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Report of the individual review of the greenhouse gas inventory of Turkey submitted in 2009*

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 greenhouse gas (GHG) emission inventory submission of Turkey, coordinated by the UNFCCC secretariat, in accordance with decision 19/CP.8. The review took place from 7 to 12 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Bernd Gugele (European Community) and Ms. Barbara Muik (Austria); energy – Mr. Darío Gómez (Argentina), Mr. Hristo Vassilev (Bulgaria) and Mr. Daniel Tutu Benefoh (Ghana); industrial processes – Ms. Lisa Hanle (United States of America) and Ms. Sonia Petrie (New Zealand); agriculture – Mr. Etienne Mathias (France) and Mr. Rob Sturgiss (Australia); land use, land-use change and forestry (LULUCF) – Mr. Leandro Buendia (Philippines) and Ms. Kimberly Klunich (United States of America); and waste – Mr. Eduardo Calvo (Peru) and Ms. Medea Inashvili (Georgia). Mr. Gómez and Mr. Gugele were the lead reviewers. The review was coordinated by Mr. Harald Diaz-Bone (UNFCCC secretariat).

2. In accordance with the "Guidelines for the technical review of GHG inventories from Parties included in Annex I to the Convention" (hereinafter referred to as the UNFCCC review guidelines), a draft version of this report was communicated to the Government of Turkey, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Inventory submission and other sources of information

3. In its 2009 submission, Turkey submitted a complete set of common reporting format (CRF) tables for the period 1990–2007 and a national inventory report (NIR). The CRF tables were submitted on 13 April 2009; the NIR was submitted on 31 July 2009. Where necessary, the expert review team (ERT) also used previous years' submissions, additional information provided during the review and other information. The list of materials used during the review is provided in the annex to this report. The ERT recommends that Turkey provide the complete inventory submission by 15 April each year.

C. Emission profiles and trends

4. In 2007, the main GHG in Turkey was carbon dioxide (CO_2), accounting for 81.7 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (14.6 per cent), and nitrous oxide (N_2O), (2.6 per cent). Hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.1 per cent of the overall GHG emissions in the country; perfluorocarbons (PFCs) are not reported. The energy sector accounted for 77.4 per cent of the total GHG emissions, followed by waste (8.5 per cent), agriculture (7.1 per cent), and industrial processes (7.0 per cent); no emissions are reported from the solvent and other product use sector. Total GHG emissions amounted to 372,637.62 Gg CO_2 eq and increased by 119.1 per cent between 1990 and 2007. These numbers have to be interpreted with caution, owing to gaps in reporting, leading to an inconsistent time series in the industrial processes (CO_2, SF_6) and agriculture (N_2O) sectors, and also to not estimated emissions from categories for all sectors and years.

5. Tables 1 and 2 show total greenhouse gas emissions by gas and by sector, respectively.

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

Table 1. Greenhouse gas emissions by gas, 1990–2007

Greenhouse gas	Gg CO_2 eq							Change 1990–2007 (%)
	1990	1995	2000	2004	2005	2006	2007	
CO_2	139 594.10	171 853.83	223 806.01	241 884.43	256 433.72	273 704.67	304 474.81	118.1
CH_4	29 207.19	42 538.78	49 268.91	46 289.71	49 316.94	50 330.09	54 384.36	86.2
N_2O	1 257.46	6 326.65	5 739.74	5 494.48	3 431.88	4 594.32	9 652.04	667.6
HFCs	NA	NA	818.43	2 228.73	2 379.00	2 729.75	3 174.30	100.0
PFCs	NA	NA	NA	NA	NA, NE	404.57	C, NA, NE	NA
SF_6	NA, NE	NA, NE	322.89	704.57	858.73	911.11	952.11	100.0

Abbreviations: NA = not applicable, NE = not estimated, C = confidential.

Table 2. Greenhouse gas emissions by sector, 1990–2007

Sector	Gg CO_2 eq							Change 1990–2007 (%)
	1990	1995	2000	2004	2005	2006	2007	
Energy	132 128.43	160 787.57	212 546.33	227 429.74	241 449.65	258 206.61	288 328.07	118.2
Industrial processes	13 070.51	21 644.09	22 232.42	26 448.25	25 394.84	28 036.40	26 183.05	100.3
Solvent and other product use	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA
Agriculture	18 473.36	17 973.83	16 134.66	15 177.82	15 823.44	16 366.61	26 276.80	42.2
LULUCF	–44 870.53	–61 836.21	–67 557.57	–75 103.75	–69 532.60	–75 935.42	–76 274.00	70.0
Waste	6 386.46	20 313.78	29 042.56	27 546.11	29 752.33	30 064.88	31 849.70	398.7
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	125 188.21	158 883.06	212 398.41	221 498.19	242 887.66	256 739.08	296 363.62	136.7
Total (without LULUCF)	170 058.74	220 719.27	279 955.98	296 601.93	312 420.27	332 674.50	372 637.62	119.1

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable, NE = not estimated.

D. Key categories

6. Turkey has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2009 submission. The key category analysis performed by the Party and that performed by the secretariat[2] produced different results, owing to the fact that Turkey did not use the results of the trend assessment to identify additional key categories and did not report a key category analysis for 1990. Turkey has included the LULUCF sector in its key category analysis following recommendations made by the ERT. However, Turkey has included the whole LULUCF sector as one category and not disaggregated as recommended in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). Therefore, the ERT found that the key category analysis was not performed in accordance with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC good practice guidance for LULUCF.

7. The ERT recommends that Turkey follow the IPCC good practice guidance and the IPCC good practice guidance for LULUCF in order to identify its key categories, according to both the level and trend assessment, and that the Party either disaggregate the LULUCF sector for its key category analysis or report on the rationale for the level of category disaggregation used. The ERT recommends that Turkey report a key category analysis for the year 1990 in its next submission. The ERT reiterates the recommendation from previous reviews that Turkey improve the transparency of its approach by ranking categories according to their contribution to the emission trend for the trend assessment.

8. Turkey uses mainly lower-tier methods for calculating emissions and the results of the key category analysis are not used as a driving factor for the improvement of the Turkish inventory. During the review, the ERT was informed by Turkey that it would take into account the results of the key category analysis when preparing future GHG emission inventories. The ERT welcomes these plans and recommends that Turkey start implementing them in its next inventory submission, in particular by ensuring that appropriate methods are used to estimate emissions from key categories.

E. Main findings

9. The inventory mostly follows the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

10. The ERT formulated a number of observations and recommendations relating to the completeness of the annual submission indicating that:

(a) For all sectors, there are not estimated emissions for categories for which methods are available in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance (para. 14);

[2] The secretariat identified, for each Party, those categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for those Parties that provided a full set of CRF tables for the base year. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

(b) For 2007 only, emissions for several categories in the industrial processes sector that have been identified as confidential were not reported in an aggregated manner (paras. 15, 16, 52);

(c) CRF tables 2(II) F, 5.D – 5.F, 5(III)-5(IV) and 8(b) as well as background information in several CRF tables are missing for all years.

