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COMPLIANCE COMMITTEE

CC/ERT/ARR/2009/28  
28 April 2009

**Report of the individual review of the greenhouse gas inventories of Poland  
submitted in 2007 and 2008**

**Note by the secretariat**

The report of the individual review of the greenhouse gas inventories of Poland submitted in 2007 and 2008 was published on 28 April 2009. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2008/POL contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.





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**Report of the individual review of the greenhouse gas inventories of Poland  
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\* In the symbol for this document, 2008 refers to the year in which the 2008 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 2007 and 2008 greenhouse gas (GHG) inventory submissions of Poland, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. In accordance with the conclusions of the Subsidiary Body for Implementation at its twenty-seventh session,<sup>1</sup> the focus of the review is on the most recent (2008) submission. The review took place from 22 to 27 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Katarina Marečková (European Community) and Mr. Philip Acquah (Ghana); energy – Ms. Erasmia Kitou (European Community), Mr. Luis Conde (Mexico) and Mr. Steven Oliver (Australia); industrial processes – Ms. Natalya Parasyuk (Ukraine) and Mr. Riccardo de Lauretis (Italy); agriculture – Mr. Michael Anderl (Austria) and Mr. Marcelo Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Mr. Atsushi Sato (Japan) and Mr. Harry Vreuls (Netherlands); and waste – Mr. Carlos Lopez (Cuba) and Mr. Davor Vešligaj (Croatia). Mr. Acquah and Mr. Vešligaj were the lead reviewers. The review was coordinated by Mr. Javier Hanna (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of Poland, 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. The 2008 inventory was submitted on 15 April 2008; it contains a complete set of common reporting format (CRF) tables for the period 1988–2006. Poland resubmitted its CRF tables on 27 May 2008 and included a national inventory report (NIR). This is in line with decision 15/CMP.1. Poland indicated that the 2008 submission is also its voluntary submission under the Kyoto Protocol.<sup>2</sup> In its 2007 submission, Poland included a complete set of CRF tables for the period 1988–2005 and an NIR consistent with the structure outlined 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). In response to recommendations made in the previous review report, improvements have been made in the 2007 submission to the comparability and consistency of the inventory reporting.

4. Poland officially submitted revised emission estimates for its 2008 inventory on 9 January 2009 in response to questions raised by the expert review team (ERT) during the course of the centralized review,<sup>3</sup> in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The revised GHG emission estimates resulted in an increase in the 2006 emission estimates from 400,459.34 Gg carbon dioxide equivalent (CO<sub>2</sub> eq), as originally reported by the Party, to 400,682.45 Gg CO<sub>2</sub> eq. These revised values are based on the inclusion of: nitrous oxide (N<sub>2</sub>O) emissions from oil and natural gas – flaring (see para. 62 below) and methane (CH<sub>4</sub>) emissions from the chemical industry – other (styrene) (see para. 70 below); and on the revision of estimated N<sub>2</sub>O emissions from agricultural soils – direct soil emissions (see paras. 84 and 85 below), and resulted in the revision of the calculation of the commitment period reserve (see para. 113 below). Where needed, the ERT also

<sup>1</sup> FCCC/SBI/2007/34, paragraph 104.

<sup>2</sup> Parties may start reporting information under Article 7, paragraph 1, of the Kyoto Protocol from the year following the submission of the initial report, on a voluntary basis (decision 15/CMP.1).

<sup>3</sup> In this report, the values for total and sectoral emissions for the complete time series, and in particular for 2006, reflect the revised estimates submitted by Poland in the course of the review. These estimates differ from Poland’s GHG inventory submitted on 15 April 2008 and resubmitted on 27 May 2008.

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 the annex to this report.

### C. Emission profiles and trends

5. In 2006 (as reported in the 2008 inventory submission), the main GHG in Poland was CO<sub>2</sub>, accounting for 82.5 per cent of total GHG emissions<sup>4</sup> expressed in CO<sub>2</sub> eq, followed by CH<sub>4</sub> (9.3 per cent) and N<sub>2</sub>O (7.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 0.8 per cent of the total GHG emissions in the country. The energy sector accounted for 82.3 per cent of the total GHG emissions, followed by agriculture (8.6 per cent), industrial processes (6.8 per cent), waste (2.1 per cent) and solvent and other product use (0.2 per cent). There were no significant differences between the shares by sector shown in the 2007 and the 2008 inventory submissions.

6. Total GHG emissions amounted to 400,682.45 Gg CO<sub>2</sub> eq in 2006 and decreased by 28.9 per cent between the base year<sup>5</sup> and 2008. This reduction in emissions is largely attributable to the restructuring of the economy and the improved energy efficiency of the energy industries. The energy sector contributed the most to this decrease, accounting for as much as 82 per cent (140,469.00 Gg CO<sub>2</sub> eq) of the total national emission reduction in 2006. In 2005 (as reported in the 2007 inventory submission), total GHG emissions amounted to 398,952.36 Gg CO<sub>2</sub> eq. The shares of the emissions by gases and sectors in 2006 (2008 inventory submission) were similar to those in 2005 (2007 inventory submission). For example, there was no significant difference between the share of CO<sub>2</sub> emissions reported in the 2007 (81.8 per cent) inventory submission and that in the 2008 (82.5 per cent) submission.

7. Tables 1 and 2 show GHG emissions by gas and by sector, respectively.

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<sup>4</sup> In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

<sup>5</sup> Base year refers to the base year under the Kyoto Protocol, which is 1988 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

**Table 1. Greenhouse gas emissions by gas, 1990–2006**

Greenhouse gas emissions	Gg CO <sub>2</sub> eq								Change base year–2006 (%)
	Base year <sup>a</sup>	1990	1995	2000	2003	2004	2005	2006	
CO <sub>2</sub>	469 143.82	368 678.29	366 135.56	320 365.46	316 690.94	316 872.78	317 669.36	330 523.57	–29.5
CH <sub>4</sub>	53 665.03	47 708.93	43 648.88	39 003.02	37 689.94	36 837.25	37 052.42	37 219.69	–30.6
N <sub>2</sub> O	40 664.68	37 871.73	30 892.30	29 553.06	28 252.52	28 003.30	28 543.57	29 795.88	–26.7
HFCs	26.44	NA,NE,NO	26.44	594.67	1 816.23	2 413.78	3 015.46	2 843.53	10 654.1
PFCs	250.18	NA,NE,NO	250.18	224.40	278.34	285.05	259.95	269.75	7.8
SF <sub>6</sub>	30.53	NA,NE,NO	30.53	24.18	21.72	23.43	28.09	30.02	–1.6

*Abbreviations:* NA = not applicable, NE = not estimated, NO = not occurring.

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1988 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

**Table 2. Greenhouse gas emissions by sector, 1990–2006**

Sectors	Gg CO <sub>2</sub> eq								Change base year–2006 (%)
	Base year <sup>a</sup>	1990	1995	2000	2003	2004	2005	2006	
Energy	470 309.06	369 657.07	368 800.28	321 960.86	319 011.69	318 824.83	318 946.16	329 840.14	–29.9
Industrial processes	32 838.95	24 324.20	23 856.41	22 997.85	22 569.86	23 813.89	25 353.68	27 227.83	–17.1
Solvent and other product use	1 006.46	629.23	524.80	616.09	647.39	704.67	705.75	705.75	–29.9
Agriculture	51 225.04	50 043.01	37 817.46	34 595.44	32 978.42	32 376.32	32 946.46	34 503.88	–32.6
LULUCF	–32 926.48	–23 024.65	–20 723.44	–24 236.89	–30 847.42	–34 101.15	–35 373.61	–40 504.79	23.0
Waste	8 401.16	9 605.45	9 984.95	9 594.53	9 542.33	8 715.87	8 616.80	8 404.85	0.0
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total (with LULUCF)</b>	530 854.20	431 234.31	420 260.46	365 527.89	353 902.26	350 334.43	351 195.25	360 177.66	–32.2
<b>Total (without LULUCF)</b>	563 780.68	454 258.96	440 983.90	389 764.78	384 749.69	384 435.58	386 568.86	400 682.45	–28.9

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

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1988 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.



#### D. Key categories

8. Poland has reported a key category tier 1 analysis, both level (L) and trend (T) assessment, as part of its 2008 submission. The key category analysis performed by Poland and that performed by the secretariat<sup>6</sup> produced different results, owing to slightly different levels of disaggregation. For the first time, Poland has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (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 Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The ERT recommends that Poland enhance the clarity and consistency of the information provided in the NIR and the CRF tables regarding its key category analysis and include summary information on this analysis in section 1.5 of the NIR of its next annual inventory submission.

9. The key categories identified by Poland in the 2007 submission are different from those identified in the 2008 submission. Poland has included the LULUCF sector in the 2008 key category analysis, which has resulted in some LULUCF categories being identified as key. The following key categories were identified in the 2008 submission, but not in the 2007 submission, for the latest reported year:

1. stationary combustion: solid fuels – CH<sub>4</sub> (T); 1. stationary combustion: biomass – CH<sub>4</sub> (T); 1.A.3.b road transportation – N<sub>2</sub>O (T); 2.G other – CO<sub>2</sub> (T); 4.D.2 pasture, range, and paddock manure – N<sub>2</sub>O (T); 5.A.1 forest land remaining forest land – CO<sub>2</sub> (L and T); 5.A.2 land converted to forest land – CO<sub>2</sub> (L and T); 5.B.1 cropland remaining cropland – CO<sub>2</sub> (L and T); 5.C.1 grassland remaining grassland – CO<sub>2</sub> (T); 5.D.1 wetlands remaining wetlands – CO<sub>2</sub> (T); 5.D.2 land converted to wetlands – CH<sub>4</sub> (T); and 5.E.1 settlements remaining settlements – CO<sub>2</sub> (T). The following key categories were identified in the 2007 submission, but not in the 2008 submission, for the latest reported year: 1.A.3.d navigation – CO<sub>2</sub> (T); 1.A.5.b other: mobile – CO<sub>2</sub> (T); and 6.B wastewater handling – CH<sub>4</sub> (T).

#### E. Main findings

10. The inventory is generally in line with 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. The 2008 inventory submission is generally of a high quality, shows significant improvement in terms of the consistency of the NIR with the UNFCCC reporting guidelines, and covers most source and sink categories for the period 1988–2006. However, the ERT identified a need for further improvements in the following areas: the level of detail and completeness of the information reported in the NIR; providing an explanation for the categories that are reported as not estimated (“NE”) but for which an estimation methodology is included in the Revised 1996 IPCC Guidelines, and ensuring the consistency of reporting such information in the CRF tables and the NIR; addressing the time-series consistency in accordance with the IPCC good practice guidance; reporting recalculations in the NIR and CRF tables in a transparent and consistent way; documenting sectoral quality assurance/quality control (QA/QC) procedures; and obtaining geographical information on land use to ensure that the inventories of the LULUCF sector meet future reporting requirements, in particular those requirements related to Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

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<sup>6</sup> The secretariat identified, for each Party, the 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 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.

11. The ERT noted the efforts made by Poland to provide one NIR, which in general follows the structure outlined in the UNFCCC reporting guidelines. The ERT also acknowledges the efforts made by Poland to improve its use of the notation keys. These improvements have significantly increased the transparency of the information provided. However, the ERT noted that, for some categories, the NIR provides limited information on the methods, activity data (AD) and emission factors (EFs) used to estimate emissions (e.g. for civil aviation, railways and other transportation). The ERT recommends, therefore, that additional methodological and background information be provided in the NIR. The ERT also recommends that Poland provide a detailed overview of the assumptions made and underlying emissions, EFs and, in particular, AD used for its estimations, especially those that are plant-specific. Finally, the ERT believes that the transparency of the NIR could be further improved if Poland were able to provide some additional information on the steps followed to ensure time-series consistency, as well as explanations for the fluctuations in the observed trend of emissions.

