vines are not burned on open fields. The ERT encourages Italy to include this information in the section on field burning of agricultural residues in its NIR as these emissions should be reported under this category according to the IPCC guidelines. The Party is also encouraged to include in the NIR information as to whether N_2O emissions are also estimated from plantings such as olive groves and vineyards, as one of

[4] N_2O emissions from animal production and CH_4 emissions from rice cultivation were not identified as key sources in the assessment by the secretariat.

the sources of direct N_2O emissions from soils, because nitrogen (N) fertilizers are usually applied to such planting. Italy indicated that these N_2O emissions are estimated and reported under direct and indirect N_2O emissions from soil.

B. Key sources

Enteric fermentation – CH_4

45. According to table 6.4 of the NIR, the average EF for dairy cattle decreased from 1990 to 2002, while that for non-dairy cattle increased slightly because the value of conversion into methane of the energy ingested decreased. However, the average weight of 650 kg for dairy cattle is reported as constant over the period 1990–2002, while the weight of non-dairy cattle gradually increased. It is recommended that the Party describe the underlying circumstances for the reported trends in weight and how these are reflected in the EFs in more detail in the NIR.

46. Italy reports in the NIR that the value for the conversion into methane of energy ingested decreased from 5.50 per cent in 1990–1994 to 5.20 per cent in 1995–1998 and 5.00 per cent in 1999–2002, taking into account an improvement in the quality of food during these years. The ERT recommends that Italy provide the underlying information used to derive these country-specific values in its future submissions.

47. The time series of EFs for dairy cattle shows large differences between 1990 and 1991 and from 1992 to 1995 in table 6.4 of the NIR. The NIR explains that the trends reflect yearly variations in parameters like total amount of milk produced, digestibility of feed and percentage of ingested energy converted to methane. However, the ERT recommends Italy to provide information on the annual values for the parameters as well as the reasons for the changes between the years.

Manure management – CH_4

48. The country-specific IEF for buffalo (15.14 kg CH_4/head/year) is significantly higher than the IPCC default values (3 and 8, for cool and temperate regions, respectively). The ERT recommends that Italy provide background information on how this country-specific value is calculated in its future submissions.

Manure management – N_2O

49. According to table 4.B(a), the allocation of animal waste management systems (AWMS) to liquid systems for dairy and non-dairy cattle is much lower than that to solid storage and dry lot, although the IPCC default value for Western Europe shows that the allocation of AWMS to liquid system is much higher than that to solid storage and dry lot. The ERT recommends that Italy provide the background information for this country-specific allocation in its future submissions.

50. The nitrogen excretion rates used for non-diary cattle, sheep and swine are lower than the IPCC default values. Although the NIR reports that these factors were calculated on the basis of recent European scientific literature, the ERT recommends that Italy include an explanation of how they are derived in its future submissions.

Rice cultivation – CH_4

51. The EF is derived from the one field measurement carried out in an Italian rice paddy field. It is recommended that Italy describe how this EF is representative for all Italian rice paddy fields. The Party is also encouraged to undertake more field studies, pending available resources, in fields where conventional management or soil types differ from the present reference case. Italy indicated that the EF is derived from a study on Italian paddies in the Po river valley were 99% of rice production in Italy occur.

52. The NIR describes (on page 74) that the EF used for Italian rice paddy fields is 39.6 gCH_4/m^2. This figure is 20 per cent higher than the EF based on the field measurement (Schultz et al., 1989), which is adjusted because post-harvest emissions (Wassmann et al., 1994) are taken into account. However, it is well known that methane is not emitted after the final draining because the soil condition changes drastically from anaerobic to aerobic. Because they are calculated before harvest in an Italian rice paddy field, as Schultz et al. (1989) describe, the modified EF and the methane emission rate estimated in the NIR would be overestimated. Italy indicated that their rice paddies are not drained after harvest during the summer and that it will clarify the issue further.