11. The ERT identified a need for further improvement in transparency of the NIR and noted that its structure does not follow completely the outline in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) (paras. 18–20). The ERT also indicated the need to improve the reporting regarding uncertainty analysis (para. 23).

12. The ERT noted that the need to establish a formal quality assurance/quality control (QA/QC) plan is still pending (para. 24).

13. The 2009 inventory submission shows some improvement in the key category analysis with the inclusion of the LULUCF sector; however the ERT indicated the need to incorporate this sector in a disaggregated manner in future analyses (paras. 6, 7).

F. Cross-cutting issues

1. Completeness

14. The inventory is complete in terms of years, but emissions from some categories are reported as not estimated ("NE") in the reporting for every sector for all years. These include: fugitive emissions from oil and natural gas; emissions from the solvent and other product use sector; N_2O emissions from pasture, range and paddock manure and indirect; emissions from land converted to cropland and to grassland; emissions from wetlands, settlements and other land; and CH_4 and N_2O emissions from wastewater handling. Turkey has not estimated potential emissions of HFCs, PFCs and SF_6 as well as actual PFC emissions from consumption of halocarbons and SF_6. For actual HFC emissions, Turkey only reports HFC emissions from refrigeration and air-conditioning equipment. Turkey included most required CRF tables; however tables 2(II).F 5.D–5.F, 5(III)–5(IV) and 8(b) were not provided.

15. For 2007, Turkey reports emissions from several categories in the industrial processes sector as confidential ("C"). These emissions are not reported elsewhere in the inventory and thus are not included in the national total; however they are included in the national total for the rest of the time series.

16. The ERT noted that Turkey improved the completeness of its inventory by reporting N_2O emissions from certain elements of the agricultural soils category in the 2009 submission. During the review, the ERT was informed that Turkey is working to fill the other reporting gaps. The ERT welcomes the improvements made and recommends that Turkey estimate in its next inventory submission emissions for all categories that were previously not reported and for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance. In addition, the ERT recommends that Turkey report confidential emissions in an aggregated manner. Finally, the ERT recommends that Turkey submit complete CRF tables.

2. Transparency

17. The ERT noted that the structure of the NIR does not completely follow the outline in the UNFCCC reporting guidelines. Limited information is given on cross-cutting issues, such as the institutional arrangements for inventory preparation and the process of inventory preparation, information on the QA/QC plan, key categories and uncertainty evaluation; also, the NIR does not

include a chapter on recalculations and improvements. The ERT encourages that Turkey restructure its NIR in accordance with the UNFCCC reporting guidelines and enhance its reporting on cross-cutting issues.

18. The ERT noted that explanations for the use of notation keys in the CRF tables (in particular table 9(a), information on notation keys) are limited. Several categories in the industrial processes sector are reported as "C", including emissions, but this reporting is not consistent for the whole time series. The ERT reiterates the recommendation from previous reviews that Turkey provide explanations for the use of the notation keys "NE" and included elsewhere ("IE") in CRF table 9(a) and encourages Turkey to reconsider the use of notation keys, especially in the industrial processes sector.

19. The information in the NIR is still incomplete and is partially unclear in all sectors. The ERT reiterates the recommendation from previous reviews that Turkey further improve the transparency of its national inventory submission by including the following: more detailed information on the choice of all methodologies, activity data (AD), emission factors (EFs) and parameters, assumptions and national circumstances; all references to the external sources used for inventory preparation; more detailed information on the national energy balances; and further explanation of EFs, AD and emission trends for all sectors and key categories, especially in the case of fluctuations.

3. Recalculations and time-series consistency

20. The ERT noted that recalculations reported by the Party for the time series 1990–2006 had been undertaken. These include the estimation of SF_6 emissions for the year 2006 that were reported as "NE" in the previous submission and revised estimates for emissions/removals from forest land remaining forest land for the whole time series. The effect of the recalculations was an increase in total GHG emissions (excluding LULUCF) in 2006 of 0.27 per cent. The rationale for these recalculations is not provided in CRF table 8(b) and is only partly explained in the NIR.

21. Turkey reports N_2O emissions from agriculture for 2007 in its 2009 submission, but it did not undertake estimates for the whole time series. During the review, the ERT was informed that Turkey plans to include emission estimates for all years in its next submission. The ERT welcomes these plans and recommends that Turkey prepare emission estimates for the entire time series in order to fully reflect improvements in the GHG emission inventory. For implementing and reporting of emission estimates, the ERT recommends that Turkey follow the approaches given in the IPCC good practice guidance and the reporting requirements of the UNFCCC reporting guidelines.

22. The ERT noted some inconsistencies in the time series for EFs (energy), AD (industrial processes and agriculture) and emissions (LULUCF). Further explanations and recommendations are included in the sectoral chapters of this report.

4. Uncertainties

23. Turkey used a tier 1 uncertainty analysis, mainly based on expert judgement, and estimates a total uncertainty of 10.9 per cent that is mainly influenced by the highly uncertain data of CO_2 uptake by forests. Uncertainties are reported for all categories, but generally without documentation on the rationale for uncertainties. The ERT recommends that Turkey document the rationale for uncertainties for all sectors when expert judgement is used, take into account the results of the uncertainty analysis in its inventory improvement plan, and update uncertainty estimates for categories that are recalculated.

5. Verification and quality assurance/quality control approaches

24. Turkey has not yet elaborated a formal QA/QC plan in accordance with the IPCC good practice guidance. According to the information provided during the last in-country review taken from the annual

review report, QA is mainly carried out by the Turkish Statistical Institute (TurkStat) and QC is carried out by individual organizations within their responsibility for each respective sector. Emission data for transport and public electricity and heat production were verified. The NIR includes only limited information on general QC procedures implemented and no documentation on QA/QC performed. During the review, the ERT was informed that Turkey intends to elaborate a QA/QC plan. The ERT welcomes this intention and reiterates the recommendation made during the previous review that Turkey: (1) establish a formal QA/QC plan in accordance with the IPCC good practice guidance; (2) clearly define and document all responsibilities of institutions/experts with regard to their contribution to the national GHG inventory, including QA/QC, and document this in the next NIR; (3) produce better documentation of QC at all stages of inventory preparation; and (4) reconsider the internal schedule, in particular with regard to the finalization of the NIR, which should be submitted by 15 April each year.