12. Poland has provided all the CRF tables for the complete time series. In response to recommendations made in the previous review report, Poland has also modified and generally improved the structure of the 2008 NIR in comparison with its 2007 submission, making it more consistent with the outline recommended for the NIR in the UNFCCC reporting guidelines. However, the chapter on “Recalculations and improvements” and some of the recommended annexes have not been provided (e.g. “Detailed discussion of methodology and data for estimating CO<sub>2</sub> emissions from fossil fuel combustion” and “Assessment of completeness and (potential) sources and sinks of GHG emissions and removals excluded”), although this information has been provided within the 2008 NIR. Poland is encouraged to include these required chapters and specified annexes in its next annual inventory submission.

13. In its 2008 submission, Poland uses different methodologies and/or EFs for different inventory periods for the energy, industrial processes and LULUCF sectors, which leads to time-series inconsistency. For example, for the energy and industrial processes sectors, Poland has applied EFs and methodologies from the European Union emissions trading scheme (EU ETS) for the period 2005–2006, but it has applied previously derived country-specific EFs for the period 1988–2004. The ERT recommends that, in order to improve consistency, Poland use the weighted average country-specific EFs resulting from EU ETS data for the period 2005–2007 for the entire time series in its next annual inventory submission, subject to expert judgement regarding critical factors such as technological changes, age of the plants and capacity changes. The methodological choices of AD and the country-specific EFs, the QA/QC of the verified plant-level data, the uncertainty estimations and assumptions made in the use of the EU ETS reports should be summarized in the NIR. Furthermore, Poland has used the IPCC good practice guidance to estimate emissions for the LULUCF sector for the first time for the period 1990–2006, while estimates for the period 1988–1989 are still based on the Revised 1996 IPCC Guidelines. The ERT recommends that Poland address the time-series consistency of the 1988–2006 period, in accordance with the IPCC good practice guidance, in its next annual inventory submission.

14. Poland has reported emission estimates for specific categories in the CRF tables but not included the required information in the NIR, and sometimes vice versa. For instance, emission estimates for forest fires and for mineral soils in cropland in the LULUCF sector have been reported in the CRF tables but not in the NIR. While, in the waste sector, CH<sub>4</sub> emissions from domestic and commercial wastewater have been estimated and elaborated upon in the NIR, but explanations have not been provided in the documentation boxes in the CRF tables. The ERT recommends that Poland improve the consistency of its reporting in the NIR and CRF tables in order to enhance transparency in its next annual inventory submission.

15. The reporting of land use is based on national statistics and there is no indication that detailed geographical information has been used, except for the area of forest in provinces (NIR 2008, figure 7.1). Furthermore, no additional information has been included in the NIR for the balance of areas by geodesic status (NIR 2008, page 121). This geographical information is required to account for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT notes that the availability of this information could pose a major challenge to Poland in its future reporting under the Kyoto Protocol, and

recommends that, if such geographical information is already being used, more information be provided in the next annual inventory submission.

16. Poland has not reported on any changes to its national system in the 2008 submission. In response to questions raised by the ERT during the centralized review, Poland indicated that no changes had been made to its national system. However, the ERT noticed that the legal arrangements necessary for a national system to perform the functions defined in the guidelines for national systems (decision 19/CMP.1) are not in place and that Poland has failed to establish these legal arrangements as recommended in the previous review report. In a subsequent communication, Poland explained that, as a result of the Polish Parliament being dissolved in October 2007, the process of establishing the legal arrangements was terminated, but that the Ministry of the Environment together with the National Administration of the Emission Trading Scheme have resumed the proceedings to establish the legal arrangements, and that a new Act is at the stage of governmental consultations and is expected to be considered by Parliament in 2009.

17. The ERT requested that Poland finalize the legal arrangements currently under consideration to meet its obligations under general functions of the national system required by decision 19/CMP.1 and provide updated information. In its response to this request, Poland indicated its commitment to this process and provided a timeline for the consultation and consideration of the legal arrangements by the Polish Parliament. Poland also provided updated information on the “Act on system of management the national limits of greenhouse gas emissions and other substances”, which includes provisions for emission reporting obligations under the Convention and other agreements; identifies key data providers (Central Statistical Office (GUS), ministries and administrative bodies); and establishes legislation specifying the scope of the required data and the timing of data collection. The ERT notes that Poland should improve the capacity of its national system to obtain and deliver confidential and non-confidential AD and EFs for inventory preparation in a timely manner, which will, for example, avoid the continued use of extrapolation of data over long periods owing to the non-availability of AD. For this reason, the ERT recommends that Poland finalize the aforementioned legal arrangements to meet the requirements of the national systems as required in decision 19/CMP.1 as soon as possible, ensure the implementation of the timeline submitted to the ERT after the review, and report on these arrangements in its next annual inventory submission.

## **F. Cross-cutting issues**

### **1. Completeness**

18. Poland has provided inventory data in CRF tables which cover most source and sink categories for the period 1988–2006, and the inventory is complete in terms of years and geographical coverage. However, Poland has not estimated actual emissions of HFCs, PFCs and SF<sub>6</sub> for the period 1989–1994, or actual emissions for most of the subcategories under the consumption of halocarbons and SF<sub>6</sub> category for 1988 and the period 1995–2006, which the Party considers to be insignificant or irrelevant subcategories. The ERT notes that Poland should have used appropriate notation keys for these subcategories, even if they could be identified as insignificant or irrelevant for some years. The ERT recommends that Poland improve transparency of the reporting of these subcategories for the complete time series in its next annual inventory submission. In addition, the Party has reported potential emissions of HFCs only for the 2000–2006 period and potential emissions of PFCs and SF<sub>6</sub> only for 2000 and 2001. Neither CRF table 7 on key categories nor CRF table 8(b) on explanation for the recalculations has been completed. During the review, Poland explained that technical problems with the CRF Reporter software prevented the completion of these CRF tables. The ERT recommends that Poland estimate actual and potential emissions of HFCs, PFCs and SF<sub>6</sub> for all the relevant categories and years, work to resolve any technical problems with CRF Reporter in order to provide complete reporting, and use appropriate notation keys for categories identified as insignificant or irrelevant in order to improve transparency in its next annual inventory submission.

19. The ERT notes that, in response to recommendations made in the previous review report, for the first time Poland has reported LULUCF categories, including land converted to forest land, following the IPCC good practice guidance for LULUCF. Poland has improved the completeness of its inventory by estimating emissions of CH<sub>4</sub> from ferroalloys production (ferrosilicon), CH<sub>4</sub> from methanol production and from ethylene production, CO<sub>2</sub> from zinc production and lead production, and CH<sub>4</sub> from sinter production in the industrial processes sector.

20. Poland has not provided explanations for some of the categories reported as “NE” in CRF table 9(a), nor is the information provided in the CRF table consistent with that in the NIR. In response to a request by the ERT during the centralized review, Poland provided additional information on categories reported as “NE” which are listed in CRF table 9(a) and for which the Revised 1996 IPCC Guidelines and the IPCC good practice guidance provide methodologies for estimation, but no default EFs. For most of the categories, Poland explained they are not estimated because there are no country-specific studies to determine country-specific EFs. The ERT recommends that Poland make efforts to estimate EFs for the missing categories for which the Revised 1996 IPCC Guidelines and the IPCC good practice guidance provide methodologies. Poland is also encouraged, in order to improve transparency, to provide clear and consistent information on the remaining categories reported as “NE”, particularly those reported as not occurring (“NO”), both in the completeness table (9(a)) and in the NIR of its next annual inventory submission.

## 2. Transparency

21. The ERT notes that, following recommendations made in the previous review report, the transparency and quality of the information provided by Poland in its NIR have improved in the 2007 and 2008 submissions. Poland provided one NIR in its 2008 submission and has improved its use of the notation keys in the CRF tables, which has significantly increased the transparency of the information provided in comparison with previous NIRs. The structure of the NIR is now in accordance with the UNFCCC reporting guidelines, and includes a description and interpretation of emission trends, key categories, a sector overview, methodological issues, uncertainties, recalculations and time-series consistency, planned improvements, and category-specific information on QA/QC. However, the ERT noted that, for some categories, the NIR provides limited information on the methods, AD and EFs used to estimate emissions (e.g. for civil aviation, railways and other transportation). The ERT recommends, therefore, that additional methodological and background information be provided in the NIR. The ERT also recommends that Poland provide a detailed overview of the assumptions made and the underlying emissions, EFs and, in particular, AD used for its estimations, especially those that are plant-specific. Finally, the ERT believes that the transparency of the NIR could be further improved if Poland were able to provide some additional information on the steps followed to ensure time-series consistency, as well as explanations for the fluctuations in the observed emissions trends.

## 3. Recalculations and time-series consistency

22. The ERT noted that the recalculations reported by Poland in its 2008 submissions for the 1988–2005 time series have been undertaken to take into account the recommendations made in the previous review report. These recalculations cover all sectors except solvent and other product use. In 2005 (as reported in the original 2008 submission), the most significant recalculations noted by the ERT were: a decrease in estimated CO<sub>2</sub> emissions by 3.3 per cent and an increase in estimated CH<sub>4</sub> emissions by 9.6 per cent in the energy sector; an increase in estimated CO<sub>2</sub> emissions by 10.0 per cent in the industrial processes sector; a decrease in estimated N<sub>2</sub>O emissions by 10.0 per cent in the agriculture sector; an increase in estimated CO<sub>2</sub> removals by 17.5 per cent and an increase in estimated CH<sub>4</sub> emissions by 84,100.2 per cent in the LULUCF sector; and a decrease in estimated CH<sub>4</sub> emissions by 27.0 per cent in the waste sector. The most significant recalculations for 1988 (as reported in the original 2008 submission) resulted in: a decrease in estimated CO<sub>2</sub> emissions by 6.6 per cent, an increase in estimated CH<sub>4</sub> emissions by 19.6 per cent and a decrease in estimated N<sub>2</sub>O emissions by 28.5 per cent in the energy sector; an increase in estimated CO<sub>2</sub> emissions by 25.3 per cent in the industrial processes

sector; and a decrease in estimated N<sub>2</sub>O emissions by 3.7 per cent in the agriculture sector. The overall impact of the recalculations on total estimated GHG emissions was a decrease of 4.0 per cent for 1988 and a decrease of 3.2 per cent for 2005. The rationale for these recalculations is provided in the NIR, but not reported in CRF table 8(b). In response to questions raised by the ERT during the centralized review, Poland explained that table 8(b) had not been completed as a result of technical problems with the CRF Reporter software. The ERT recommends that Poland solve these problems and provide explanations for its recalculations in the relevant CRF tables in its next annual inventory submission.

23. In terms of recalculations, the improvements made to the 2008 submission include: the application of the IPCC good practice guidance for LULUCF to the emission estimates for the LULUCF categories for the period 1990–2006; the recalculation of N<sub>2</sub>O emissions from cultivated histosols on the basis of a new study (Oświecimska-Piasko, 2008); and the use of the IPCC good practice guidance to estimate N<sub>2</sub>O emissions from manure management.

24. Poland also used verified plant-specific data from facilities participating in the EU ETS to estimate emissions for key categories in the energy and industrial processes sectors for 2005 and 2006. The ERT recommends that Poland ensure that future recalculations address time-series consistency in accordance with the IPCC good practice guidance and that Poland report recalculations in a transparent manner in the CRF tables and in the NIR in its future annual inventory submissions.