Agricultural soils – N_2O

53. The NIR does not provide a transparent description how the AD are derived for animal wastes applied to soils, N-fixing crops, and crop residues, although the NIR reports that the IPCC methodology has been modified taking into account some specific national circumstances. The Party is recommended to provide the relevant methodology description, including annual country-specific data and modifications of the IPCC methodology, in its future submissions.

C. Non-key sources

Field burning of agricultural residues – CH_4, N_2O

54. The country-specific methodology is not clearly described in the NIR, although the NIR reports (on page 77) that the AD are derived from national data. The Party is recommended to report the country-specific methodology and the corresponding data in its future submissions.

55. The residue/crop ratio in table 4.F of the CRF is less than 1 for cereals except for maize and sorghum, although their IPCC default value is more than 1. The Party is recommended to describe how those data are derived.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

56. The LUCF sector in Italy is a net sink, absorbing 20,358 Gg CO_2 equivalent in 2002, which is equal to 3.7 per cent of total national emissions.

57. Both country-specific methods and IPCC default values have been used in calculating the GHG estimates in the LUCF sector. However, the NIR does not provide sufficient information about the national data or a description of the country-specific methods used. It explains briefly what has been done but does not make it possible to replicate all the calculations. It is suggested that, to enable a thorough review, Italy should include summaries of AD, EFs and calculation parameters in the NIR.

58. The review of the CRF tables for the LUCF sector indicated clear improvements in terms of completeness, consistency with the NIR and reporting of non-CO_2 emissions, compared with the 2003 inventory. Non-CO_2 gases from forest fires are shown directly in CRF table 5, as they do not belong to forest and grassland conversion. This is an improvement compared to the reporting of previous years; however, it was not possible to check the calculations as the amount of biomass burned has not been provided. It is suggested that the IEFs for these calculations be provided in the NIR.

Changes in forest and other woody biomass stocks

59. Only net values are given in table 5 although both removals and emissions could be reported from table 5.A. It is recommended that both emissions and removals be reported in table 5.

Forest and grassland conversion

60. The NIR states that "In Italy, in consideration of national normative, forest fires do not affect changes in land use; therefore conversion of Forest and Grassland does not take place." It is suggested

that Italy provide in the NIR information on land conversions to support the statement that forests and grasslands are not converted to other land use, for example, urban areas. In response to questions raised during the review Italy explained that conversion of forest and grassland, other than forest fires, can occur following specific authorization procedures. These emissions are calculated under the 5.A and 5.D estimates. The ERT encourages Italy to include this information in its future NIRs.

Abandonment of managed lands

61. Italy has used IPCC methods and national data to estimate GHG flux in this category. The NIR provides only a very short description of the methods used and AD (mainly percentages). More detailed descriptions are needed on methods used, for example, the application of the moving average methods to derive the AD. In addition, IEFs should be calculated for all categories (they are currently missing in the Temperate Mixed subcategory).

VI. WASTE

A. Sector overview

62. In 2002 the Waste Sector contributed 2.2 per cent of total national GHG emissions and had decreased by 2.5 per cent since 1990.

63. The CRF tables are complete. All CRF tables for the Waste sector are provided and include emissions of CH_4, CO_2, N_2O, nitrogen oxide (NO_X), carbon monoxide (CO), NMVOCs and sulphur dioxide (SO_2). Solid waste disposal on land and waste-water handling are treated as key sources; waste incineration and compost production are included as non-key sources. The information provided by Italy is mostly transparent.

64. The EF for NMVOCs used to estimate emissions from landfills has been updated. This EF and the associated parameters were verified with IPCC default values. To improve transparency, the ERT recommends that Italy provide information on the methodology used to determine these parameters in its next submission.

B. Key sources

Solid waste disposal on land – CH_4

65. To calculate CH_4 emissions from solid waste disposal sites (SWDS), Italy has made the assumption that all solid waste disposed at landfills was disposed at one landfill, which started operation in 1975. The ERT recommends that Italy improve the explanation of the rationale behind this simplifying assumption. All solid waste has been disposed at managed sites since 2000. The share of waste disposed to uncontrolled landfills, which was 52.7 per cent in 1975, has gradually decreased thanks to the enforcement of new regulations. Emissions are still released from unmanaged landfills due to the waste disposed in the past. The unmanaged sites are considered to be 50 per cent deep and 50 per cent shallow.