6. Follow-up to previous reviews

25. The ERT acknowledges the short period of time available to Turkey between the review of the 2008 submission and the 2009 submission and that, owing to this, only a small number of recommendations could be implemented, such as the inclusion of the LULUCF sector in its key category analysis, the improvement of transparency by providing better documentation on the calculation of emissions from road transportation and manure management in the NIR, and the reporting of N_2O emissions from manure management and certain elements of the agricultural soils category. The ERT reiterates the recommendation made during the previous review that Turkey implement a transparent and well-documented regular procedure that allows the improvement of the national GHG inventory to be managed according to well-prescribed priorities, in order to make best use of the resources available.

26. With regard to the strengthening of the institutional arrangements and inventory management, the ERT was informed during the review that: TurkStat had been designated as the focal point of the national GHG emission inventory by the Climate Change Coordination Board in January 2009 and would have responsibility for the national inventory; most institutions involved in the inventory preparation have climate change focal points, although institutional capacity is still lacking; there are plans to allocate more human and financial resources; TurkStat will be responsible for archiving; and a QA/QC plan and improvement plan have not yet been developed, but that improvements are currently focused on estimating emissions from missing categories.

27. Recommendations relating to the different sectors and categories are included in the relevant sector chapters below.

G. Areas for further improvement

1. Identified by the Party

28. The NIR does not identify any areas for improvement with regard to cross-cutting issues. Turkey indicated that it is working to improve its estimates of emissions from road transportation, to obtain AD to estimate emissions from bunker fuels under the energy sector, and to estimate carbon stock changes in forest soil and litter under the LULUCF sector.

2. Identified by the expert review team

29. The ERT identified the following cross-cutting issues for improvement:

(a) The calculation and reporting of emissions that are currently “NE” and for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance;

(b) The use of higher-tier methods to estimate emissions from key categories;

(c) The transparency by structuring the NIR so that it follows more closely the UNFCCC reporting guidelines and provision of more precise descriptions of the methods, AD and EFs used;

(d) The development of an improvement plan for the inventory;

(e) The assessment of time-series consistency, carrying out recalculations where necessary and provision of the corresponding rationale in the NIR;

(f) The creation of a QA/QC management system on the basis of the QA/QC plan.

30. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

31. The energy sector is the main sector in the GHG inventory of Turkey. In 2007, emissions from the energy sector amounted to 288,328.07 Gg CO_2 eq, or 77.4 per cent of total GHG emissions. Since 1990, emissions have increased by 118.2 per cent. The key driver for the rise in emissions is changes occurring in energy industries, manufacturing industries and construction, and transport. Within the sector, 37.1 per cent of the emissions were from energy industries, followed by 27.9 per cent from manufacturing industries and construction, 18.0 per cent from transport and 16.4 per cent from other sectors. The remaining 0.6 per cent was from solid fuels.

32. Some categories such as fugitive emissions from oil and gas and emissions from international bunkers are reported as "NE". Also, emissions from combustion in the category other are reported as not applicable ("NA") and/or not occurring ("NO"). During the review, Turkey informed the ERT that military emissions are "NE" and the corresponding fuel consumption, at present, is not collected. Turkey provided information on bunker fuels, which is discussed in paragraph 37. The ERT reiterates previous recommendations that Turkey improve the completeness of its reporting.

33. Turkey has made efforts to improve transparency, particularly concerning AD. Turkey provides in the NIR a copy of the energy balance issued by the Ministry of Energy and Natural Resources (MENR). The NIR indicates that there are other sources of information apart from the energy balance that Turkey uses to estimate AD, in particular for liquid fuels. During the review, Turkey informed the ERT that: the data provided by the MENR are considered as the official fuel consumption data and that data relative to liquid fuels for the transport categories are checked for time-series consistency against data provided by the Petroleum Producers Association and the Automotive Producers Association. To improve transparency, the ERT recommends that Turkey improve the description of the role of data providers in the NIR. Although Turkey reports some of the EFs used to estimate emissions in annex A.2 to the NIR, there is still a lack of transparency regarding the EFs actually adopted by Turkey, as indicated by the findings reported in paragraphs 40–45 below.

34. Another matter not reported transparently is whether Turkey has used different fuel properties for different years. During the review, Turkey provided the ERT with time-series figures of net calorific values (NCVs) and EFs for crude oil, gasoline, jet kerosene, gas/diesel oil, liquefied petroleum gas, naphtha, coking coal, other bituminous coal, lignite and natural gas. However, Turkey did not report values for a number of fuels, most noticeably residual fuel oil, other kerosene, bitumen, lubricants and biomass. The ERT noted that: EFs for all fuels and NCVs for liquid fuels are constant throughout the period 1990–2007 and NCVs for solid fuels and natural gas vary. The ERT welcomes the information provided on NCVs and EFs and improvements in transparency and recommends that Turkey assess the

potential inconsistency of variable NCVs and constant CO_2 EFs for solid fuels and natural gas, as these two physical properties, being function of fuel composition, are strongly correlated. The ERT also recommends that Turkey make efforts to estimate and report the properties for the fuels that were not reported.

35. No recalculations were made in the 2009 submission. However, the ERT noted time-series inconsistencies that are discussed in paragraphs 43–48. The ERT recommends that Turkey amend these inconsistencies and recalculate the corresponding emissions in its subsequent submission. During the review, Turkey indicated its intention to recalculate emissions from public electricity and heat production and petroleum refining. The ERT welcomes this decision and encourages Turkey to undertake this task.

36. During the review, Turkey informed the ERT about category-specific QC procedures that are performed by the main data suppliers, TurkStat, Ministry of Education (MoE) and the Ministry of Transport (MoT). These procedures are not mentioned in the summary of the QA/QC approach (annex A.4 to the NIR). During the review, Turkey also informed the ERT that, in general, there are no QC checks for emission estimates. The ERT encourages Turkey to improve QA/QC-specific procedures for the energy sector and to document them in the NIR.

37. The NIR reports that the uncertainties for sectoral energy use were estimated by the MENR while those associated with selecting EFs and estimating emissions were estimated using expert judgement. During the review, Turkey informed the ERT that an energy expert group was formed in 2006 to evaluate the uncertainty of each fuel reported in the energy balance. The values estimated in 2006 have been adopted for the whole time series. The ERT appreciates Turkey's efforts to provide additional information in this regard but encourages Turkey to continue improving the uncertainty assessment by drawing on the IPCC good practice guidance.