#### 4. Uncertainties

25. In response to recommendations made in the previous review report, in its 2008 submission Poland has included other sources of information it has used for the estimation of uncertainties, including: the results of research conducted in 2000 for the 1998 GHG inventory in Poland; literature describing details of the uncertainty analyses of Scandinavian countries for their 2002 GHG inventories; and expert judgement from the inventory team at the National Emission Centre with regard to CO<sub>2</sub> EFs in the energy sector and AD and EFs for waste incineration. Poland has used the IPCC tier 1 methodology for its analysis, which included a simplified analysis for the LULUCF sector and for HFCs, PFCs and SF<sub>6</sub> emissions.

26. The ERT notes that the uncertainty estimates for most sectors are based on IPCC default values, national expert judgement and methods applied by the inventory teams of countries with similar national circumstances. The ERT reiterates the recommendations made in previous review reports that Poland should include in its future NIRs a discussion of the quality of national AD and EFs, as well as the rationale for adopting the uncertainty values reported, including the procedures used for qualitative assessment of uncertainties based on expert judgement, and update the information provided on uncertainties in the annex of the NIR accordingly in its next annual inventory submission.

27. The ERT also reiterates previous recommendations on the need for Poland to use more country-specific information, particularly from the EU ETS verification system, to obtain plant-specific uncertainty estimates of relevant data and to involve the institutions providing AD in the estimation of the relevant uncertainties.

#### 5. Verification and quality assurance/quality control approaches

28. Poland has developed a national programme for QA/QC in line with the IPCC good practice guidance, which has been elaborated in the 2008 submission in response to the recommendations made in the previous review report. The QA/QC plan includes general QC procedures (tier 1), category-specific QC procedures (tier 2), QA procedures, and reporting, documentation and archiving procedures. Poland employs extended QC procedures (tier 2) conducted by national experts to check the correctness of emission estimates for key categories, in particular where country-specific EFs are used and especially for the stationary fuel combustion, transport, cement production, enteric fermentation, manure management and agricultural soils categories.

29. However, Poland has provided limited discussion of the implementation of the QA/QC and verification procedures for most sectors in its 2008 NIR. The ERT recommends that Poland clearly document and detail the QA/QC and verification procedures performed under the QA/QC plan for all sectors in the NIR of its next annual inventory submission. The ERT also recommends the application of further QA/QC checks related to time-series consistency along with more extensive verification QC checks of AD and EFs. The ERT reiterates the recommendation made in the previous review report that Poland continue to enhance the implementation of its QA/QC plan, including by upgrading the archiving system, in order to have the sufficient capacity to organize and maintain all the electronic information necessary for inventory submissions and the supporting information required to produce the national GHG inventory.

#### 6. Follow-up to previous reviews

30. As described in subchapters I E and I F above, Poland has followed most of the recommendations from the previous review and has made several changes to improve the transparency and completeness of the inventory and the NIR. Among the more important changes, Poland provided one NIR in its 2008 submission in accordance with the UNFCCC reporting guidelines and has improved its use of the notation keys in the CRF tables; used the IPCC good practice guidance to estimate emissions for the LULUCF sector for the first time for the period 1990–2006, and reported recalculations for the 1988–2005 time series, taking into account the recommendations made in the previous review report. However, as is also mentioned above, the ERT notes that a number of recommendations have not been implemented. Following these recommendations Poland should include in its future NIRs a discussion of the quality of national AD and EFs, as well as the rationale for adopting the uncertainty values reported, to use more country-specific information to obtain plant-specific uncertainty estimates of relevant data, and continue to enhance the implementation of its QA/QC plan and verification procedures.

### G. Areas for further improvement

#### 1. Identified by the Party

31. The 2008 NIR identifies several areas for improvement:

- (a) Use verification reports from installations covered by the EU ETS for the 2005–2007 period for emission estimates for relevant categories in the energy and industrial processes sectors;
- (b) Verify and update EFs in industrial processes categories that are not included in the EU ETS, such as N<sub>2</sub>O emissions from nitric acid production, and estimate CO<sub>2</sub> emissions from limestone and dolomite use;
- (c) Carry out recalculations to address time-series inconsistency owing to changes in the age characterization of non-dairy cattle livestock since 1998 and the disaggregation of the subcategories for non-dairy cattle to enable the application of tier 2 methodology for estimating CH<sub>4</sub> emissions for this category;
- (d) Carry out a five-year cycle (2005–2009) national forest accounting study to identify and subsequently monitor the forest status, as well as the rate and trend of the carbon stock change taking place in forests, in order to provide data on Polish forests for the estimation of emissions and removals for the LULUCF sector, including activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;
- (e) Develop country-specific inventory methods in accordance with the IPCC good practice guidance and in line with the improvement plans for key categories for which tier 1 methodology is used. These categories include N<sub>2</sub>O emissions from nitric acid production, CO<sub>2</sub> emissions from land converted to forest land, CO<sub>2</sub> emissions from

cropland remaining cropland and CH<sub>4</sub> emissions from solid waste disposal on land (using country-specific EFs and replacing the default values currently employed);

- (f) Address the time-series consistency in the use of data from the Food and Agriculture Organization of the United Nations (FAO) for the estimation of N<sub>2</sub>O emissions from human waste for the period 2004–2006.

## 2. Identified by the expert review team

32. The ERT identifies the following cross-cutting issues for improvement:

- (a) Finalize the legal arrangements currently under consideration to fully meet the requirements for national systems as required by decision 19/CMP.1, ensuring the implementation of the timeline submitted to the ERT;
- (b) Estimate actual and potential emissions of HFCs, PFCs and SF<sub>6</sub> for all the relevant categories and years and use appropriate notation keys for categories identified as insignificant or irrelevant in order to improve transparency, make efforts to estimate emissions for currently missing categories for which the Revised 1996 IPCC Guidelines and the IPCC good practice guidance provide methodologies, and provide clear and consistent information on the remaining categories not estimated in the CRF tables and the NIR;
- (c) Include in the NIR a detailed overview of the assumptions made for the estimation of country-specific EFs and the handling of AD from data providers;
- (d) Address the time-series consistency of the 1988–2006 period in accordance with the IPCC good practice guidance;
- (e) Improve the transparency of the NIR and provide more precise descriptions of the methodologies and choice of EFs used in recalculations, as well as of the steps followed to ensure time-series consistency in all recalculations. In addition, provide explanations for recalculations in the relevant CRF tables;
- (f) Include all the required chapters and specified annexes in the NIR in accordance with the outline provided in the UNFCCC reporting guidelines;
- (g) Document sectoral QA/QC and verification procedures as part of the implementation of the inventory QA/QC plan under the national system and apply further QA/QC checks related to time-series consistency, AD and EFs;
- (h) Include adequate explanations in the NIR for the methodologies and underlying assumptions as well as the expert judgement used in the uncertainty analysis, including a discussion of the quality of AD and EFs, as well as the rationale for choosing uncertainty values. Furthermore, use more country-specific information and uncertainty values for the uncertainty analysis;
- (i) Make efforts to obtain geographical information on land use for the inventories of the LULUCF sector with a view to meeting future reporting requirements, in particular those related to Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

33. Recommended improvements relating to specific source/sink categories are presented in the relevant sectoral chapters of this report.

## II. Energy

### A. Sector overview

34. In 2006, emissions from the energy sector amounted to 329,840.14 Gg CO<sub>2</sub> eq, or 82.3 per cent of total GHG emissions. The emissions from this sector have declined by 29.9 per cent since 1988 owing to the restructuring of the economy and the implementation of energy efficiency policies and measures. Most of the emissions came from the energy industries, which accounted for 57.1 per cent of the sectoral emissions, while other sectors accounted for 16.6 per cent, transport for 11.7 per cent and manufacturing industries and construction for 10.4 per cent. Fugitive emissions from fuels accounted for 4.2 per cent of the total GHG emissions in this sector, of which 66.8 per cent was due to solid fuels and 33.2 per cent to oil and natural gas. Poland is a major producer of hard coal and lignite, but imports most of the crude oil, diesel oil and natural gas that it consumes.

35. Poland has provided all the CRF tables for the energy sector, containing estimates for most of the categories. The ERT welcomes the Party's efforts to provide estimates for a number of categories previously reported as "NE". However, the ERT notes that estimates for some fugitive emission categories are still missing, namely: CO<sub>2</sub> emissions from coal mining and handling (underground and surface mines); CH<sub>4</sub> emissions from surface mines – post-mining activities; CH<sub>4</sub> and CO<sub>2</sub> emissions from solid fuel transformation; and CH<sub>4</sub> and CO<sub>2</sub> emissions from the distribution of oil products, from oil – exploration, and from natural gas – other leakage (in residential and commercial sectors). The ERT recommends that Poland make efforts to provide the currently missing estimates, in particular for those categories which the Revised 1996 IPCC Guidelines and the IPCC good practice guidance provide methodologies, and that the Party provide clear and consistent information on the remaining not estimated categories in the completeness table (9(a)) and in the NIR of its next annual inventory submission.

36. To calculate emissions from the energy sector, Poland has primarily used tier 2 and tier 3 methods and a combination of country-specific, default and plant-specific EFs. For the estimation of fugitive emissions, tier 1 methods and a combination of country-specific and default EFs have been used. The plant-specific EFs were used for the first time for the 2006 inventory year and are based on verified emissions from the EU ETS; however, the NIR does not provide an explanation as to how time-series consistency was ensured. The ERT recommends that Poland, in its next annual inventory submission, provide detailed information on the integration of the EU ETS data into the inventory estimates and on its efforts to ensure time-series consistency for the categories where these data are used for emission estimates.

37. The NIR contains limited information on the statistical data used as the basis for the compilation of the inventory, particularly in the transport categories. As these statistical data constitute one of the main sources of AD, the ERT recommends that Poland include a more detailed description of the statistical data in the NIR of its next annual inventory submission.

38. Poland has provided in the NIR only a limited general discussion of its QA/QC and verification procedures for the energy sector. The ERT recommends that Poland clearly document and detail all the QA/QC and verification procedures performed for the energy sector in the NIR of its next annual inventory submission. The ERT also recommends the application of further QA/QC checks related to time-series consistency, along with more extensive verification checks of the underlying emissions, EFs and AD, in particular those that are plant-specific.

39. Poland has provided estimates of the uncertainties associated with the energy sector following the tier 1 method from the IPCC good practice guidance. However, these uncertainty values seem to have been underestimated, probably because of the uncertainty ranges assumed for AD and EFs. The ERT recommends that Poland revise its uncertainty estimates to reflect data availability in its next annual inventory submission. The estimated uncertainties for the energy sector in the base year are 1.8 per cent for CO<sub>2</sub>, 6.1 per cent for CH<sub>4</sub> and 2.9 per cent for N<sub>2</sub>O. As noted in previous review reports, these



uncertainty values (particularly those for N<sub>2</sub>O and CO<sub>2</sub>) appear to be rather low, but no explanation for this is provided in the NIR. The ERT recommends that Poland provide such an explanation in its next annual inventory submission.

40. Poland indicates in the NIR that uncertainties were based on expert judgement and on an analysis of the GHG inventories of other Parties. For EF uncertainties, the ERT recommends that Poland re-examine the values used to perform the analysis and compare these values with other available information for different Parties. The ERT also reiterates the recommendations from the previous review report that Poland include in its future NIRs a discussion of the quality of fuel consumption data and the uncertainty values adopted, including the rationale for adopting these values and the procedures used for eliciting expert judgment.

