UNITED
NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/ARR/2009/IRL*
24 November 2009

ENGLISH ONLY

Report of the individual review of the annual submission of Ireland submitted in 2009**

* Reissued for technical reasons.

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

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Ireland, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 7 to 12 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Michael Strogies (Germany) and Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland); energy – Mr. Simon Wear (New Zealand) and Mr. Glen Whitehead (Australia); industrial processes – Ms. Debra Ottinger (United States of America) and Ms. Birna Hallsdottir (Iceland); agriculture – Mr. Sergio Gonzalez (Chile) and Mr. Marcelo Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Mr. Peter Stephens (New Zealand) and Mr. Héctor Ginzo (Argentina); and waste – Mr. Hiroyuki Ueda (Japan) and Ms. Juliana Boateng (Ghana). Mr. Strogies and Mr. Gonzalez were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (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 Ireland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Emission profiles and trends

3. In 2007, the main GHG in Ireland was carbon dioxide (CO_2), accounting for 68.6 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (18.7 per cent) and nitrous oxide (N_2O) (11.6 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.0 per cent of the overall GHG emissions in the country. The energy sector accounted for 66.7 per cent of the total GHG emissions, followed by agriculture (25.6 per cent), industrial processes (4.7 per cent) and waste (2.8 per cent). Total GHG emissions amounted to 69,205.15 Gg CO_2 eq and increased by 24.6 per cent between the base year[2] and 2007.

4. Tables 1 and 2 show total GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector.

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

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 1. Total greenhouse gas emissions by gas, 1990–2007[a]

Greenhouse gas	Gg CO_2 eq							Change base year–2007 (%)
	Base year[b]	1990	1995	2000	2005	2006	2007	
CO_2	32 400.10	32 400.10	35 269.44	44 748.44	47 637.96	47 242.80	47 498.72	46.6
CH_4	13 468.59	13 468.59	13 798.45	13 535.77	13 249.40	13 277.85	12 961.95	–3.8
N_2O	9 478.26	9 478.26	9 931.56	10 074.85	8 671.73	8 437.79	8 043.09	–15.1
HFCs	44.85	0.69	44.85	230.22	435.06	506.96	497.62	1 009.6
PFCs	75.38	0.09	75.38	305.41	168.34	148.32	130.58	73.2
SF_6	82.83	35.40	82.83	55.96	95.96	68.60	73.20	–11.6

[a] Total GHG emissions includes emissions from Annex A sources only (excludes emissions/removals from the LULUCF sector).
[b] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

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

Sector	Gg CO_2 eq							Change base year–2007 (%)
	Base year[a]	1990	1995	2000	2005	2006	2007	
Energy	31 448.58	31 448.58	34 450.37	43 408.46	46 486.66	46 072.48	46 156.18	46.8
Industrial processes	3 332.43	3 165.57	3 061.50	4 184.88	3 251.94	3 262.44	3 281.68	–1.5
Solvent and other product use	79.43	79.43	84.58	78.96	78.65	81.33	83.19	4.7
Agriculture	NA	19 228.57	19 917.49	19 634.93	18 667.67	18 434.64	17 747.86	–7.7
LULUCF	251.99	251.99	293.98	141.95	–490.45	–494.04	–984.93	NA
Waste	1 461.00	1 461.00	1 688.56	1 643.43	1 773.52	1 831.42	1 936.25	32.5
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	55 635.13	59 496.48	69 092.61	69 768.00	69 188.27	68 220.23	NA
Total (without LULUCF)	55 550.01	55 383.14	59 202.51	68 950.66	70 258.44	69 682.31	69 205.15	24.6

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable.
[a] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 9 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007, and a national inventory report (NIR). Ireland also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on the accounting of Kyoto Protocol units and on changes in the national registry. Ireland reported that there was no change in its national system since the previous (2008) annual submission. The standard electronic format (SEF) tables were also submitted on 9 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

6. In response to questions raised by the expert review team (ERT) during the review, on 14 September 2009 Ireland submitted revised information on the completeness of its annual inventory submission (see para. 10 below). Where necessary, the ERT also used the previous years' submissions during the review.

7. In addition, the ERT used the Standard Independent Assessment Report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF and its comparison report) and on the national registry.[3]

8. During the review, Ireland provided the ERT with additional information. The documents concerned are not part of the annual submission but are in many cases referenced in the NIR. The full list of materials used during the review is provided in the annex to this report.