B. Reference and sectoral approaches

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

38. In 2007, the difference in CO_2 emissions between both approaches was 7.3 per cent. A highly variable trend for this difference is exhibited between 1990 and 2007, with the lowest point in 1991 (–4.4 per cent) and the highest in 1990 (+10.5 per cent). As regards the reference approach, data on imports and exports are missing for a number of oil products and solid fuels, most noticeably for other kerosene, residual fuel oil, lubricants, refinery feedstocks and other bituminous coal. When this information is missing, Turkey aggregates these products under oil, lignite or hard coal and uses average values for the corresponding carbon content and NCV. For the sectoral approach, fuel consumption is available for all fuels used. Turkey reports in the NIR that the main reason for such differences lies in the differences in carbon content and NCV between the aggregated and disaggregated fuels. While this may be the primary reason, the ERT recommends that Turkey investigate other possible factors, such as statistical differences in the energy balance and missing information in the reference or sectoral approaches.

39. There are a number of differences between the data in the CRF tables and those provided by the International Energy Agency (IEA) database. The ERT encourages Turkey to examine the data available for the Party from IEA and international databases (e.g. Eurostat) and to make efforts to reconcile these data with those available from the inventory team and assess the practicalities of filling the gaps in information with the data from international databases.

2. International bunker fuels

40. Turkey does not estimate emissions from international aviation and navigation owing to the unavailability of AD. During the review, Turkey informed the ERT that the MoT is planning to initiate a

project that will enable these data to be obtained. During the last in-country visit, the ERT found existing data that could be used to estimate emissions from international aviation and encouraged Turkey to evaluate this information and make efforts to estimate these emissions if the data were considered appropriate. The ERT encourages Turkey to undertake the project to estimate emissions from the use of international bunker fuels.

3. Feedstocks and non-energy use of fuels

41. Turkey has not provided any information in CRF table 1.A(d) on feedstocks and non-energy use of fuels, and there are some inconsistencies regarding this matter in the NIR and CRF tables. For instance, the NIR reports that naphtha is the only fuel used as feedstock in the petrochemical industry and that natural gas is used as feedstock in the fertilizer industry; however, in CRF table 1.A(d), gas/diesel oil is the only fuel reported as feedstock or having a non-energy use. During the review, Turkey acknowledged the use of naphtha and natural gas as feedstock but indicated that it was not possible to disaggregate the corresponding AD. The ERT reiterates the recommendation from the previous review that Turkey explore future data collection efforts for quantifying the amount of feedstocks and non-energy use of fuels, and that the Party make use of the documentation box in CRF table 1.A(d) in its future reporting.

C. Key categories

Stationary combustion: solid, liquid and gaseous fuels– CO_2

42. Turkey has continued to use the tier 1 method and default EFs to estimate emissions from stationary combustion. The ERT reiterates previous recommendations that Turkey make efforts to use tier 2 methods for key categories under stationary combustion, while trying to develop country-specific EFs and improving the collection of fuel consumption data.

43. The NIR indicates that country-specific EFs have been used for public electricity and heat production. However, during the review, the Party informed the ERT that the default EFs, reported in the Revised 1996 IPCC Guidelines, were used for all fuels throughout the period 1990–2007. The ERT recommends that Turkey improve transparency in the NIR and reiterates previous recommendations that Turkey make efforts to obtain country-specific and plant-specific EFs from the data that are already being collected by the MENR.

44. For all fuels, the corresponding time series of implied emission factors (IEFs) shows unexpected fluctuations. For liquid and solid fuels, the IEFs for 2006 and 2007 (72.60 and 92.70 t CO_2/TJ, respectively) are within the corresponding IPCC default values (63.07–100.83 t CO_2/TJ and 94.60–106.70 t CO_2/TJ, respectively) while for previous years, the IEFs are much lower and vary considerably. For natural gas, the IEF is equal to the corresponding IPCC default value (55.8 t CO_2/TJ) for the periods 1990–1999 and 2005–2007; however, there are large inter-annual fluctuations for the period 2000–2004. These trends in IEFs are inconsistent with the use of constant EFs throughout the time series (for liquid fuels) and with the variable EFs reported by the Party during the review for solid fuels and natural gas (see para. 34 above). The ERT recommends that Turkey recalculate the whole time series using the EFs that best represent national circumstances until the Party is able to develop its own country-specific data.

45. IEFs for non-ferrous metals and iron and steel show unusually low values in 2007 (30.24 and 9.29 t CO_2/TJ, respectively). During the review, Turkey informed the ERT that residual fuel oil was used in both subcategories, while gas/diesel oil was also used in iron and steel. The 2007 IEF values are not consistent with the use of these fuels and the corresponding EFs adopted by Turkey. The ERT recommends that Turkey verify the selection of AD, EFs and the calculations performed to estimate these emissions and undertake the corresponding recalculations in its next inventory submission.

46. For the subcategories chemicals and other (under manufacturing industries and construction) and residential, the IEFs are consistently equal to the IPCC default EF (55.8 t CO_2/TJ) in the period 1990–1999. Starting in 2000, the time series shows large fluctuations. During the review, Turkey indicated that this was because of variations in the NCV of natural gas obtained by the MENR. Considering the previously cited information provided by Turkey regarding the adoption of the IPCC default EF for natural gas across the time series (see para. 31 above), the ERT noted that:

(a) The use of a constant EF and a variable NCV leads to inconsistencies, as the physical properties of the fuel are closely correlated;

(b) The use of a constant EF should have produced a time series of constant values equal to the IPCC default EF, considering that natural gas is the only gaseous fuel used.

47. The ERT recommends that Turkey verify the selection of AD, EF and the calculations performed to estimate these emissions and that the Party undertake the corresponding recalculations in its next inventory submission.

48. The trends in CO_2 IEFs for residential for solid and liquid fuels exhibit large inter annual fluctuations. For solid fuels, the CO_2 IEFs for the period 1990–2004 (in the range 123.42–140.70 t/TJ) are outside the IPCC default range (94.6–106.7 t/TJ). During the review, Turkey informed the ERT that this was because of variations in the NCVs of the corresponding fuels. The ERT makes similar observations to those in paragraph 43 and reiterates its recommendations that Turkey verify the selection of AD, EF and the calculations performed to estimate these emissions and that the Party undertake the corresponding recalculations in its next inventory submission.

D. Non-key categories

1. Stationary combustion: solid, liquid and gaseous fuels – CH_4 and N_2O

49. As with CO_2 emissions, Turkey reports in the NIR that country-specific EFs have been used for all fuels. However, during the review, the Party informed the ERT that the default EFs, as given in the Revised 1996 IPCC Guidelines, were used for all fuels throughout the period 1990–2007. The ERT recommends that Turkey improve transparency in both the NIR and CRF summary table 3 by clearly indicating the choice of EFs and estimation methods used.

2. Road transportation: liquid fuels – CH_4 and N_2O

50. Turkey estimates non-CO_2 emissions from road transportation using a model developed by Istanbul Technical University, which is based on the COPERT model. The ERT commends Turkey for its improvement of the discussion of this model following previous recommendations and encourages the Party to further specify the version of the COPERT model that was used as the basis for the country-specific model and the modifications that were carried out.