41. Except for the use of the EU ETS data, no other significant changes or differences were identified in Poland's 2008 inventory submission compared to the 2007 one.

42. In response to questions raised by the ERT, after the centralized review Poland included estimates of N<sub>2</sub>O emissions from oil and natural gas – flaring (see para. 62 below). This revision has resulted in a 0.0001 per cent increase for the energy sector for 2006, from 329,839.89 Gg CO<sub>2</sub> eq to 329,840.14 Gg CO<sub>2</sub> eq.

## **B. Reference and sectoral approaches**

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

43. In the 2006 inventory, the difference in estimated CO<sub>2</sub> emissions calculated using the sectoral and reference approaches is 0.91 per cent. However, when comparing energy consumption, the observed difference is significant for both liquid and gaseous fuels. In particular for liquid fuels, energy consumption in the reference approach is 16.9 per cent higher than in the sectoral approach, but CO<sub>2</sub> emissions are 4.9 per cent lower. Poland has not provided explanations in the NIR for the observed discrepancies or for the fluctuations observed in the differences between the reference and the sectoral approach over the period 1988–2006 (ranging from –2.87 to 3.04 per cent for CO<sub>2</sub> emissions). After the centralized review, Poland provided additional explanations to the ERT clarifying that table 1.A(b) included data on energy consumption, whereas data on non-energy use and feedstocks were only included in table 1.A(d). In addition, Poland provided revised estimates of energy consumption excluding non-energy use and feedstocks, for the reference approach. When comparing the reference approach with the sectoral approach based on these data the observed differences are smaller, in particular for liquid fuels. The ERT recommends that Poland, in its next annual inventory submission, report estimates of energy consumption excluding non-energy use and feedstocks for the reference approach in table 1.A(c), and provide clear explanations for the differences between the CO<sub>2</sub> emission estimates and energy consumption using the reference and sectoral approaches, as well as for the aforementioned fluctuations in these differences. The ERT also recommends that Poland complete the documentation boxes of the CRF tables and use notation keys as necessary.

44. The ERT noted that Poland has not provided the values for production, imports, exports, international bunkers and stock changes in CRF table 1.A(b) and it has instead used notation keys. Poland explained that this is due to the fact that these data are only available expressed in TJ and that the CRF Reporter software allows only for mass units to be reported, except for apparent consumption. The ERT believes that, as noted in previous reviews, Poland should at least provide in its NIR figures on production, imports, exports, international bunkers and stock changes, even if these are provided in TJ, as this would help to increase transparency of the inventory. The ERT further noted that in certain cases there was inappropriate use of notation keys, for example, for anthracite the notation key used for all entries is not applicable (“NA”) while the appropriate notation key that should have been used is “NO”. The ERT recommends that Poland report data correctly in table 1.A(b) and use appropriately notation keys in accordance with the UNFCCC reporting guidelines its next annual inventory submission.

45. The ERT also reiterates the recommendation from the previous review report that high-methane and nitrified gas related emission estimates calculated using the reference approach should also be presented in an aggregated form in the CRF tables, as this would increase the comparability of this information. In the NIR, natural gas estimates could be disaggregated and the relevant explanations and background information provided.

## 2. International bunker fuels

46. Poland states in its NIR that the allocation of emissions from domestic and international aviation is based on expert judgment and no further explanations are provided. The same holds true for the allocation of emissions from domestic and international navigation, with the small addition of reference made to a questionnaire of the GUS (GUS-3) in the recalculations section, but again with no further details provided. The ERT recommends that Poland further investigate the split of aviation and navigation-related emissions in the domestic and international categories, and that the methods and definitions recommended by the IPCC good practice guidance be strictly applied for its future annual inventory submissions, in order to ensure that emissions from international aviation and navigation are neither systematically over- nor underestimated for the whole time series.

47. The ERT encourages Poland to establish further contacts with the national aviation authorities and also to contact international organizations, such as EUROCONTROL, to obtain relevant statistics. In 2006, the assumed split for aviation was 5.7 per cent domestic and 94.3 per cent international, while for navigation it was 1.5 per cent domestic and 98.5 per cent international. Marine bunker data are based on energy statistics from the International Energy Agency (IEA) and Eurostat.

48. The ERT noted that there are differences between the figures for the residual fuel oil and gas/diesel oil consumption for international navigation and the jet kerosene consumption for international aviation reported to the IEA and the data reported in the CRF tables. In addition, Poland reports aviation gasoline to the IEA, but does not include this in the CRF tables as bunker fuels and instead includes aviation gasoline in the civil aviation category, as this fuel is entirely used in domestic aviation.

49. Poland states in its NIR that the same EF, equal to 74.1 kg/GJ, has been used to estimate CO<sub>2</sub> emissions from diesel oil for both domestic and international navigation, which the ERT considers to be appropriate. However, the ERT noted that, in practice, the EF used to estimate emissions from diesel oil in navigation was equal to 73.12 kg/GJ, leading to an underestimation of CO<sub>2</sub> emissions for this category in 2006. During the centralized review, the ERT requested Poland to provide supporting information for this apparent inconsistency or to revise its estimates and use the value of 74.1 kg/GJ for both domestic and international navigation.

50. In its response to the ERT, Poland stated that in the domestic navigation category (1.A.3d) two different EFs for CO<sub>2</sub> from diesel oil were applied: the first (73.0 kg/GJ) for inland navigation, taken from the Revised 1996 IPCC Guidelines (Reference Manual, table I-49, page 191); and the second (74.1 kg/GJ) for domestic marine navigation, taken from published, recognized international literature. The observed changes in the implied emission factors (IEFs) depend on the amount of fuel consumed for domestic inland and marine navigation. The CO<sub>2</sub> EF applied for international navigation is the same as the one for domestic marine navigation (74.1 kg/GJ). The ERT accepted the explanation provided by Poland and recommends that the Party, in the NIR of its next annual inventory submission, clearly explain its use of EFs for international and domestic navigation, including why EFs from recognized international literature are considered more applicable to its national circumstances than the default values from the Revised 1996 IPCC Guidelines, and particularly showing the difference in the diesel oil used for domestic inland navigation and for marine navigation.

## 3. Feedstocks and non-energy use of fuels

51. The NIR does not provide information on carbon stored and emissions from feedstocks and non-energy use of fuels. Poland is encouraged to increase the transparency of its reporting of carbon stored

and these emissions by providing, in the NIR of its next annual inventory submission, clear and detailed information on the methodologies, AD and EFs used for its estimations. Furthermore, the ERT noted the inappropriate use of the notation key “NA” in CRF table 1.A(d). The ERT recommends that Poland use the notation key “NO” instead.

### C. Key categories

#### 1. Stationary combustion: solid fuels – CO<sub>2</sub>

52. In its 2008 submission, Poland integrated EU ETS data into the inventory estimates for the first time; however, the Party did not provide any information in its NIR as to how these data were aggregated in the relevant CRF categories. During the centralized review, Poland clarified that industry data are collected in the National Administration of Emission Trading Scheme database. Plant-level data on fuel consumption and emission values contained in this database are aggregated into individual industry branches. The respective IPCC categories in which data on fuel consumption from a particular branch were incorporated are given after the branch names as follows: Electricity and heat production industry – 1.A.1.a; Refinery – 1.A.1.b; Coke oven plants – 1.A.1.c; Iron and steel industry – 1.A.2.a; Chemical industry – 1.A.2.c; Paper industry – 1.A.2.d; Cement industry – 1.A.2.f; Lime industry – 1.A.2.f; Glass industry – 1.A.2.f; Ceramic industry – 1.A.2.f; Wood-derivative products industry – 1.A.2.f; Sugar industry – 1.A.2.e; and Other industry branches – 1.A.2.f (excluding data described below). Data concerning commercial/institutional activities, agriculture and the food industry were transferred from “Other industry branches” to the IPCC subcategories 1.A.4.a, 1.A.4.c and 1.A.2.e, respectively, on the basis of the PKD<sup>7</sup> codes of the industry concerned. The ERT recommends that Poland provide detailed information on the integration of EU ETS data into the inventory estimates and on its efforts to ensure time-series consistency for the categories indicated above, in its next annual inventory submission.

53. After the centralized review had taken place, Poland informed the ERT of a mistake identified in the Eurostat database. The value used for hard coal consumption in district heating plants in 2006 (169,761 TJ) had been overestimated, the correct value being 125,671 TJ (123,219 TJ of bituminous coal and 2,452 TJ of coking coal). This mistake results in an overestimation of the GHG emissions from solid fuels in the public electricity and heat production category by 4,159.92 Gg CO<sub>2</sub>, 0.04 Gg CH<sub>4</sub> and 0.07 Gg N<sub>2</sub>O, totalling 4,181.30 Gg CO<sub>2</sub> eq. The ERT recommends that Poland incorporate this revision as a recalculation and include the relevant explanation in its next annual inventory submission.

54. Overall, the ERT was pleased to see that Poland had implemented the majority of the recommendations made in the previous review report for this category. Reiterating some of the recommendations, the ERT encourages Poland to further improve its process for determining national EFs for lignite. In addition, the ERT recommends that Poland present in its future inventory submissions a full carbon balance with inputs and outputs of fuel used in the iron and steel category and describe the links to the fuel reported under the industrial processes sector, in order to increase transparency and avoid a possible under- or overestimation of related emissions.

#### 2. Stationary combustion: liquid fuels – CO<sub>2</sub>

55. The inter-annual changes in the IEFs for CO<sub>2</sub> emissions from petroleum refining for 1994–1995, 1995–1996 and 1997–1998 are unusual (1.7 per cent, 1.3 per cent and 1.4 per cent, respectively) and the trend fluctuates. The IEFs for CO<sub>2</sub> have increased by 2.4 per cent over the period 1990–2006. During the centralized review, Poland explained that this increase is the result of an increase in the share of fuel oil in liquid fuels. The ERT recommends that Poland provide explanations for these fluctuations, along with graphs showing the composition of liquid fuels used in this category over time, in the NIR of its next annual inventory submission.

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<sup>7</sup> PKD stands for Polska Kalasyfikacja Działalności, the Polish Classification of Economic Activities, which corresponds to NACE (Nomenclature générale des activités économiques dans les Communautés européennes).

### 3. Stationary combustion: gaseous fuels – CO<sub>2</sub>

56. The ERT acknowledges that the CO<sub>2</sub> emission estimates reported under the category 1.A.2.f other are based on the EU ETS data for Poland. During the centralized review, the ERT noted that, in 2006, the IEF for CO<sub>2</sub> (52.11 t/TJ) from gaseous fuels for the category 1.A.2.f other is lower than the default IPCC EF (56.1 t/TJ), the EF reported by Poland for the period 1988–2005 (55.82 t/TJ) and the EFs in the other subcategories under manufacturing industries and construction. This may lead to an underestimation of CO<sub>2</sub> emissions for 2006. The ERT requested that Poland provide information on the shares of the different types of natural gas used in this category (e.g. high-methane, nitrified and coal-bed methane) for the whole time series, but in particular for 2005 and 2006, as well as information on the carbon content of the identified gaseous fuels, or revise its estimates using the same EF (55.82 t/TJ) for the complete time series.