Completeness of inventory

9. The inventory covers all sectors and most source and sink categories and GHGs for the period 1990–2007. The NIR follows the outline set out 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) and all CRF tables have been reported for all years, except table 7 (key category analysis), which has been reported for 1990 and 2007 only. The ERT encourages Ireland to explore the possibility of reporting CRF table 7 for all years of the time series.

10. In response to a question raised by the ERT, the Party indicated that it would, in its next annual submission, address the completeness of its inventory, and that it would also revise its attribution of notation keys from not estimated ("NE") to not occurring ("NO") for emissions from the following categories: refining/storage (fugitive emissions) (CO_2); navigation (CO_2, CH_4 and N_2O); and cement production, lime production and other non-specified (under waste incineration) (CO_2, CH_4 and N_2O). The Party also indicated in its response that it would explore the possibility of estimating emissions for the categories road paving with asphalt, glass production, food and drink, use of N_2O for anaesthesia, and N_2O emissions from industrial wastewater and domestic and commercial wastewater (without human sewage), which have currently been reported as "NE".

[3] The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paragraphs 5(a), 6(c) and 6(k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF and its comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry. The SIAR is not publicly available.

11. The ERT recommends that Ireland improve the completeness of its inventory by its next annual submission, especially for those categories in which emissions are known to occur within the country and for which methodologies to estimate emissions are available in 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 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). The ERT also recommends that the Party, when reporting data on emissions for a given category for the first time, ensure that these data are provided for the entire time series and that the rationale for the choice of methods, emission factors (EFs) and other parameters is clearly explained in the NIR.

D. Main findings

12. In its 2009 submission, Ireland's inventory continues to have been prepared and reported generally in line with the Revised 1996 IPCC Guidelines, 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). However, the ERT found that Ireland could improve the transparency of its inventory submission by providing improved documentation of uncertainty analysis, especially for LULUCF (see paras. 25, 26 and 30 below), and improved documentation of its quality assurance/quality control (QA/QC) (see paras. 28 and 30 below). The ERT also found that the Party had used data obtained from the European Union emissions trading scheme (EU ETS) to estimate emissions from the energy and industrial processes sectors. The Party provided only limited information in the NIR (see para. 29 below) on:

(a) Whether these data have been prepared and incorporated into the inventory submission in line with the principles of the IPCC good practice guidance;

(b) Whether these data have been subjected to any QA and/or verification and if so, which tier approach from the EU ETS guidelines has been used and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance;

(c) How time series consistency has been ensured when using these data, and the impact of the use of these data on the emission trend (see paras. 41 and 53 and 57 below).

13. Recalculations performed by the Party over the time series were in line with the IPCC good practice guidance and have been reported, including information on the underlying rationale for these recalculations, in accordance with the UNFCCC reporting guidelines.

14. In addition, Ireland's inventory continues to be generally of a high quality and covers all sectors and most categories. However, the ERT found that completeness could be improved with regard to the Party's reporting of "NE" for a number of non-LULUCF categories, especially those categories for which methods to estimate emissions are available in either the Revised 1996 IPCC Guidelines or the IPCC good practice guidance.

15. Ireland has submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with Part I of the annex to decision 15/CMP.1. The Party did not submit on a voluntary basis information on activities under Article 3, paragraph 3, of the Kyoto Protocol[4], nor information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. Ireland has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1,

[4] Ireland did not elect to account for land activities under Article 3, paragraph 4, of the Kyoto Protocol.

and used the SEF tables required by decision 14/CMP.1. The Party also reported in its 2009 annual submission that there has been no change in its national system since its previous annual submission. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1. The Party did report a change in its national registry in accordance with section G of the annex to decision 15/CMP.1. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) decisions.

16. The ERT encourages Ireland to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.[5]

17. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of Ireland's annual submission.

E. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

1. Overview

18. The ERT concluded that the national system and institutional arrangements continued to perform their required functions.