III. Industrial processes and solvent and other product use

A. Sector overview

51. In 2007, emissions from the industrial process sector amounted to 26,183.05 Gg CO_2 eq, or 7.0 per cent of total GHG emissions. Emissions from the solvent and other product use sector were reported as “NA” or “NE”. Since 1990, emissions have increased by 100.3 per cent in the industrial processes sector. The key driver for this rise in emissions is the increase in CO_2 emissions from cement production (105.2 per cent). Within the industrial processes sector, 84.0 per cent of the emissions were from mineral products, followed by 15.8 per cent from consumption of halocarbons and SF_6 and 0.2 per cent from chemical industry. The following categories are reported as “NE”: PFC emissions

from aluminum production (except for the year 2006); potential emissions from fluorinated gases (F-gases); actual emissions from halocarbons and SF_6 (except for HFC-134a and SF_6); and emissions from the solvent and other product use sector. The ERT noted gaps in reporting in CRF tables 2(I), 2(II) and 2(II).F. The ERT recommends that Turkey enter appropriate notation keys in order to fill these gaps and that the Party report emissions for categories currently reported as "NE", and for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance, when data become available.

52. The ERT noted several categories were reported as "C" for the year 2007, including CO_2 emissions from limestone and dolomite use, soda ash production and ammonia production; N_2O emissions from nitric acid production; and CO_2 emissions and emissions of PFCs from aluminum production. The ERT acknowledges the confidentiality requirements in Turkey for categories where there are fewer than three industrial plants. However, the NIR does not indicate clearly whether these confidential emission estimates are aggregated elsewhere or whether they are excluded from the total and the inventory is therefore underestimated. The ERT recommends that Turkey aggregate all confidential data and that it report emissions from these categories for all years in its next submission. The ERT also recommends that Turkey document how each of the confidential categories of emission estimates is reported in its next NIR.

53. The ERT encourages Turkey to continue to provide greater transparency in the NIR, particularly in describing the methods and EFs used in estimating emissions and explaining fluctuations in emission trends over the time series for all categories.

54. Emissions of SF_6 from consumption of halocarbons and SF_6 were recalculated for the year 2006 but no justification for this recalculation was given in the NIR. The ERT recommends that Turkey include the justification for any recalculations made in its next NIR and CRF table 8(b).

B. Key categories

1. Cement production – CO_2

55. The NIR states that a tier 1 method is used to estimate CO_2 emissions from cement production. However, monthly clinker production data are used to estimate emissions, indicating that Turkey is using a tier 2 method. As the lime content of the clinker is currently unknown, the default EF is used. The ERT recommends that Turkey calculate emissions using the tier 2 method in line with the IPCC good practice guidance and that it use the default EF (0.51) and cement kiln dust factor (1.02) for all years. As cement production is a key category, the ERT reiterates the previous recommendation that Turkey develop country-specific EFs as far as resources allow.

2. Nitric acid production – N_2O

56. Nitric acid production is a key category; however, Turkey uses an IPCC default EF. The IEF (0.019 t/t) is one of the highest factors used by any reporting Party (0.002–3.865 t/t). The ERT reiterates the recommendation made during the previous review that Turkey provide information in its NIR on the type of technology used in nitric acid production plants and on their age in order to provide justification for using this default EF.

57. The NIR reports that plants were equipped with non-selective catalytic reduction (NSCR) technology in 2007; however, there is no discussion on the methodology used to calculate emissions. The ERT recommends that, in order to accurately capture emission reductions from the NSCR abatement technology, Turkey use the method in the IPCC good practice guidance (in the absence of directly measured data) and include the N_2O destruction factor and abatement system utilization factor for the years when NSCR is used.

58. As nitric acid production is a key category, the ERT encourages Turkey to collect plant-specific data and use a higher tier to estimate emissions.

3. Iron and steel production – CO_2

59. Turkey currently reports emissions using a tier 1 method. The ERT recommends that Turkey work towards implementing a tier 2 method to estimate emissions from iron and steel, as it is a key category.

60. In accordance with previous recommendations, emissions for iron and steel were reported as "IE" and were included in the energy sector. However, this was only for the year 2007; estimates for the period 1990–2006 were double counted, as they were included in both the industrial processes and energy sectors. The ERT recommends that CO_2 emissions resulting from the consumption of reducing agents in iron and steel production be reported under iron and steel production in line with the IPCC good practice guidance. To enhance transparency and ensure that there is no double counting, the ERT further recommends that the quantity of reducing agents used in iron and steel production be reported as a feedstock in the energy sector and that the corresponding CO_2 emissions be deducted from energy sector emissions.

61. In response to a query from the ERT during the review, Turkey explained that limestone is used in iron and steel production but is not currently reported in the inventory. The ERT recommends that Turkey report emissions from limestone use in iron and steel under limestone and dolomite use.

C. Non-key categories

1. Lime production – CO_2

62. The IEF for limestone use (0.91 t/t) is the highest of all Parties (0.30–0.91 t/t) and is higher than the IPCC default value (0.75 t/t for high calcium lime and 0.86 t/t for dolomitic lime). During the review, Turkey explained that this EF would be re-examined. The ERT welcomes this further research and recommends that Turkey provide further information in the next NIR to justify the use of this EF.

2. Aluminium production – CO_2 and PFCs

63. The ERT noted there is inconsistency in data in the time series for aluminium production. Production data are reported for the years 1990–2004 but the notation key "NA" is used from 2005 onward. However, CO_2 emissions are estimated for all years with the exception of 2007, where they are reported as "C". During the review, Turkey explained that the use of the notation key "NA" was due to errors when using CRF Reporter software. The ERT encourages Turkey to continue working with the secretariat to resolve this problem.

IV. Agriculture

A. Sector overview

64. In 2007, emissions from the agriculture sector amounted to 26,276.80 Gg CO_2 eq, or 7.1 per cent of total GHG emissions. Since 1990, emissions have increased by 42.2 per cent. The key drivers for the rise in emissions are agricultural soils and manure management. Within the sector, 59.5 per cent of the emissions were from enteric fermentation, followed by 21.4 per cent from agricultural soils and 15.5 per cent from manure management. Field burning of agricultural residues accounted for 2.1 per cent and rice cultivation accounted for 1.5 per cent.

65. The completeness of the inventory of Turkey has improved since the previous submission, as estimates of N_2O emissions from manure management and certain elements of the agricultural soils

category have been reported for the first time. The ERT welcomes this development; however, the inventory remains incomplete, as no estimate has been provided for the following subcategories under agricultural soils: nitrogen (N)-fixing crops; crop residue; cultivation of histosols; and pasture, range and paddock. Turkey has indicated that it plans to include estimates from these categories in its next submission.