57. In its response to the ERT, Poland indicated that the low value of the EFs in the category 1.A.2.f other was the result of a calculation error when shifting AD and the emission estimates concerning electricity and heat production from “Other industry branches” into the public electricity and heat production category. Poland has revised the 2006 estimates accordingly, reallocating AD for natural gas from public electricity and heat production to the category other. This revision resulted in an increase of 166.56 Gg CO<sub>2</sub> eq in the emission estimates for the category other, with a CO<sub>2</sub> IEF for natural gas of 54.67 kg/GJ, and an equivalent decrease in the emission estimates for the public electricity and heat production category, with a CO<sub>2</sub> IEF for natural gas of 54.88 kg/GJ; however, this revision did not result in any change in the estimate of the total CO<sub>2</sub> emissions in the energy sector. The ERT considers the revision adequate and recommends that Poland include, in its next annual inventory submission, detailed information and explanations to support the use of these lower IEFs for natural gas in comparison with other categories in the energy sector, and that the Party maintain consistency in its emission estimates for the complete time series.

### 4. Road transportation – CO<sub>2</sub>

58. A number of unusual inter-annual changes were identified by the ERT for the period 1988–2006 as regards the IEFs for CO<sub>2</sub> from gasoline in road transportation (ranging from –2.9 to +0.2 per cent). The NIR does not contain sufficient information to clarify the reasons for these changes. During the centralized review, Poland explained that emissions from road transportation are estimated on the basis of the methodology of the Motor Transport Institute (ITS) and country-specific EFs. The total fuel consumption of a particular type of vehicle (classified according to categories listed in the ITS reports) was calculated as the product of the mileage and fuel consumption. Data on fuel consumption per vehicle were received from the ITS, derived from its own analysis, and data from vehicle producers. The estimation of the EFs for CO<sub>2</sub> for individual types of vehicle is based on the carbon content of fuels and the work of the ITS. The ERT recommends that Poland carefully examine and, in its next annual inventory submission, report the fleet composition data, some of which were provided to the ERT during the centralized review. The ERT also recommends that the Party describe in detail the methodologies and EFs used, and provide detailed explanations in the NIR for EF fluctuations over the whole time series.

### 5. Coal mining and handling – CH<sub>4</sub>

59. Fluctuations were observed in the estimated CH<sub>4</sub> emissions from both surface mines (ranging from –6.2 to +5.4 per cent) and underground mines (ranging from –14.1 to +4.4 per cent) and, in general, the CH<sub>4</sub> emissions showed a decreasing trend (by 50.2 and 18.1 per cent, respectively) for the period 1988–2006. During the centralized review, Poland explained that the observed fluctuations for underground mines are primarily due to:

- (a) The amount of coal extracted over the 1988–2006 period (depending on the availability of coal seams prepared for extraction and on market demand);

- (b) The amount of CH<sub>4</sub> captured by the de-methane systems (and used for energy and heat production purposes);
- (c) The amount of post-mining activities/processes (depends on, inter alia, the demand for coal);
- (d) Different EFs used for different years on the basis of the current knowledge and actual measurements at mine level.

60. As regards surface mines, the fluctuations are mainly dependent upon the amount of lignite extracted over the 1988–2006 period, which in turn depends on the availability of lignite seams prepared for extraction and on market demand. The ERT recommends that Poland include this information in the NIR of its next annual inventory submission.

61. Reiterating recommendations from the previous review report, the ERT suggests that Poland re-examine the EFs used for its estimates under this category and, if it considers them satisfactory, provide a more detailed description of their derivation in its NIR. To improve the current time series, the ERT also reiterates the recommendation that Poland analyse the difference in EFs from different national studies and, if appropriate, consider using interpolation for emission estimates for the years in which Poland assumed a constant EF (e.g. for surface mines), starting from the year in which the study was conducted. In order to improve transparency, it is recommended that Poland provide in its next annual inventory submission a full description of the methods used to estimate emissions for this category, as well as supporting information. To improve the completeness of this category, the ERT encourages Poland to estimate CH<sub>4</sub> emissions from surface post-mining activities, CO<sub>2</sub> emissions from all coal mining and handling activities, and emissions from solid fuel transformation currently reported as “NE”.

#### 6. Oil and natural gas – CH<sub>4</sub>

62. Poland reports CH<sub>4</sub> emissions from the production, transport and refining/storage of oil and the production/processing, transmission and distribution of natural gas. The ERT appreciates that Poland has followed the recommendation made in the previous review report and provided estimates for other leakage from industrial plants and power stations. In response to questions raised by the ERT, after the centralized review Poland also included estimates of N<sub>2</sub>O emissions from oil and natural gas – flaring. This revision has resulted in a 0.01 per cent increase in the emission estimates for the oil and natural gas category for 2006, from 4,607.06 Gg CO<sub>2</sub> eq to 4,607.31 Gg CO<sub>2</sub> eq. The ERT recommends that Poland estimate CH<sub>4</sub>, CO<sub>2</sub> and N<sub>2</sub>O emissions for categories in which emissions are currently reported as “NE” and for which there are available methodologies, such as other leakage from residential and commercial sectors, and that the Party apply these estimations consistently for the whole time series.

63. As emissions for this category are estimated using a tier 1 method and, in most cases, using country-specific EFs, the ERT reiterates the recommendation that, in order to improve transparency, Poland provide in the NIR of its next annual inventory submission the whole set of country-specific EFs and default EFs used, and particularly information on the underlying estimation methods and background information on the oil and gas activities in the country.

### **D. Non-key categories**

#### 1. Civil aviation – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O

64. The NIR provides limited information on the methods, AD and EFs used to estimate emissions for this category. Poland states in its NIR that the allocation of emissions from domestic and international aviation is based on expert judgement and no further explanations are provided. The ERT recommends that Poland further investigate the split of aviation-related emissions in the domestic and international categories and strictly apply the methods and definitions recommended by the IPCC good practice guidance for its future annual inventory submissions, in order to ensure that emissions from international aviation are neither systematically over- nor underestimated for the whole time series. The ERT

encourages Poland to establish further contacts with the national aviation authorities and also to contact international organizations, such as EUROCONTROL, to obtain relevant statistics.

65. The ERT also reiterates the recommendation from the previous review report that Poland include a detailed discussion and extend the information on the methods, AD and EFs used in its estimations for this category, in the NIR of its next annual inventory submission.

## 2. Railways – CO<sub>2</sub>

66. The NIR provides limited information on the methods, AD and EFs used to estimate emissions for this category. As regards the inter-annual fluctuations in CO<sub>2</sub> emissions from railways over the period 1988–2006 (ranging from –43.6 to +11.1 per cent), Poland clarified during the centralized review that these are primarily due to changes in fuel consumption, which have resulted from the replacement of diesel oil locomotives with rail buses and the elimination of many train connections in recent years. The ERT recommends that Poland clearly explain in the NIR of its next annual inventory submission all trend changes observed for the time series and extend the information provided on the methods, AD and EFs used for its estimations.

# III. Industrial processes and solvent and other product use

## A. Sector overview

67. In 2006, emissions from the industrial processes sector amounted to 27,227.83 Gg CO<sub>2</sub> eq, or 6.8 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 705.75 Gg CO<sub>2</sub> eq, or 0.2 per cent of total GHG emissions. Between 1988 and 2006, emissions from the industrial processes sector decreased by 17.1 per cent and emissions from the solvent and other product use sector decreased by 29.9 per cent. The key driver for the fall in emissions is the change of economic system in Poland since 1988. In 2006, most of the emissions came from cement production, which accounted for 22.0 per cent of the sectoral emissions, while ammonia production accounted for 16.4 per cent, nitric acid production for 16.2 per cent and iron and steel production for 15.5 per cent.

68. The inventory covers the main sources of GHG emissions in the sector, although some minor categories are reported as “NE”, including CO<sub>2</sub> emissions from asphalt roofing and road paving with asphalt; CH<sub>4</sub> emissions from dichloroethylene and calcium carbide; CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from non-ferrous metals; and SF<sub>6</sub> used in aluminium foundries. Actual emissions of fluorinated gases are reported for 1988 and 1995–2006 only, while potential emissions of HFCs are reported only for 2000–2006 and PFCs and SF<sub>6</sub> only for 2000 and 2001. Actual emissions of HFCs and PFCs for 1988 and 1995 are identical. Emissions from many of the ozone-depleting substance substitutes (HFCs) and PFCs, and from subcategories under consumption of halocarbons and SF<sub>6</sub>, are reported as “NE” or “NA”. The CO<sub>2</sub> emissions from glass production and other mineral products (bricks, tiles and ceramic materials) are provided only for 2005 and 2006. The ERT recommends that Poland further improve the completeness of its inventory in its next annual submission, in particular by estimating actual and potential emissions of HFCs, PFCs and SF<sub>6</sub> for all the relevant categories and years in the time series and by providing in the NIR complete and detailed information on methods, AD and EFs.

69. Poland has addressed a number of the issues raised in the 2006 review report. However, as mentioned in the previous review report (2006), in order to improve the transparency of the NIR the Party needs to make improvements to a number of the methodological descriptions and include a description of the trends for the GHGs emitted in this sector. The ERT encourages Poland to include detailed descriptions of the methodologies, EFs and AD used and a full description of the aforementioned trends in its future NIRs.

70. In response to questions raised by the ERT, after the centralized review Poland included in its inventory estimates of CH<sub>4</sub> emissions from the chemical industry – other (styrene). This revision has

resulted in a 0.04 per cent increase in the estimated emissions for the industrial processes sector for 2006, from 27,217.63 Gg CO<sub>2</sub> eq to 27,227.83 Gg CO<sub>2</sub> eq.

## **B. Key categories**

### **1. Cement production – CO<sub>2</sub>**

71. Poland has used a combination of default EFs, country-specific EFs and plant-specific data to estimate emissions from the cement industry for the period 1998–2006. For 2005 and 2006, estimates of CO<sub>2</sub> emissions from clinker production were taken from the verified reports of installations participating in the EU ETS (534 kg CO<sub>2</sub>/t clinker is reported as the IEF for 2005 and 533 kg CO<sub>2</sub>/t clinker for 2006). For 1988 and 1989, the default EF (525 kg CO<sub>2</sub>/t clinker) and clinker production data were used to derive the estimates. For 1990–2000 and 2001–2004, an averaged EF resulting from country-specific EFs developed for 2001–2004 (529 kg CO<sub>2</sub>/ t clinker) has been used. The ERT recommends that, in order to improve consistency, Poland use the weighted average country-specific EFs resulting from EU ETS data (2005–2007) for the entire time series in its next submission, subject to expert judgement regarding critical factors such as technological changes and the age of the plants, which influence the cement kiln dust correction factor for clinker emissions. The ERT noted a lack of transparency in the information reported in the NIR for this category. The ERT recommends that Poland revise its estimates for this category in its next annual inventory submission, ensuring as much consistency as possible in the time series, and fully document in the NIR the methods, data sources and assumptions used.

### **2. Ammonia production – CO<sub>2</sub>**

72. Poland has estimated emissions from this category using national statistics on natural gas (1988–2006) and coke oven gas (1989 and 1990) consumption in the ammonia production process, and default IPCC carbon content factors for these fuels (NIR, section 4.2.1.1, page 82), in response to recommendations made in the previous review. The ERT encourages Poland to include more information on the data used for its estimations, including the assumptions used in calculating CO<sub>2</sub> emissions (e.g. the carbon content factor of coke oven gas) in the NIR of its next annual inventory submission.

### **3. Nitric acid production – N<sub>2</sub>O**

73. Poland has based its emission estimates on a single country-specific EF (6.47 kg/Mg nitric acid) derived from a national study<sup>8</sup> and production data from national statistics. As mentioned in the previous review report, the NIR does not provide sufficient documentation of the methods used to derive this country-specific EF, or background information on the industry activities or any information on the abatement levels in the plants. The ERT recommends that Poland revise the methods used to derive the country-specific EF and use the information obtained at plant level to ensure that it is consistent over the entire time series, and that it provide a more detailed description of the methods and AD used in the NIR of its next annual inventory submission.