19. The NIR and additional information submitted by the Party described the national system and institutional arrangements for the preparation of the inventory. The Office of Climate, Licensing and Resource Use of the Environmental Protection Agency (EPA) is the inventory agency and the EPA is designated as the single national entity with overall responsibility for the annual GHG inventory. Other agencies and organizations, namely Sustainable Energy Ireland, Department of Agriculture, Fisheries and Food, Central Statistics Office, COFORD (the National Council for Forest Research and Development), Bord Gáis, Marine Institute, Emissions Trading Unit, Road Safety Authority, and Department of Communications, Energy and Natural Resources, are also involved in the preparation of the inventory. Table 1.1 of the NIR outlines details of memorandums of understanding which have been established for the delivery of data and methodologies for the GHG inventory. The NIR reported no change in Ireland's national system since the previous annual submission.

2. Inventory planning

20. The QA/QC procedures reported by Ireland in its NIR define and allocate specific responsibilities in the inventory development process, including those related to choosing methods; collecting data, particularly activity data (AD) and EFs from statistical services and other entities; and processing and archiving. Ireland has elaborated a QA/QC plan, which identifies its specific objectives in relation to the quality of the data in its national inventory following the principles of transparency, consistency, completeness, comparability and accuracy. The Party also maintains a QA/QC manual, which provides a general overview of the QA/QC system, guidance on the application of the QA/QC plan and procedures, and templates used for quality checking, documentation and traceability, selection of source data and calculation methodologies, and peer and expert review of inventory data, as well as outlines annual requirements for the continuous improvement of the inventory.

[5] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

21. The NIR outlines inventory improvements, including planned improvements, for all sectors except the energy sector. In response to a question raised by the ERT, Ireland provided details of planned improvements for the energy sector. The ERT recommends that Ireland ensure that its reporting of improvements is in accordance with the UNFCCC reporting guidelines.

22. The ERT found Ireland's national system and the institutional, procedural and legal arrangements to be effective, reliable and capable of reporting on emissions in a timely manner in the annual inventory submission.

3. Inventory preparation

Key categories

23. Ireland has prepared and reported a tier 1 key category analysis, both level and trend assessment, as part of its 2009 submission. The Party has reported its key category analysis, which was performed in accordance with the IPCC good practice guidance for LULUCF, both excluding and including the LULUCF sector. The key category analysis performed by the Party and that performed by the secretariat[6] produced similar results. However, some differences in the levels of aggregation used by Ireland and the secretariat led to some slight differences in their ranking of categories.

24. The key category analysis is a driving factor for the prioritization of improvements to Ireland's inventory submission. In response to a question raised by the ERT during the review, Ireland indicated that it would not undertake a tier 2 key category analysis as it is not a priority for it to prepare tier 2 uncertainty estimates.

Uncertainties

25. Ireland has prepared and reported a tier 1 uncertainty analysis in accordance with the IPCC good practice guidance. This uncertainty analysis provided an overall uncertainty for the 2009 inventory submission of 5.9 per cent, compared with the 6.1 per cent reported by the Party for its 2008 inventory in its previous annual submission. Ireland has reported a trend uncertainty of 3.8 per cent for the period 1990 to 2007, which is similar to the corresponding value (3.6 per cent) contained in the 2008 annual submission for the period 1990–2006. Ireland has indicated that the observed differences in its uncertainty analysis between the two most recent annual submissions were a result of: the revision of uncertainties for AD and EFs for a number of categories (e.g. cement production, limestone and dolomite use, and soda ash production and use) in order for them to better reflect the national circumstances; and the exclusion of fugitive CO_2 emissions from the production/processing of natural gas for all years (1990–2006) in order to prevent double-counting within the emission estimates. The ERT recommends that Ireland include this information and details of any other changes concerning the uncertainty analysis, in its next annual submission. The ERT also recommends that Ireland explore the possibility of estimating the uncertainty of AD and EFs used for LULUCF categories, for its next annual submission.

26. The ERT found that limited descriptions of the uncertainty analysis have been provided in the sector chapters of the NIR, with the exception of the agriculture sector, and recommends that Ireland report on its uncertainty analysis for all sectors in line with the UNFCCC reporting guidelines, in the NIR of its next annual submission.

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[6] 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 IPCC good practice guidance for LULUCF. 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 or period. 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.