66. The ERT noted that estimates could be prepared for direct soil emissions from synthetic fertilizers, N-fixing crops and crop residue, and pasture, range and paddock using AD already used for other categories in conjunction with the use of IPCC default EFs. In the case of crop residue, AD could be obtained from the Food and Agriculture Organization of the United Nations (FAO). Cultivation of histosols is reported as "NA" but this is not an appropriate use of that notation key; the ERT recommends that the Party assess whether this subcategory should be classified as "NO" or "NE".

67. Turkey has not yet reported estimates for indirect emissions from agricultural soils. The ERT noted that estimates could be prepared for this category with available AD in conjunction with the use of IPCC default EFs.

68. The ERT reiterates the recommendation made during the previous review that Turkey develop estimates for missing categories, for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance to improve the completeness of the inventory in its next submission.

69. The transparency of Turkey's inventory could be improved considerably. The NIR could contain more information describing Turkey's national circumstances and emission trends. More information could be provided on its choice of methods, on EFs used and on planned improvements for each category. The provision of data in CRF background tables would also improve the transparency of the estimates provided. The ERT recommends that Turkey improve the transparency of its reporting through additional explanations in the NIR and completed CRF tables.

70. The reported emissions are generally consistent across the time series. However, CH_4 emissions from enteric fermentation of dairy cattle are not consistent over the time series and recalculations are recommended for the period 1990–2006 to align the estimates for this period with methods applied for the estimates calculated for 2007. In addition, estimates are missing for N_2O emissions from manure management and agricultural soils for the period 1990–2006. New estimates for these categories are required for the period 1990–2006 to ensure completeness and time-series consistency

B. Key categories

1. Enteric fermentation – CH_4

71. Turkey uses tier 1 methods for the estimation of emissions from all livestock species. The AD used are generally consistent with data reported by FAO, while EFs are a combination of IPCC default EFs for Asia and Eastern Europe. For 2007, as regards AD for dairy cattle, Turkey has used two new classifications: 'cultural' cattle and 'domestic' cattle. The ERT encourages Turkey to provide a recalculation of the time series for this category using AD split between cultural and domestic cattle. The ERT recommends the development of tier 2 methods for dairy and beef cattle and giving consideration to the use of tier 2 methods for sheep (given the relatively high milk yields reported for sheep). If Turkey has low average milk yields for dairy cattle then it is likely that changing to a tier 2 method would only lead to a small increase in emissions from this category.

2. Manure management – CH_4

72. Turkey uses tier 1 methods for this category. However, the EFs used have not been transparently reported in the NIR and a significant increase in the IEF for dairy cattle for 2007 (from 9.1 kg CH_4

per head to 16.1 kg CH_4 per head) has not been explained. The ERT recommends that the time series be evaluated for time-series consistency for the period 1990–2006. The ERT also recommends that Turkey consider changing to a tier 2 method for key animal types including dairy cattle, beef cattle and possibly sheep.

3. Manure management – N_2O

73. Turkey has provided estimates for this category for the first time for the year 2007. The ERT welcomes this development; however, the transparency of the estimates could be significantly improved. The EFs used have not been transparently reported in the NIR and background data are missing from the CRF tables. To ensure completeness and to maintain time-series consistency for estimates for this category, the ERT recommends that the time series be recalculated for the period 1990–2006 in its next submission.

4. Agricultural soils – N_2O

74. Turkey has provided estimates for this category for the first time for the year 2007. The ERT welcomes this development. AD used are generally consistent with data reported by FAO. Nonetheless, the transparency of the estimates could be significantly improved as, in particular, the EFs used have not been transparently reported in the NIR and background data are missing from the CRF tables. To ensure completeness and to maintain time-series consistency for the estimates for this category, the ERT recommends that Turkey calculate estimates for the period 1990–2006 in its next submission.

C. Non-key categories

1. Rice cultivation – CH_4

75. In the CRF table, data are reported under single aeration even though the EF for the continuously flooded technique has been applied. The ERT reiterates the recommendation made during the previous review that Turkey re-evaluate the choice of EF used for rice cultivation and that it correct the data included in CRF table 4.C.

2. Field burning of crop residues – CH_4 and N_2O

76. In Turkey the burning of crop residues is prohibited by law, however Turkey utilises a factor for $Frac_{BURN}$ of 25 per cent. The ERT reiterates the recommendation made during the previous review that Turkey provide further information on the choice of the $Frac_{BURN}$ factor.

V. Land use, land-use change and forestry

A. Sector overview

77. In 2007, net GHG removals from the LULUCF sector amounted to 76,274.00 Gg CO_2 eq. Since 1990, net removals have increased by 70.0 per cent. The key driver for the rise in removals is net carbon stock changes in forest land remaining forest land. Within the sector, 69.9 per cent of the removals were from forest land, followed by 23.7 per cent from cropland and 6.4 per cent from grassland. The wetlands and settlements categories are not reported for the year 2007 and no notation keys are included in the relevant CRF tables. Biomass burning on forest land was the only source of emissions reported and made up a small share of sectoral emissions (0.0027 Gg CO_2 eq).

78. As stated during the previous review, reporting of the LULUCF sector remains incomplete. Several CRF tables are left blank, either for the entire time series or for those years for which estimates were not calculated, while others are only partially complete. Turkey did not provide any estimates or appropriate notation keys for other land, CO_2 emissions from liming, N_2O emissions from disturbance

associated with land-use conversion to cropland, or N_2O emissions from drainage of wetland soils. AD are missing for all CRF tables for cropland, grassland and wetlands, and complete AD are not reported in the NIR. Without complete AD, a thorough review of these categories is not possible. The ERT recognizes and commends the action taken by Turkey to make some improvements in the completion of the CRF tables with appropriate notation keys, particularly for N_2O emissions from fertilization of forests and N_2O emissions from drainage of forest soils.

79. Turkey has not provided a complete, consistent representation of its land base. During the review, the Party reported that it has not made progress on this issue. The ERT reiterates the recommendation made during the previous review that Turkey make progress towards providing a complete representation of land use that is consistent with the IPCC good practice guidance for LULUCF.

80. The ERT commends Turkey for the progress made in improving descriptions of methodologies, sources of information, EFs and AD for the LULUCF sector in its NIR. The ERT recommends that Turkey continue to improve these descriptions, particularly on the rationale for the selection of these methodologies for each LULUCF category. Turkey is encouraged to comply with the UNFCCC reporting guidelines by providing transparent descriptions of methods, data and assumptions in the NIR as well as the required information in the documentation boxes of the CRF tables.

81. The Party has not included a section on sector-specific recalculations. Non-CO_2 emissions from biomass burning on forest land were recalculated and, although a limited explanation is given, there should be a complete discussion on recalculations specific to the LULUCF sector, ensuring that further information is provided on the revisions made to these calculations.