## **C. Non-key categories**

### **Limestone and dolomite use – CO<sub>2</sub>**

74. CO<sub>2</sub> emissions from this category are reported only for 2005 and 2006. In addition, AD for this category are reported as included elsewhere (“IE”) in CRF table 2.(I).A-G. In the description cell for AD in this CRF table, Poland reports “limestone use in agriculture”. However, the NIR indicated that only emissions from sulphur removal installations for pollution control in power plants which participate in the EU ETS are included in the category limestone and dolomite use. The remaining CO<sub>2</sub> emissions from limestone and dolomite use were included in other categories where these minerals are used, namely: 2.C.1 metal production (iron ore sinter production, pig iron in blast furnaces, steel production, casting), 2.A.7 other (glass and ceramics production) and 5.IV.B CO<sub>2</sub> emissions from agricultural lime application

<sup>8</sup> Kozłowski K. 2001. *Strategy of Reduction of N<sub>2</sub>O Emission in Industry Processes*.

– cropland. The ERT notes that Poland has not addressed the recommendation of the previous review report that, where emissions from limestone production and use are estimated separately, it should report the aggregate emissions under the 2.A.3 category. The ERT reiterates the views of the previous review report that reporting CO<sub>2</sub> emissions from limestone and dolomite use separately under different subcategories in the industrial processes sector, instead of reporting the aggregate emissions under this category, is not in accordance with the Revised 1996 IPCC Guidelines. The ERT also reiterates the recommendation of the previous review report that Poland review the use of limestone and dolomite in iron and steel production, glass and ceramics production, construction and environmental pollution control, and include estimates of emissions from these activities under the limestone and dolomite use category in its next annual inventory submission, in order to improve the comparability and consistency of the reporting of this category in the CRF tables and the NIR.

## IV. Agriculture

### A. Sector overview

75. In 2006, emissions from the agriculture sector amounted to 34,503.88 Gg CO<sub>2</sub> eq, or 8.6 per cent of total GHG emissions. Overall, emissions from the sector decreased by 32.6 per cent between 1988 and 2006, although they experienced an increase of 6.6 per cent between 2004 and 2006. The key driver for this overall decrease is the economic recession at the beginning of the 1990s, while the increase in emissions over the latest years is attributable to Poland's accession to the European Union in 2004. Within the sector, 44.8 per cent of the emissions were from agricultural soils, followed by 28.5 per cent from manure management and 26.6 per cent from enteric fermentation. The remaining 0.1 per cent was from field burning of agricultural residues. There is no rice cultivation in Poland.

76. In general, the information in the NIR has not been presented transparently enough. For each category, there is a brief overview and a discussion of the methodological issues specially related to EFs; however, the ERT notes that additional information should be provided in relation to country-specific parameters and AD trends. Only a short description of uncertainties, recalculations and planned improvements has been presented for the whole sector. The ERT recommends that Poland provide more extensive information in the NIR of its next annual inventory submission, including more details on the background data used for its estimations.

77. In response to comments made in the previous review report, in its 2008 submission Poland has improved the methods, AD and EFs that were not consistent with the IPCC good practice guidance. Poland has harmonized the AD on milk production from the Institute of Animal Production with the national statistics for the entire time series 1988–2006. Poland has also recalculated emissions of N<sub>2</sub>O from cultivated histosols for the entire time series on the basis of the results of a new country study of N<sub>2</sub>O emissions from cultivated histosols (Oświecimska-Piasko, 2008).

78. In response to questions raised by the ERT, after the centralized review Poland provided revised estimates of N<sub>2</sub>O emissions from agricultural soils – direct soil emissions (see paras. 84 and 85 below). This revision has resulted in a 0.6 per cent increase in the estimated emissions for the agriculture sector for 2006, from 34,291.22 Gg CO<sub>2</sub> eq to 34,503.88 Gg CO<sub>2</sub> eq.

### B. Key categories

#### 1. Enteric fermentation – CH<sub>4</sub>

79. In 2006, emissions from enteric fermentation amounted to 9,167.79 Gg CO<sub>2</sub> eq, or 2.3 per cent of total GHG emissions. Emissions from this category decreased by 41.6 per cent between 1988 and 2006, as a result of a general decreasing trend in the livestock population since the late 1980s in Poland. In 2006, dairy cattle, non-dairy cattle and swine were the main subcategories, responsible for 61.0 per cent, 30.6 per cent and 6.5 per cent of the CH<sub>4</sub> emissions in this category, respectively.



80. A tier 2 approach is used to estimate emissions from dairy cattle, non-dairy cattle and sheep, while tier 1 methodology with IPCC default EFs are used to derive emission estimates for the rest of the animal categories. During the centralized review, Poland provided the ERT with additional information that improved understanding of the country-specific parameters and trends for the time series. The ERT recommends that Poland incorporate this information in its next annual inventory submission and adopt a higher tier approach for its estimation of emissions from swine.

## 2. Manure management – CH<sub>4</sub>

81. Emissions from manure management accounted for 3,738.51 Gg CO<sub>2</sub> eq in 2006, or 0.9 per cent of total GHG emissions, increasing by 9.3 per cent between 1988 and 2006. In 2006, swine, dairy cattle and non-dairy cattle were the main subcategories, responsible for 69.3 per cent, 14.8 per cent and 9.3 per cent of the CH<sub>4</sub> emissions in this category, respectively. A tier 2 approach is used to estimate emissions from dairy cattle, non-dairy cattle, sheep and swine, while tier 1 methodology is used to estimate emissions for the rest of the animal categories. The NIR reports that, for dairy cattle, country-specific data on gross energy (GE) intake dependent on the increasing milk yield have been used to estimate the average daily volatile solids excretion (VS). The ERT recommends that Poland, in the NIR of its next annual inventory submission, provide better descriptions of its animal waste management systems, particularly as this is related to the transparency of the estimates of both CH<sub>4</sub> and N<sub>2</sub>O from manure management (see also para. 82 below).

## 3. Manure management – N<sub>2</sub>O

82. In 2006, N<sub>2</sub>O emissions from manure management amounted to 6,093.84 Gg CO<sub>2</sub> eq, or 1.5 per cent of total GHG emissions. Poland applies the IPCC default nitrogen (N) excretion values for Eastern Europe to estimate N<sub>2</sub>O emissions for this category. In accordance with the IPCC good practice guidance, the estimates of feed intake developed through the enhanced characterization used in the tier 2 emission estimate for cattle, buffalo and sheep for enteric fermentation (whichever are applicable), should be used, to harmonize the estimated manure and N excretion rates used to estimate CH<sub>4</sub> and N<sub>2</sub>O emissions from manure management and direct and indirect N<sub>2</sub>O emissions. The ERT recommends, therefore, that Poland apply this approach to the relevant animal subcategories and further improve its inventory in the next annual submission by applying country-specific N excretion rates in its calculations for this category; in particular for dairy cattle, the increased milk yield should also be considered.

## 4. Direct soil emissions – N<sub>2</sub>O

83. Direct soil emissions amounted to 15,466.90 Gg CO<sub>2</sub> eq in 2006, or 3.9 per cent of total GHG emissions. Poland applied a country-specific EF of 0.009 kg N<sub>2</sub>O-N/kg N for synthetic fertilizers and a country-specific EF of 0.01 kg N<sub>2</sub>O-N/kg N for all other N inputs (manure applied to soils, N-fixing crops and crop residues). These EFs are lower than the IPCC default value (0.0125 kg N<sub>2</sub>O-N/kg N); they were taken from a national study (Mercik et al., 2001) and are based on domestic research, measurements and available literature. During the centralized review, Poland provided supporting background information and some relevant paragraphs of the national study were translated into English for the ERT. Poland explained that these values are representative of the whole of Poland, since all kinds of mineral fertilizer used and all soil types occurring in Poland were taken into account. As in the previous review report, the ERT recommends that Poland clearly document how these country-specific EFs were derived in the NIR of its next annual inventory submission. Additionally, relevant information and references should be provided in the documentation box of CRF table 4.D.

84. Poland has reported N<sub>2</sub>O emissions from crop residues of non-N-fixing crops under the subcategory crop residue (4.D.1.4) and N<sub>2</sub>O emissions from crop residues of N-fixing crops under the subcategory N-fixing crops (4.D.1.3). During the centralized review, the ERT recommended that Poland revise these estimates and include N<sub>2</sub>O emissions from all crop residues (both from N-fixing and non-N-fixing crops) in the subcategory crop residue (4.D.1.4), in line with the Revised 1996 IPCC Guidelines. Following this recommendation, after the centralized review Poland provided revised estimates of N<sub>2</sub>O

emissions from crop residues of N-fixing crops (formerly reported under 4.D.1.3) and N<sub>2</sub>O emissions from other crop residues (formerly reported under 4.D.1.4.) that are now summarized and reported under the subcategory crop residue (4.D.1.4). This revision resulted in a 10.6 per cent increase in the estimated N<sub>2</sub>O emissions in the subcategory crop residue for 2006 (from 2.69 Gg to 2.98 Gg). The ERT considers this revision adequate.

85. In the course of the centralized review, the ERT also recommended that Poland estimate the N<sub>2</sub>O emissions from subcategory N-fixing crops (4.D.1.3) by applying equation 4.25 or 4.26 of the IPCC good practice guidance. Following this recommendation, after the centralized review Poland provided revised estimates using equation 4.26 of the IPCC good practice guidance. Seed yields of N-fixing crops were taken from the Statistical Yearbooks of the Republic of Poland and other relevant input parameters were taken from a Polish study (Loboda and Pietkiewicz, 1994). This revision resulted in an increase of 140.1 per cent in the estimated N<sub>2</sub>O emissions from the subcategory N-fixing crops for 2006 (from 0.29 Gg to 0.69 Gg). The ERT considers this revision adequate and encourages Poland to include the new estimates and all the parameters and background information used to make these estimates in the NIR of its next annual inventory submission. Overall, the revisions for this category resulted in a 2.0 per cent increase in the estimated N<sub>2</sub>O emissions from direct soil emissions category for 2006, from 34.15 Gg to 34.84 Gg.

86. The NIR reports that, under the subcategory cultivation of histosols (4.D.1.5), Poland recalculated these estimates for the entire time series on the basis of a new national study (Oswiecimska-Piasko, 2008), in which areas of histosols were estimated and used for the inventory. However, the ERT noted that recalculations and estimation were undertaken for the period 1990–2006, but not for 1988–1989. During the centralized review, Poland explained that it had left the values for 1988–1989 unchanged because they referred to base year estimates that were “fixed” during the previous in-country review in 2007. This inconsistency resulted in a significant decrease in the reported area of soil cultivation and a 12.0 per cent decrease in the corresponding estimated emissions from 1989 to 1990. Following the recommendations of the ERT, after the centralized review Poland revised the values for 1988 and 1989 in order to ensure time-series consistency.

## **V. Land use, land-use change and forestry**

### **A. Sector overview**

87. In 2006, the LULUCF sector was a net sink of 40,504.79 Gg CO<sub>2</sub> eq. Removals from the sector increased by 23.0 per cent between 1988 and 2006. The key driver for the rise in removals is the continual increase in forest cover. Within the LULUCF sector, forest land is the main sink, accounting for net removals of 54,266.11 Gg CO<sub>2</sub>, while other removals occur in settlements, accounting for 74.45 Gg CO<sub>2</sub>. Cropland is the major source of emissions, accounting for 8,237.09 Gg CO<sub>2</sub>, followed by wetlands with 3,090.49 Gg CO<sub>2</sub>. Grassland is the source of the least emissions, accounting for 130.54 Gg CO<sub>2</sub>.