Recalculations and time-series consistency

27. Recalculations have been performed and reported in accordance with the IPCC good practice guidance and the UNFCCC reporting guidelines. The ERT noted that recalculations performed by the Party of the time series 1990 to 2006 have been undertaken either in response to recommendations made in the previous review report, or in order to address the Party's own QA/QC findings, or as a result of revisions made to national statistics. Also, the ERT found that the recalculations have taken into account changes and/or improvements in AD for the energy, industrial processes, agriculture and LULUCF sectors, and the revision of EFs for the energy and LULUCF sectors. The major changes, and the magnitude of the impact, include decreases in total GHG emissions of 0.3 and 0.8 per cent for the base year and 2006, respectively. The rationale for these recalculations has been well documented in the NIR and in CRF table 8(b). In response to questions from the ERT, the Party indicated that it is exploring the use of methods, EFs and other parameters contained in the 2006 IPCC Guidelines in the energy (see para. 47 below) and waste (see para. 85) sectors. The ERT encourages the Party to include in its future NIR submissions the rationale for any recalculations arising from the use of such methods, EFs or other parameters contained in the 2006 IPCC Guidelines, and that the Party ensure that the resultant recalculations are time-series consistent and prepared and reported in accordance with the IPCC good practice guidance.

Verification and quality assurance/quality control approaches

28. In line with the UNFCCC reporting guidelines, Ireland has included in its annual submission information on QA/QC procedures. The Party undertakes sector-specific QA/QC procedures across all sectors of the inventory and these procedures are effective in identifying errors and improving the quality of the inventory. Ireland has elaborated a QA/QC plan and, in response to questions raised by the ERT in the course of the review, the Party provided the ERT with copies of its QA/QC procedures and user manual. These procedures, including category-specific procedures, have been implemented in accordance with the IPCC good practice guidance. However, the ERT found that Ireland has not provided in its NIR a description of its QA/QC procedures for the industrial processes and LULUCF sectors, and that only limited general statements have been provided for the waste sector. Therefore, the ERT recommends that Ireland prepare information on QA/QC in accordance with the IPCC good practice guidance and report thereon in line with the UNFCCC reporting guidelines.

29. Ireland reported that EU ETS information used for the inventory submission is subject to independent verification (emissions monitoring reports) that forms part of the EU ETS system. However, the ERT found that the NIR did not include information on which tier approach from the EU ETS guidelines was used, nor did it identify where "Fall Back Approaches" have been used and estimates that are likely to be of higher uncertainty. The ERT recommends that the Party include this information in its next annual submission.

Transparency

30. Ireland's 2009 annual inventory submission is in general transparent. However, the ERT identified several areas for improvement, such as:

(a) Provision of information in the NIR on the use of EU ETS data, as outlined by the ERT in the section on main findings (see para. 12 above);

(b) Improved documentation of its uncertainty analysis, especially for LULUCF;

(c) Improved documentation on its QA/QC activities;

(d) The provision of the rationale for the choice of methods and EFs used in the energy and industrial processes sectors, the inclusion of information on AD for the LULUCF sector (e.g. for grassland and cropland), and the provision of a better explanation for the method used to estimate emissions from nitric acid (EF and type of catalyst).

31. With regard to the above list, the ERT recommends that Ireland addresses these transparency issues and to report thereon in its next annual submission. In addition, the ERT recommends that the Party adhere to the outline for the NIR set out in the UNFCCC reporting guidelines in order to improve the transparency of its annual submission. Sector-specific findings on transparency are provided in the relevant sector chapters of this report.

4. Inventory management

32. Ireland has a centralized archiving system, which includes the archiving of disaggregated AD and EFs, and documentation on how these and other data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. Registry information and EU ETS data are archived and managed separately by colleagues at the Dublin Regional Inspectorate of the EPA.

F. Follow-up to previous reviews

33. In its 2009 NIR, Ireland has reported that recommendations made in the 2008 review report have been taken on board, where feasible, in the 2009 annual submission. These implemented recommendations relate, in particular, to improved explanations for and clarifications on a number of ongoing issues, concerning, for example: the trends in the implied emission factors (IEFs) in the energy industries and manufacturing industries and construction subsectors; time-series consistency related to process CO_2 emissions from cement production; and the methodology for estimating CH_4 emissions from solid waste disposal sites. The ERT concluded that Ireland had taken into consideration the main issues raised in the previous review reports.

G. Areas for further improvement

1. Identified by the Party

34. The 2009 NIR provides details of areas of improvement for the agriculture, LULUCF and waste sectors, and a general statement in the industrial processes sector on the continued utilization of EU ETS data and outsourcing contracts for estimating emissions of F-gases.