B. Key categories

1. Forest land remaining forest land – CO_2

82. Turkey applies a tier 2 methodology for net carbon stock changes in above-ground and below-ground biomass and dead wood on forest land remaining forest land. Forest area data, average annual net increment, basic wood density and fraction of biomass left in forests after harvesting are all country-specific values. IPCC default values are used only for root to shoot ratio and carbon fraction of dry matter. The factors and parameters used are appropriate and in line with the IPCC good practice guidance for LULUCF.

83. The ERT recommends that Turkey provide more information in its NIR on the data sources for this category and how they differ over the time series. For example, the Party communicated during the review that the source of data for forest land net carbon stock changes in biomass for 2005 and 2006 is the ENVANIS system, a data management system that builds the national forest inventory by summing the results for the multiple forest management plans. This data source, however, is not named or described in the NIR. The ERT recommends the Party include this information in its next inventory submission.

84. In the NIR, Turkey reports on a project that has been initiated to estimate carbon stock changes in forest soils and litter. The Party provided further details on this project during the review; it is a pilot scheme that will result in country-specific factors, which will allow the Party to eventually include these forest carbon pools and report on them at a tier 2 level. The ERT commends the progress made by the Party in enhancing completeness by covering more forest carbon pools.

2. Cropland – CO_2

85. The cropland category was a net sink of 18,066.03 Gg CO_2 eq in 2007. Turkey applied a tier 1 approach to estimate net carbon stock changes in mineral soils. Organic soils were not considered, as this area represents only 0.3 per cent of all soils in Turkey. Given the contribution of cropland removals to total LULUCF removals, it is recommended that Turkey report on this category using a higher-tier approach, with country-specific factors. In its NIR, Turkey indicates that no stock-change factors that are country-specific are available. The ERT encourages the Party to collect such data.

86. The ERT noted that the total area of cropland in Turkey was not taken into consideration in the GHG inventory. Only net carbon stock changes associated with lands converted from annual crop to permanent crop each year were estimated (an annual average of 2.3 kha), only accounting for around 9 per cent of total cropland. The ERT encourages Turkey to collect information in this regard in order to achieve completeness in the reporting of this land-use category. In addition, the Party is encouraged to fill all gaps in the CRF tables, using all relevant AD.

87. In the previous submission, Turkey reported cropland estimates for the period 1990–2004. The ERT commends the improvements made by Turkey regarding completeness by including estimates for the period 2005–2007. However, AD are only available through 2005; the AD used and the methodology applied for the period 2005–2007 is therefore not transparent and should be described in the NIR.

3. Grassland – CO_2

88. Using a tier 2 approach, Turkey reported that grassland accounted for a removal of 4,889.22 Gg CO_2 eq in 2007. This included net carbon stock changes in living biomass (woody perennials) and in soils (mineral soils only). As stated in the NIR, estimates for this category cover only areas of land being rehabilitated under a government programme, with a maximum area of 81,613.8 ha in 2007. The ERT suggests recommends that Turkey improve the completeness of its inventory for the grassland category by estimating carbon stock changes for the total managed grassland area in the country. For net carbon stock changes in grassland soils, the ERT recommends that Turkey either explain why organic soils are not included in the estimates or include them in the next inventory submission.

89. As with the cropland category, very limited information was given in the NIR for the grassland category on methods, assumptions and choice of EFs. The ERT encourages recommends Turkey to provide this information in its next submission. The NIR indicates that default stock change factors were applied. The ERT encourages the use of country-specific stock-change factors.

C. Non-key categories

1. Wetlands – CO_2

90. Turkey estimates carbon stock changes in living biomass only from lands converted to flooded lands. A complete time series was not reported; estimates were only provided for the periods 1992–1997 and 1999–2002. Information on areas of reservoirs is not provided in the CRF tables and procedures for the estimations were not included in the NIR. It is not clear if the estimates include only above-ground biomass or both above-ground and below-ground biomass pools. The ERT recommends that Turkey provide a clear description of the AD and choice of method in the NIR and a complete time series in its next inventory submission.

91. Carbon stock changes in living biomass from conversion to flooded lands result in a net removal; however, if the activity involved is a conversion of land to reservoirs, then a net emission (i.e. decrease in biomass and other carbon stocks) should be expected. The ERT recommends that Turkey investigate this issue and report thereon or provide an explanation in its next inventory submission.

2. Settlements – CO_2

92. CO_2 removals by living biomass in urban trees were reported only for the period 1991–2000. It was explained in the NIR that the crown area of urban trees was determined in 2000; this was presumably the reason for the lack of reporting for years after 2000. AD are described in the NIR but not included in the CRF tables. Appropriate notation keys are not used in the CRF tables for non-reported years (1990 and 2001–2007). The ERT encourages Turkey to report the complete time series in its next submission or, if the complete time series cannot be reported, to include the appropriate notation keys for particular years that are "NE".

VI. Waste

A. Sector overview

93. In 2007, emissions from the waste sector amounted to 31,849.70 Gg CO_2 eq, or 8.5 per cent of total GHG emissions. Since 1990, emissions have increased by 398.7 per cent. The key driver for this growth trend is the rise in CH_4 emissions from solid waste disposal on land (SWDL), which is the only category that has been estimated. The other categories (wastewater handling, waste incineration and other) are reported as either "NE" or "NA".

94. The NIR does not provide a sufficient description of the actual state of the sector or the procedures for data collection and parameter selection. Estimated uncertainties for AD and EFs are not provided in the NIR. The ERT recommends Turkey to provide the appropriate information in its next submission.

95. The QA/QC plan for the waste sector has not yet been elaborated. The NIR reports a general QC procedure that has been carried out on AD for SWDL. The ERT reiterates previous recommendations that Turkey include a description of the data collection procedures and elaborate a sector-specific QA/AC plan. The ERT recommends that Turkey apply the category-specific QC measures to CH_4 emissions from SWDL, as it is a key category.

96. The ERT strongly recommends that Turkey enhance its efforts to estimate and report "NE" emissions, improve the data collection/estimation procedure and use the appropriate methodology for key categories in its next submission.

B. Key categories

Solid waste disposal on land – CH_4

97. Turkey has been encouraged during previous reviews to use a tier 2 methodology for estimating emissions where the trend shows an approximate fivefold increase since 1990. However, the NIR indicates that Turkey still uses tier 1 methodology owing to lack of data. The ERT also encourages Turkey to make efforts to estimate these emissions using a tier 2 approach. The NIR does not provide a description of waste management practices and does not report on the data collection process, methodology and EF selection process, criteria or assumptions. Turkey is strongly recommended to provide this information in its next submission in order to improve transparency.