88. In the previous review report, it was stated that Poland had revised its estimates for the LULUCF sector for the 1988–2004 period using the IPCC good practice guidance for LULUCF, resulting in a reduction in the estimated net removals for 1988, from 32,926.48 Gg CO<sub>2</sub> eq to 29,978.31 Gg CO<sub>2</sub> eq. It was also recommended in the previous review report that Poland include these revised estimates in its next annual inventory submission. However, the revised estimate for 1988 (29,978.31 Gg CO<sub>2</sub> eq) is not reported in either the 2007 or the 2008 submission. The ERT recommends that Poland clarify this apparent inconsistency, provide background information in the NIR and, if necessary, recalculate its emission/removal estimates for the complete time series, but particularly for 1988, in its next annual inventory submission.

89. Poland has reported emission estimates for the LULUCF sector using the IPCC good practice guidance for LULUCF for the first time in its 2008 submission, covering the period 1990–2006 as

indicated in the NIR. The ERT noted the indication in the NIR that recalculations have been performed for the period 1990–2004 using the IPCC good practice guidance for LULUCF. The ERT concludes that the estimates for 1988 and 1989 have not been recalculated using the IPCC good practice guidance for LULUCF and are, therefore, still based on the Revised 1996 IPCC Guidelines. This results in a time-series inconsistency, as a result of the change of methodology. The ERT strongly recommends that Poland use the IPCC good practice guidance for LULUCF to estimate emissions/removals for the complete time series, and in particular for 1988 and 1989, and report on these recalculations in its next annual inventory submission.

90. The ERT notes that Poland has not provided in the NIR documentation on several country-specific factors and parameters, and recommends that adequate information on country-specific factors and parameters be provided in its future inventory submissions in order to improve transparency.

91. The reporting of land use is based on national statistics and there is no indication that detailed geographical information has been used, except for the area of forest in provinces (NIR 2008, figure 7.1). Furthermore, no additional information has been included in the NIR as to the area balance by geodesic status (NIR 2008, page 121), information that is required in relation to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT notes that lack of this information could pose a major challenge for Poland in its future reporting under the Kyoto Protocol and recommends that, if such geographical information is already being used, more information be provided in its next annual inventory submission.

## **B. Key categories**

### **1. Forest land remaining forest land – CO<sub>2</sub>**

92. The area reported in table 7.2 of the NIR is not consistent with the information provided in CRF table 5.A. In CRF tables 5.A, 5.B and 5.C, Poland has reported only the mineral soils area and not the total area as AD. The ERT recommends that Poland correct this mistake and report, in its next annual inventory submission, the total area (mineral and organic soils) in the CRF tables and continue to report the organic soils area separately.

93. The ERT identified some unusual inter-annual changes in net carbon stock change in living biomass per area for forest land remaining forest land for the period 1990–2006 (ranging from –22.3 to +23.3 per cent). A graph on annual biomass increment has been provided in the NIR, which shows a clear decrease over the period 1989–1992; also the curve for 10-year average shows a decrease for 1991–1995. The ERT recommends that Poland provide clear and detailed explanations for these trends as well as background data in the NIR of its next annual inventory submission.

94. The net carbon stock changes in mineral soils per area for forest land remaining forest land for the period 1988–2006 are unusual (ranging from 0.368 to 0.369 Mg C/ha); they are among the highest of the reporting Parties in the 2008 submissions. Poland informed the ERT of the ongoing research that will enable it to estimate for future inventory submissions the rates of carbon stock change in forest soils in the country, as well as estimate the net CO<sub>2</sub> fluxes between forest ecosystem and atmosphere, carbon stock in forests, the adaptation of forest management, and a large area inventory of the national forests for all the forest ownership categories in the country. The ERT welcomes these efforts and expects Poland to use the country-specific values resulting from these studies to estimate the rates of carbon stock change in forest soils in its next annual inventory submission.

95. Poland has estimated CH<sub>4</sub> and N<sub>2</sub>O emissions from forest fires, but has not included in the NIR information on the parameters of the equations used (NIR 2008, page 132). The ERT noted that CO<sub>2</sub> emissions from wildfires are reported as “NE” in CRF table 5(V). During the centralized review, Poland provided the ERT with data for the parameters of the equations used. The ERT recommends that Poland include this information in the NIR of its next annual inventory submission and report CO<sub>2</sub> emissions from wildfires in table 5(V).

## 2. Land converted to forest land – CO<sub>2</sub>

96. The NIR provides very little information on this category, which includes a reference to analogous calculations as used for the forest land remaining forest land category. Although there is an analogy in the equations, the values of the parameters for land converted to forest land estimates are different from those for forest land remaining forest land. In CRF table 5.A, Poland reports significant removals from cropland converted to forest land in 2006. In addition, the ERT noted that net carbon stock changes in mineral soils per area are also unusual for this category for the period 1991–2006 (ranging from 2.021 to 2.034 Mg C/ha), being among the highest of the reporting Parties in the 2008 submissions. The ERT recommends that Poland provide more information on this category in the NIR of its next annual inventory submission.

97. In the NIR, it is reported that, in Poland, only cultivated organic soils are drained. The ERT notes that emissions from organic soils do not need to be estimated if there is no drainage involved but, if the carbon stock changes occurred in a drained area, emissions should be estimated in accordance with the IPCC good practice guidance for LULUCF. As organic soils from cropland are involved in this land-use change, it should be checked whether the organic soils involved are drained or not. The ERT recommends that Poland provide more information on this issue in the NIR of its next annual inventory submission.

## 3. Cropland remaining cropland – CO<sub>2</sub>

98. Poland has reported in its NIR that, for its estimations of emissions from mineral soils, the IPCC good practice guidance for LULUCF default parameters were corrected by experts to suit domestic conditions; however, no documentation or explanation for this has been provided in the NIR or in the references. The same situation has been identified for the emissions from mineral soils (grassland) under cropland converted to grassland (no emissions are reported in the CRF tables). The ERT recommends that Poland include clear and detailed documentation on the country-specific values either in the NIR of its next annual inventory submission or in an annex, along with a summary of this documentation in the NIR.

## 4. Grassland remaining grassland – CO<sub>2</sub>

99. CO<sub>2</sub> emissions from net carbon stock changes in organic soils have been reported under this category. Also, CH<sub>4</sub> and N<sub>2</sub>O emissions from wildfires for the subcategories cropland remaining cropland and land converted to cropland are reported together with wildfires in grasslands under grassland remaining grassland. In the documentation box of CRF table 5.C, it has been reported that, in Poland, there are no data for the controlled burning of grasslands and, in CRF table 5(V), the notation key “NO” has been used for this activity. Furthermore, in the aforementioned documentation box, it has also been indicated that, in Poland, only cropland is converted to grassland; however, no estimates have been provided for this category (cells have been left empty). The ERT recommends that Poland make efforts to report these emissions in its next annual inventory submission and provide the relevant information in the NIR.

## 5. Wetlands – CO<sub>2</sub> and CH<sub>4</sub>

100. Poland has reported estimates of emissions from wetlands remaining wetlands and land converted to wetlands for the first time in its 2008 submission. The ERT welcomes this improvement. Data on areas, CH<sub>4</sub> and N<sub>2</sub>O emissions for peatland, as well as flooded lands, have been included in CRF table 5(II), with the exception of N<sub>2</sub>O emissions from flooded lands, which are reported as “NE”. The explanation provided in the NIR for not estimating CH<sub>4</sub> emissions from flooded lands is not consistent with the content of CRF table 5(II), although this could just be a case of making an incorrect reference (i.e. to CH<sub>4</sub> rather than to N<sub>2</sub>O emissions). Furthermore, the area of peatland and flooded lands reported in the NIR does not correspond with the area reported in CRF table 5.D under land converted to wetlands. After the centralized review, Poland informed the ERT that the value provided in the NIR in section

7.2.4.1 (page 138) is incorrect, although the correct value is given in table 7.2 (page 122). The ERT recommends that Poland check the data used in its estimates, correct these if necessary and report consistently the relevant information in the NIR and the CRF tables of its next annual inventory submission.

## **VI. Waste**

### **A. Sector overview**

101. In 2006, emissions from the waste sector amounted to 8,404.85 Gg CO<sub>2</sub> eq, or 2.1 per cent of total GHG emissions. Emissions from the sector increased by just 0.04 per cent between 1988 and 2006, mainly as a result of the stable trend in waste generation over this period. Within the sector, 75.0 per cent of the emissions were from solid waste disposal on land, followed by 21.0 per cent from wastewater handling and 4.0 per cent from waste incineration. The transparency of the NIR has improved significantly when compared with the 2006 and 2007 submissions. The reporting on the waste sector is almost complete, including N<sub>2</sub>O emissions from human sewage, but with the exception of N<sub>2</sub>O emissions from industrial wastewater. The ERT recognizes that most of the recommendations from the previous review report have been taken into account in the 2008 submission.

102. When making a comparison between the emission estimates for 2005 reported in the 2007 and 2008 inventory submissions, the ERT noted that estimated total sectoral GHG emissions have decreased by 37.3 per cent as a result of recalculations. The significant methodological changes in the 2008 submission which influenced the emission reduction were: the use of the IPCC default fraction of CH<sub>4</sub> in landfill gas (F) of 0.50 instead of the previously used country-specific EF of 0.618; the application of a value for waste composition which varied with time on the basis of country studies (Rzeczyński, 1996; Rosik-Dulewska, 2000), replacing the constant value previously used for whole time period; and the use of a lower percentage of municipal waste (96 per cent) going to solid waste disposal sites for the 1970s than the previously used value (99 per cent). The ERT recommends Poland to provide clear and detailed information on the rationale for changing country-specific fraction F to the IPCC default, as well as detailed information on the choice of values used for calculations of the CH<sub>4</sub> generation rate constant (k) in the NIR of its next annual inventory submission.

103. According to the information provided in the NIR and the CRF tables, recalculations were performed for all categories in the waste sector. The ERT notes that the information provided on these recalculations is very general, in particular for industrial wastewater, and recommends that Poland provide adequate information and background data in its next annual inventory submission.

104. The ERT observed that Poland has not reported any information on the implementation of sector-specific QA/QC procedures in the waste sector and recommends that sector-specific QA/QC activities in the context of the national QA/QC plan be elaborated upon and implemented in its next annual inventory submission.

### **B. Key categories**

#### Solid waste disposal on land – CH<sub>4</sub>

105. Poland has used a first order decay (FOD) multi-phase spreadsheet model (IPCC waste model) for its estimates in this category as recommended in the previous review report. Poland has improved its methodology by using country-specific data for municipal and industrial waste composition, derived from published country studies (Rzeczyński, 1996; Rosik-Dulewska, 2000). Instead of being a constant value as previously used for the whole time series, these data reflected changes in waste composition over time. Data on CH<sub>4</sub> recovery were available for the period 2004–2006 only; for previous years in the time series, CH<sub>4</sub> recovery has been reported as “NE”. Data given in dm<sup>3</sup> on the amount of municipal solid waste were extracted from national statistical reports and converted to tonnes applying a conversion factor of 0.26 t/m<sup>3</sup>. After the centralized review, Poland informed the ERT that this value has been used in the

calculations; however the value of the conversion factor of 0.25 t/m<sup>3</sup> has not been updated in the NIR. The ERT recommends that Poland ensure the use of the correct conversion factor in its estimations and correct this value in the NIR of its next annual inventory submission.