2. Identified by the expert review team

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

(a) The preparation of an NIR consistent with the outline set out in the UNFCCC reporting guidelines;

(b) The reporting of uncertainty estimates for AD and EFs used for the LULUCF sector;

(c) The provision of information in the NIR on the use of EU ETS data, as outlined by the ERT in the section on main findings (see para. 12 above);

(d) The improvement of transparency by including improved information on Ireland's uncertainty analysis and QA/QC activities.

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

II. Energy

A. Sector overview

37. The energy sector is the main sector in the GHG inventory of Ireland. In 2007, emissions from the energy sector amounted to 46,156.18 CO_2 eq, or 66.7 per cent of total GHG emissions. Since the base year, emissions have increased by 46.8 per cent. The key drivers for the rise in emissions are the categories road transportation, and public electricity and heat production, the emissions from which have increased by 178.0 and 27.3 per cent, respectively, since the base year. Within the sector, 32.2 per cent of the emissions were from energy industries, followed by 31.1 per cent from transport, 22.9 per cent from other sectors and 13.7 per cent from manufacturing industries and construction. The remaining 0.1 per cent were from fugitive emissions.

38. With regard to its coverage of the energy sector, Ireland's inventory is generally transparent, complete and has been prepared in accordance with the IPCC good practice guidance and the UNFCCC reporting guidelines. However, the ERT identified areas for improvement and recommended that the Party improve transparency in the energy sector by providing more information on methods and on other information that would enhance understanding of the inventory and its estimates (see paras. 39 and 45 below).

39. The ERT noted that most of the recommendations made in the previous review report have been implemented by the Party in its 2009 annual submission. However, Ireland has not provided information related to transport as recommended by the previous expert review report. The ERT reiterates a recommendation made in the previous review report that the Party provide improved documentation for the transport subsector on underlying trends, including vehicle numbers, population change, gross domestic product, and heating or cooling days. This information would improve the transparency of the inventory submission, enable the validation of the fuel consumption data provided, and also aid understanding of the underlying category-specific emission trends in road transportation and how they contribute to the overall sectoral emission trend.

40. The recalculations performed by the Party for the energy sector have been undertaken and reported in line with the IPCC good practice guidance. The recalculations for the base year and 2006 resulted in decreases in the estimates of emissions of 0.45 per cent (142.19 Gg CO_2 eq) and 0.15 per cent (68.98 Gg CO_2 eq), respectively.

41. Ireland has used data reported under the EU ETS for some parts of the inventory. However, the NIR has not provided information on the use of EU ETS data, as outlined by the ERT in the section on main findings (see para. 12 above).

42. The ERT noted that Ireland is implementing a comprehensive QA/QC plan and encourages the Party to continue in this regard and report thereon in its next annual submission. The ERT also encourages the Party to include in the energy sector section of the NIR information on planned improvements, similar to that in the other sector-specific sections of the NIR, and to consider using both the key category and uncertainty analyses as the basis for prioritizing inventory improvements. The ERT further encourages Ireland to report in its next annual submission on the planned improvements that it communicated to the ERT in response to a question raised in the course of the review.

B. Reference and sectoral approaches

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

43. In 2007 (as reported in the 2009 submission), there were differences between the estimates calculated using the reference and sectoral approaches of 0.6 and 0.3 per cent for energy consumption and CO_2 emissions, respectively. These differences are small, indicating good reconciliation at an aggregated level and an improvement since the 2008 submission.

44. The ERT noted many discrepancies when the energy data in Ireland's CRF tables were compared with corresponding data from the International Energy Agency (IEA). Therefore, the ERT reiterates the recommendation made in the previous review report that the Party explore the basis of such discrepancies and investigate how the energy data submitted in the CRF tables of its annual submission can be reconciled with corresponding data provided to IEA by Sustainable Energy Ireland (the compiler of Ireland's energy statistics).

2. International bunker fuels

45. The national energy balance sheets report fuel sold for marine bunkers and international aviation as specific line items and the emission estimates were calculated directly from these. Emissions from civil aviation were estimated using a bottom-up, landing and take-off method and IPCC aircraft-specific EFs and have been prepared in line with the IPCC good practice guidance. As regards the method to appropriate emissions between domestic and international navigation bunkers, the ERT found that the explanation in the NIR (section 3.2.1.3) could be clarified further. The ERT encourages the Party to elaborate in its next annual submission how emissions from domestic and international segments are appropriated between the two sources.