98. AD for managed and unmanaged waste disposal have been collected for all years in the periods 1994–1998 and 2001–2004, for 2005 and 2006 only data for managed waste disposal was available. Data interpolation and extrapolation have been used to estimate missing AD. The cubic model used for interpolation and extrapolation exhibits inconsistencies, especially when used for extrapolation (e.g. negative values for 1990). The ERT recommends that Turkey enhance its efforts to obtain actual data and/or to estimate missing data in line with the IPCC good practice guidance.

99. Emissions of CH_4 from SWDL are reported under unmanaged waste disposal sites with a methane correction factor equal to 0.6 that corresponds to uncategorized landfill sites. During the review, Turkey explained that this figure was used because a lack of data made it impossible to differentiate the unmanaged waste disposal sites from managed ones. However, Turkey provides in the NIR a graph of CH_4 emissions from controlled and uncontrolled waste throughout the period 1990–2007 (figure 8.2 in the NIR). Turkey is encouraged to process the existing information for both managed and unmanaged (deep/shallow) SWDS and to estimate and report CH_4 emissions according to proper allocations.

100. The previous review report indicated that municipal solid waste data are based on waste collected by operators of managed landfills and by municipalities. Therefore, emissions from waste that is not collected are "NE". The ERT recommends that Turkey make efforts to estimate data on uncollected waste. An incorrect value (100 per cent) for the fraction of solid waste disposed of in SWDS is reported in CRF table 6.A. The ERT recommends that Turkey correct this fraction when reporting in its next inventory submission.

101. For municipal solid waste, the Party has remained applying a degradable organic carbon (DOC) value for food instead of a weighted average DOC value. The ERT reiterates previous recommendations that Turkey choose the appropriate DOC value and document its choice in the next inventory submission.

102. Turkey uses European Union classification for SWDS. The ERT reiterates the previous recommendation that Turkey classify SWDS according to the IPCC classification.

103. In the additional information box of CRF table 6.A, Turkey mistakenly reports 1.00 as the value for CH_4 generation rate constant (k), which refers to a tier 2 method that is not used by Turkey. The ERT reiterates previous recommendations that Turkey correct this value in its next submission.

C. Non-key categories

1. Solid waste disposal on land – CO_2

104. During the previous review, it was noted that a proportion of solid waste was disposed of by open burning and it had been recommended that the Party estimate such emissions under the category other (solid waste disposal on land); the ERT reiterates this recommendation. The ERT also reiterates previous recommendations that Turkey use the appropriate notation key ("NE") in CRF table 6.A.

2. Wastewater handling – CH_4 and N_2O

105. Emissions from wastewater handling were "NE" and the NIR does not provide a description of this category in the country. The ERT reiterates previous recommendations that Turkey estimate CH_4 emissions using the IPCC default parameters and N_2O emissions using the FAOSTAT data on protein consumption.

106. In CRF table 6.B, the notation key "NA" is used for CH_4 and N_2O emissions from domestic sludge and for N_2O emissions from domestic and commercial wastewater, as well as for CH_4 recovery from industrial and domestic and commercial wastewater. The NIR does not explain the reason for using this notation key for these subcategories. The ERT recommends the Party to provide an explanation of the rationale for the use of this notation key in its next submission.

3. Waste incineration – CO_2 and N_2O

107. Emissions from this category are not reported although there are incineration plants for hazardous and medical waste in the country. The previous review report indicates that hazardous and clinical waste data are reported to the Ministry of Environment and Forestry (MoEF). The ERT

reiterates the previous recommendation that Turkey use these data and the IPCC default methodology and parameters to report emissions from this category in its next submission.

108. Turkey estimates emissions from hazardous and medical waste that is incinerated in 31 licensed cement kilns and used as an alternative fuel for heat and power generation. The ERT reiterates previous recommendations that the Party report these emissions under the energy sector.

VII. Conclusions and recommendations

109. The ERT concludes that the inventory submission of Turkey has been prepared and reported partially in accordance with the UNFCCC reporting guidelines. The Party has submitted a set of CRF tables for the years 1990–2007 and an NIR; these are generally complete in terms of geographical coverage, years and sectors; however table 8(b) as well as some LULUCF tables are missing for all years. CRF tables and NIR are not complete in terms of categories and gases. Categories reported as not estimated include:

(a) The category other for stationary combustion, fugitive emissions from oil and gas and international bunkers in the energy sector;

(b) PFCs from aluminium production, potential emissions of F-gases, and actual emissions of halocarbons (except for HFC-134a) from the industrial processes sector;

(c) All categories in the solvent and other product use sector;

(d) N-fixing crops, crop residue, cultivation of histosols, pasture, range and paddock manure and indirect N_2O emissions from agricultural soils in the agriculture sector;

(e) Wetlands and settlements in the LULUCF sector;

(f) Wastewater handling and waste incineration in the waste sector.

110. The ERT recommends that Turkey provide estimates for all categories for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance in its next inventory submission in order to improve completeness.

111. The Party's inventory is partially in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Although Turkey has made some progress since its previous submission, the NIR includes only limited information on cross-cutting issues, such as the QA/QC plan, key categories and uncertainty evaluation, a chapter on recalculations and improvements as well as a complete and consistent representation of the Party's land base are missing.

112. In the course of the review, the ERT formulated a number of recommendations[3] relating to the completeness of the inventory submission, transparency of the information and other cross-cutting issues presented by Turkey in its inventory submission. The key recommendations are that Turkey:

(a) Improve completeness by estimating and reporting categories currently reported as "NE", for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance, including reporting confidential emissions in an aggregated manner and submitting complete CRF tables;

(b) Calculate emissions from key categories using a higher-tier method, where appropriate;

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

(c) Include more detailed information in the NIR on national circumstances, choice of methods, AD and EFs used;

(d) Prepare emission estimates for the entire time series for those emissions that have been estimated only for recent years;

(e) Recalculate the emission estimates of the inventory in accordance with the IPCC good practice guidance, particularly for those categories which were identified in this review and provide the corresponding justification in the NIR;

(f) Perform a key category analysis that is in line with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF and take into account the corresponding results as a means of improving the inventory;

(g) Document the rationale for uncertainties when expert judgement is used;

(h) Establish a formal QA/QC system in accordance with the IPCC good practice guidance;

(i) Reconsider the internal schedule, in particular with regard to the finalization of the NIR, which has to be submitted by 15 April each year.

Annex

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>.

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Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <http://unfccc.int/resource/webdocs/sai/2009.pdf>.

FCCC/ARR/2008/TUR. Report of the individual review of the greenhouse gas inventory of Turkey submitted in 2008. Available at <http://unfccc.int/resource/docs/2009/arr/tur.pdf>.

B. Additional information provided by the Party

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

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