66. The maximum CH_4 generation rate is held constant at 0.4 per year. This seems to be high as it corresponds to a half-life of only 1.7 years. Italy responded to a question put by the ERT as to why this value has been chosen. The maximum value of the range in the IPCC Guidelines was chosen because of the high moisture content in Italian landfill sites and lack of other national reference data. The ERT encourages Italy's intention to use the updated default value from the IPCC good practice guidance (0.2) for its next submission.

67. The uncertainties of annual emissions and AD as well as EFs are provided in the NIR and the CRF. Verification and QA/QC procedures to establish the EFs and parameters of solid waste disposed on land are described in the NIR. There are big differences between the country-specific value of degradable organic carbon (DOC) and the IPCC default value. The ERT encourages the Party to provide the underlying information used to derive these EFs in its future submissions.

68. As the amount of waste incinerated has changed, the amount of waste disposed on land may have changed as well. The ERT suggests that, in the Party's next submission, the amount of waste disposed to landfills be evaluated and that emissions from solid waste disposal be recalculated if needed.

C. Non-key sources

Waste incineration – CO_2, CH_4 and N_2O

69. Emissions from waste incineration have been recalculated for the whole time series, based on new data for the amount of waste incinerated in plants, resulting in a decrease in the estimates compared with previous results. Estimates of emissions from the incineration of olive and vine residues are included in the Waste sector. The ERT recommends that Italy provide reasoning for including these emissions in the Waste sector and not the Agriculture sector, and that the reporting of the emissions is addressed also in the Agriculture sector, under Field Burning of Agricultural Residues.

Other waste – CH_4

70. CH_4 emissions from compost production are reported, based on data from the scientific literature, and the uncertainty is estimated to be 100 per cent in annual emissions. The ERT encourages Italy to provide more information on how the estimates were derived and how the uncertainty was estimated.

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

2003 and 2004 Inventory submissions of Italy. 2004 submission including a set of CRF tables for 1990–2002 and an NIR.

UNFCCC secretariat (2004). "Report of the individual review of the greenhouse gas inventory of Italy submitted in the year 2003 (Centralized review)". FCCC/WEB/IRI(3)/2003/ITA (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/itarep03.pdf>).

UNFCCC secretariat. "2004 Status report for Italy" (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/ita04.pdf>).

UNFCCC secretariat. "Synthesis and assessment report of the greenhouse gas inventories submitted in 2004. Part I": FCCC/WEB/SAI/2004 (available on the secretariat web site <http://unfccc.int/resource/webdocs/sai/2004.pdf>) and Part II – the section on *Italy* (unpublished).

UNFCCC secretariat. Review findings for Italy (unpublished).

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UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", "Part II: UNFCCC reporting guidelines on national communications" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/1999/7 (available on the secretariat web site <http://www.unfccc.int/resource/docs/cop5/07.pdf>).

UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/2002/8 (available on the secretariat web site <http://unfccc.int/resource/docs/cop8/08.pdf>).

UNFCCC secretariat. Database search tool – *Locator* (unpublished).

IPCC. *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000* (available on the following web site: <http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm>).

IPCC/OECD/IEA. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, volumes 1–3, 1997* (available on the following web site: <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>).

B. Additional materials

Responses to questions during the review were received from Mr. Riccardo De Lauretis (Agency for the Protection of the Environment and for Technical Services, APAT) including additional material on the methodology and assumptions used.

BEN (2004). *Bilancio Energetico Nazionale (National Energy Balance). Time series 1994–2002* (available on the web site <http://www.minindustria.it>, under Statistiche dell'Energia, or alternatively on the web site <http://dgerm.attivitaproduttive.gov.it/dgerm/ben.html>).

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