3. Feedstocks and non-energy use of fuels

46. In response to questions raised by the ERT, Ireland explained that it does not estimate emissions from the non-energy use of naptha, lubricants and bitumen in the sectoral approach. In the reference approach, the fraction of carbon stored is assumed to be 0.5, 0.75 and 1.0 for lubricants, naptha and bitumen, respectively, and Ireland explained that "some emissions may be missed". Ireland informed the ERT that it is working with Sustainable Energy Ireland to ascertain the end use(s) of naptha and lubricants with a view to including corresponding carbon emissions in its next annual submission. The ERT welcomes this planned improvement and encourages Ireland to include this information in its next annual submission.

C. Key categories

Stationary combustion: liquid and solid fuels – N_2O

47. The 2007 N_2O implied EF was found to be high when compared with corresponding data reported by other Parties. In response to a question raised by the ERT, the Party indicated that in its 2010 annual inventory submission it intends to revise the N_2O EFs used to estimate emissions from liquid and solid fuels that are used in public electricity and heat production. Ireland indicated to the ERT that it will develop technology-specific tier 3 N_2O EFs based on the IPCC good practice guidance and the 2006 IPCC Guidelines for its next inventory submission, since, according to the Party, this is the best available information. The ERT recommends that Ireland in the 2010 annual submission report its justification for use of the 2006 IPCC Guidelines where applicable, elaborate on the new methodology, report on recalculations, and explain the impact of the revision of these EFs on emission levels and trends.

D. Non-key categories

Public electricity and heat production: liquid fuels – CH_4

48. Ireland reports CH_4 emissions as not occurring. In response to a question raised by the ERT, Ireland indicated that it would undertake a major review of the CH_4 and N_2O EFs used for this category. The ERT found that the Party has reported CH_4 emissions as "NO" even though these emissions do occur. The ERT recommends that the Party undertake the above-mentioned review and report thereon in its next annual submission.

III. Industrial processes and solvent and other product use

A. Sector overview

49. In 2007, emissions from the industrial processes sector amounted to 3,281.68 Gg CO_2 eq, or 4.7 per cent of total GHG emissions, while emissions from the solvent and other product use sector amounted to 83.19 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 1.5 per cent in the industrial processes sector, and increased by 4.7 per cent in solvent and other product use. Emissions from the industrial processes sector have increased 3.7 per cent since 1990. The relatively stable level of emissions in the industrial processes sector hides the fact that there have been structural changes in the Irish economy since 1990. Emissions from cement production increased by 168.6 per cent between 1990 and 2007, but this increase was counterbalanced to some extent by the decrease in emissions due to the termination of the production of ammonia and nitric acid in 2003 and 2002, respectively. Within the industrial processes sector, 78.6 per cent of the emissions were from mineral products and the remaining 21.4 per cent were from consumption of halocarbons and SF_6.

50. In respect of the industrial processes sector, the reporting is generally complete. However, the ERT identified a number of categories that have been reported as "NE" by the Party. In response to a question raised by the ERT on this issue, the Party indicated that it would address in its next annual submission the completeness of its inventory in terms of the industrial processes and solvent and other product use sectors by reporting on the categories road paving with asphalt, glass production, food and drink, and use of N_2O for anaesthesia, which have currently been reported as "NE". The Party also indicated that it would revise its attribution of the notation key from "NE" to "NA" for asphalt roofing and to "NO" for the CO_2 recovery for cement production and lime production, in its next annual submission. The ERT recommends that the Party ensure the inclusion in its next annual submission of emissions for categories which have currently been reported as "NE" and for which methods to estimate emissions are available in the Revised 1996 IPCC Guidelines and/or in the IPCC good practice guidance; where emissions cannot be estimated for any category, the Party is to provide sufficient explanation for this in the NIR.