106. In CRF table 6.A, CH<sub>4</sub> emissions have been reported under the category other because the model used does not disaggregate emissions between managed and unmanaged disposal sites. In order to increase the transparency of the reporting and the comparability across Parties, the ERT recommends that Poland disaggregate emissions between managed, unmanaged and other solid waste disposal sites, by making a simple modification of the methane correction factor parameter in the model used, and report these disaggregated emissions in its next annual inventory submission.

### **C. Non-key categories**

#### **1. Wastewater handling – CH<sub>4</sub> and N<sub>2</sub>O**

107. CH<sub>4</sub> emissions from domestic and commercial wastewater as well as from industrial wastewater handling have been estimated using the methodology from the Revised 1996 IPCC Guidelines, with a combination of default and country-specific EFs which are elaborated upon in the NIR. In comparison with those reported in the 2007 submission, the estimated CH<sub>4</sub> emissions reported in the 2008 submission for 2005 decreased by 71.1 per cent, mainly owing to changes made to the AD for industrial wastewater in response to comments in the previous review report.

108. N<sub>2</sub>O emissions from wastewater handling include only emissions from human sewage, which have been estimated in line with the Revised 1996 IPCC Guidelines. N<sub>2</sub>O emissions from industrial wastewater handling are reported as “NE”. Poland has recalculated its estimates of N<sub>2</sub>O emissions for 2004 and 2005 using country-specific data on protein consumption per capita instead of the data from FAO which were used for the previous years in the time series. This creates a time-series inconsistency. Therefore, the ERT recommends that Poland revise its estimates for all the years before 2004 using the new country-specific data and report these revised emission estimates in its next annual inventory submission.

#### **2. Waste incineration – CO<sub>2</sub> and N<sub>2</sub>O**

109. CO<sub>2</sub> and N<sub>2</sub>O emissions from waste incineration have been estimated using methodology and default EFs from the IPCC good practice guidance and country-specific AD for the amount and distribution of waste for incineration from a national case study (Wielgosisnski, 2003). CO<sub>2</sub> and N<sub>2</sub>O emissions are reported in the CRF tables for the entire time series. In comparison with the 2007 submission, the information provided in the 2008 submission shows decreases in the estimated emissions for 2005 by 41.4 per cent for CO<sub>2</sub> and by 30.9 per cent for N<sub>2</sub>O, as a result of the recalculation of the emission estimates on the basis of the aforementioned national study. Waste combusted for energy purposes has been reported under the energy sector.

## **VII. Other issues**

### **1. Changes to the national system**

110. Poland has not reported on any changes to its national system in the 2008 submission. In response to questions raised by the ERT during the centralized review, Poland confirmed that no changes to the national system have taken place.

111. However, the ERT noticed that the legal arrangements necessary for a national system to perform the functions defined in the guidelines for national systems (decision 19/CMP.1) are not in place and that Poland has failed to establish these legal arrangements as recommended in the previous review report. Poland explained to the ERT that, as a result of the Polish Parliament being dissolved in October 2007, the process of establishing the legal arrangements was terminated, but that the Ministry of the Environment together with the National Administration of the Emission Trading Scheme have resumed

the proceedings to establish the legal arrangements, and that a new “Act on system of management the national limits of greenhouse gas emissions and other substances” is at the stage of governmental consultations and is expected to be considered by Parliament in 2009. The ERT reiterates its recommendation that Poland finalize the aforementioned legal arrangements to meet the requirements of the national systems as required in decision 19/CMP.1 as soon as possible, ensure the implementation of the timeline submitted to the ERT after the review, and report on these arrangements in its next annual inventory submission.

## 2. Changes to the national registry

112. Poland has not reported changes to its national registry in the 2008 submission. In response to questions raised by the ERT during the review, Poland confirmed that no significant changes had occurred, but informed the ERT that the national registry had taken part in three trials (in May, July and September 2008) aimed at preparing the registry for its connection to the international transaction log (ITL). After successful trials performed in October 2008, the national registry participated in the go-live process, which was successfully completed and, subsequently, the national registry of Poland is being connected to the ITL.

## 3. Commitment period reserve

113. Poland has not reported its commitment period reserve in the 2008 submission. In response to questions raised by the ERT during the centralized review, Poland reported its commitment period reserve to be 1,942,410,776 t CO<sub>2</sub> eq based on the national emissions presented in its most recently reviewed inventory (388,482.155 Gg CO<sub>2</sub> eq for 2004 in the 2006 submission). The ERT disagreed with this figure. After the centralized review, in response to questions raised by the ERT, Poland revised the estimates in its most recently reviewed inventory (2006) to be 400,682.450 Gg CO<sub>2</sub> eq and reported its calculation of the commitment period reserve to be 2,003,412,251 t CO<sub>2</sub> eq. The ERT agrees with this figure. The ERT recommends that Poland include information on its commitment period reserve in its next annual submission.

# VIII. Conclusions and recommendations

114. The inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The 2008 inventory submission is generally of a high quality and shows significant improvements since the 2007 submission. Poland submitted its 2008 inventory in time and has provided data covering most categories in a complete set of CRF tables for the period 1988–2006 and an NIR. The inventory is complete in terms of years and geographical coverage. However, Poland has not estimated actual emissions of HFCs, PFCs and SF<sub>6</sub> for the period 1989–1994, as well as actual emissions for most of the sub-categories under the consumption of halocarbons and SF<sub>6</sub> category for 1988 and the period 1995–2006, which Poland considers as to be insignificant or irrelevant sub-categories. In addition, it has reported potential emissions of HFCs for the period 2000–2006 only, and potential emissions of PFCs and SF<sub>6</sub> only for 2000 and 2001. The ERT recommends that Poland estimate actual and potential emissions of HFCs, PFCs and SF<sub>6</sub> for all the relevant categories and years, use appropriate notation keys for categories identified as insignificant or irrelevant and work to include emission estimates for all the currently missing categories for which IPCC methodologies for estimating emissions are available in its next annual inventory submission.

115. In response to recommendations made in the previous review report, Poland has improved the structure of its NIR in the 2008 submission, making it more consistent with the outline recommended for the NIR in the UNFCCC reporting guidelines. The ERT notes that, also in response to the recommendations made in the previous review report, Poland has reported for the first time emissions from the LULUCF sector following the IPCC good practice guidance for LULUCF. However, Poland did not apply this methodology to its estimation of emissions for 1988 and 1989. The ERT strongly recommends that Poland use the IPCC good practice guidance for LULUCF to estimate

emissions/removals for the complete time series, but in particular for 1988 and 1989, and report on these recalculations in its next annual inventory submission.

116. The ERT commends the effort made by Poland to obtain the available plant-specific data from organizations participating in the EU ETS for the major categories in the energy and industrial processes sectors; however, these emission estimates covered 2005 and 2006 only. The ERT recommends that Poland, in its next annual submission, use the appropriate methodologies for the complete time series and address the issues of consistency related to the use of different methodologies for some categories over the time series, in accordance with the IPCC good practice guidance, for example using the weighted average country-specific EFs resulting from EU ETS data for the period 2005–2007 for the entire time series, subject to expert judgment regarding critical factors such as technological changes and age of the plants. It also recommends that Poland develop well-documented country-specific EFs for use with higher-tier methods for key categories in accordance with the IPCC good practice guidance.

117. The ERT identified various inventory-related problems in a number of categories and requested Poland to revise its estimates. After the centralized review, following the recommendations made by the ERT, Poland provided revised and new estimates and/or additional documentation, including improved estimation methods, EFs and AD for: N<sub>2</sub>O emissions from oil and natural gas – flaring (see para. 62 above); CH<sub>4</sub> emissions from the chemical industry – other (styrene) (see para. 70 above); and N<sub>2</sub>O emissions from agricultural soils – direct soil emissions (see paras. 84 and 85 above). As a result of these revisions, the total estimated GHG emissions for 2006 increased by 0.1 per cent (223.1 Gg CO<sub>2</sub> eq), from 400,459.34 Gg CO<sub>2</sub> eq, as originally reported, to 400,682.45 Gg CO<sub>2</sub> eq.

118. The ERT notes that the legal arrangements necessary for a national system to perform the functions defined in the guidelines for national systems (decision 19/CMP.1) are not in place in Poland as recommended in the previous review report. Poland explained that, as a result of the Polish Parliament being dissolved in October 2007, the process of establishing the legal arrangements was terminated and indicated its commitment to this process and provided a timeline for the consultation and consideration of the legal arrangements by the Polish Parliament (2009) and provided updated information on the new “Act on system of management the national limits of greenhouse gases emissions and other substances” The ERT recommends that Poland finalize the aforementioned legal arrangements to meet the requirements of the national systems as required in decision 19/CMP.1 as soon as possible, ensure the implementation of the timeline submitted to the ERT after the review and report on these arrangements in its next annual inventory submission. The ERT notes that reporting activities under Article 3, paragraphs 3 and 4 of the Kyoto Protocol could be a major challenge to Poland in its future reporting under the Kyoto Protocol, and it recommends that efforts be made to obtain geographical information to meet the requirements, as well as the LULUCF reporting requirements, in its next annual inventory submission.

119. The ERT notes that Poland provided timely and thorough responses to the questions raised by the ERT and to potential problems identified during the centralized review, in line with the reporting guidelines under Article 8 of the Kyoto Protocol. The ERT recommends that Poland include in its future annual submissions the revisions of emissions that were made during this review together with the necessary supporting information and documentation.

120. The key additional recommendations identified by the ERT are that Poland:

- (a) Include in the NIR a detailed overview of the assumptions made for the estimation of country-specific EFs and the handling of AD from data providers;
- (b) Improve the transparency of the NIR and provide more precise descriptions of methodologies and explanations for the choice of EFs used in recalculations, as well as information on the steps followed to ensure time-series consistency in all recalculations, and fully document these recalculations in the relevant CRF tables and the NIR;



- (c) Include all the required chapters and specified annexes in the NIR in accordance with the outline provided in the UNFCCC reporting guidelines;
- (d) Improve the consistency of its reporting by cross-checking the information provided in the NIR with that included in the CRF tables;
- (e) Document sectoral QA/QC and verification procedures as part of the implementation of the QA/QC plan under the national system and apply further QA/QC checks related to time-series consistency, AD and EFs;
- (f) Include adequate explanations in the NIR of the methodologies and underlying assumptions as well as the expert judgement used in the uncertainty analysis, including a discussion of the quality of AD and EFs and the rationale for choosing uncertainty values. In addition, more country-specific information and uncertainty values should be used for the uncertainty analysis.

## **IX. Questions of implementation**

121. No questions of implementation have been identified by the ERT during the review.



**B. Additional information provided by the Party**

Responses to questions during the review were received from Ms. Anna Olecka (National Emission Centre) and Mr. Krzysztof Olendrzyński (National Emission Centre), including additional material on the methodology and assumptions used. The following documents were also provided by Poland:

Extracts from Poland's draft legislation on the national system for greenhouse gas inventories for the Parliament's consideration by January 2009 to meet its obligations under general functions of the national system required by decision 19/CMP.1, paragraph 10.

CRF table 7 on key categories that were not reported owing to technical problems encountered in the application of CRF Reporter software.

Poland's response to the request made by the ERT for information on changes to its national system and commitment period reserve as a result of the recalculations recommended by the ERT during the centralized review.

Poland's response to the request of the ERT for information on the consistency of reporting in the national inventory report and CRF tables.

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