51. Estimation approaches, data availability and the relevant documentation have in general been transparently presented in the NIR. The ERT commends Ireland for including more information on the methods used to estimate emissions from ammonia and nitric acid production, as recommended by the ERT in the previous review report. Ireland could further enhance the transparency of its inventory by describing in more detail the method used to estimate emissions from nitric acid production (EF and type of catalyst) and by specifying the method used by the semiconductor manufacturer to estimate its emissions. The ERT found that the sections of Ireland's NIR on the industrial processes and solvent other product use sectors did not adhere to the outline set out in the UNFCCC reporting guidelines. The NIR would be more transparent if the recommended detailed structure was used. Therefore, the ERT reiterates the recommendation that Ireland, for its next annual submission, structure its NIR following the outline set out in the UNFCCC reporting guidelines.

52. Uncertainty estimates have been reported by the Party using the IPCC tier 1 approach. Ireland has applied general and source-specific QA/QC procedures in compiling the industrial processes section of its inventory. The source-specific QA/QC procedures have not been described in the NIR, but a description was provided to the ERT that reviewed the 2008 annual submission upon request. The ERT encourages Ireland to include a description of these procedures in the NIR of its next annual submission.

53. Ireland has used data reported under the EU ETS for some parts of the inventory. However, the NIR has not provided information on the use of EU ETS data, as outlined by the ERT in the section on main findings (see para. 12 above).

54. Recalculations were undertaken in accordance with the IPCC good practice guidance. The main differences between the 2008 and 2009 submissions in terms of the industrial processes and solvent and other product use sectors were the completion of the time series for soda ash production and use, recalculations undertaken in the solvent and other product use sector, and some other minor recalculations. The reported recalculations for the industrial processes sector resulted in increases of 0.04 per cent (1.48 Gg CO_2 eq) and 0.02 per cent (0.5 Gg CO_2 eq) for the base year and 2006, respectively, with recalculations reported for the solvent and other product use sector resulting in a decrease of 2.1 per cent (1.72 Gg CO_2 eq) in the base year and an increase of 1.6 per cent (1.32 Gg CO_2 eq) in 2006.

B. Key categories

Consumption of halocarbons and SF_6: substitutes for ozone-depleting substances – HFCs

55. Ireland's reporting of emissions from substitutes for ozone-depleting substances is complete and has been prepared generally in accordance with the Revised 1996 IPCC Guidelines. In general, this part of the inventory is also very transparent, including clear explanations of methods and parameters used, with the exception of the important subsector stationary refrigeration and air-conditioning. In its NIR, Ireland has noted that it applied a top-down approach using reported sales data and information on market shares in order to estimate emissions, but it has not described this method in any more detail or indicated which IPCC method it corresponds to. In response to a question raised by the ERT, Ireland stated that it estimated emissions as a share of annual sales, and that this share changes over the time series (from 5 per cent in 1990 to 25 per cent in 2007). Based on an analysis of Ireland's reported potential and actual emissions of HFC-125 and HFC-143a, this approach results in variable and relatively low emission levels from the implied bank.[7] The ERT recommends that Ireland carefully evaluate its estimates of emissions from stationary refrigeration and air-conditioning, taking into consideration their relationship to the bank, and that Ireland include more detail on the bank and its relationship to emissions in future inventories. The ERT also recommends that Ireland correct the EFs used for motor vehicle air-conditioning in CRF table 2(II)F, which are too low by a factor of 100.

56. Ireland estimated potential emissions of HFCs but the NIR is unclear regarding the method used to estimate these emissions from fire extinguishers. The NIR states that "potential emissions account for the total available product", implying that the potential emissions may be equated to the full bank of gas in the equipment. This would not be consistent with the IPCC good practice guidance, and, based on Ireland's responses to questions raised by the ERT, this is not in fact Ireland's method of estimating potential emissions. Therefore, the ERT recommends that Ireland clarify the method used to estimate potential emissions of HFCs from fire extinguishers.

[7] The analysis showed that, after fluctuating between 1 and 5 per cent during the early 1990s, the HFC-125 and HFC-143a EFs settled into a range of between 4 and 6 per cent of the implied bank. In comparison, the range of the IPCC default factors for commercial refrigeration is 10 to 30 per cent for medium and large equipment (IPCC good practice guidance, table 3.22).

C. Non-key categories

Lime production – CO_2

57. According to Ireland's NIR, emissions from lime production were calculated for all years of the time series up to 2003 applying the tier 1 method by using statistical data on lime production obtained from lime manufacturers combined with the core inventory of air emissions (CORINAIR) default value for CO_2 emissions from lime production (0.75 t CO_2/t lime). For the period 2004–2007 the NIR states that verified emissions data for this activity were obtained from returns from ETS participants provided to the Climate Change Unit under the EU ETS. For the period 1990–2003 the ERT found the trend in the CO_2 IEF to be unstable, ranging from 0.75 to 0.88 t CO_2/t lime and the values for 1997 and 2003 are higher than the IPCC default range (0.59–0.86 t CO_2/t lime). The ERT found no explanation of this fluctuation or the inconsistency in the time series in the NIR. Therefore, the ERT reiterates the recommendation that Ireland explain and justify the time-series inconsistency and fluctuations in the IEF for this category.

IV. Agriculture

A. Sector overview

58. In 2007, emissions from the agriculture sector amounted to 17,747.86 Gg CO_2 eq, or 25.6 per cent of total GHG emissions. Since the base year, emissions have decreased by 7.7 per cent. The key drivers for the fall in emissions are reductions in livestock, in animal numbers and in the use of synthetic nitrogen fertilizer, owing to reforms of the Common Agricultural Policy. Within the sector, 49.8 per cent of the emissions were from enteric fermentation, followed by 35.9 per cent from agricultural soils and 14.3 per cent from manure management. CH_4 was the dominant GHG, accounting for 62.0 per cent of the sectoral emissions, while N_2O accounted for the remaining 38.0 per cent.

59. With regard to the agriculture sector, the NIR is complete in terms of categories and years, as well as transparent in relation to methodologies, AD and EFs used. References to the major studies have been presented.

60. Following the previous submission, several improvements were made to the inventory, resulting in recalculations reported for emissions from enteric fermentation (CH_4), manure management (CH_4 and N_2O) and agricultural soils (N_2O). The ERT concludes that these recalculations resulted in emission estimates that were prepared largely in accordance with the IPCC good practice guidance, using tier 2 methods to estimate CH_4 emissions from enteric fermentation and manure management in cattle.

61. The changes undertaken as a result of inventory improvements, as referred to in paragraph 60 above, include: an adjustment of the milk production patterns in the tier 2 model used to calculate CH_4 emissions from enteric fermentation in dairy cows as a result of the provision by the Ireland Central Statistics Office of revised data on milk yield; and the correction of the assignment of dairy heifers within the total heifer populations following the identification of a transcription error on the model calculation sheets. These modifications resulted in minor recalculations of the CH_4 emissions from enteric fermentation and from manure management; revised statistics for the poultry population in 2006 resulted in a 0.28 per cent decrease in N_2O emissions from manure management; while refined estimates of the quantities of sewage sludge applied to agricultural land and revised estimates of ammonia emissions undertaken for the time series 1990–2006 led to the recalculation of direct soil emissions (N_2O) and indirect emissions, respectively. The reported recalculations resulted in a negligible increase in the 1990 agriculture inventory submission, and a 0.07 per cent decrease in the 2006 inventory submission.

62. Planned inventory improvements with regard to the agriculture sector include the adoption, when estimating N_2O emissions from soils, of a methodology that systematically accounts for the influences of soil type, fertilizer type and application rates, temperature and rainfall, which are not captured by the methods in the Revised 1996 IPCC Guidelines or in the IPCC good practice guidance.

B. Key categories

1. Enteric fermentation – CH_4

63. Emissions from enteric fermentation accounted for 12.8 per cent of the total GHG emissions and have decreased by 6.9 per cent since the base year. Since 2006, a tier 2 approach has been used to estimate emissions from cattle, in line with the IPCC good practice guidance. The ERT reiterated the finding indicated in previous review reports that a constant average weight has been used for dairy cattle. In response to question raised by the ERT on this matter, the Party repeated the explanation given in previous years that there is no clear relationship between average milk yield and the weight of the dairy cows. Nevertheless, since the tier 2 methodology developed take into account liveweight for maintenance requirements as each kg liveweight lost contributed 24.9 MJ to net energy for lactation (NE_i) to energy requirements, while each kg of liveweight gained required 32 MJ NEi). The ERT reiterates the recommendation made in the previous review reports that the Party revise this figure and/or provide a clear explanation of the basis for this assumption.

64. Ireland used an IPCC tier 1 approach to estimate emissions for other livestock categories (e.g. swine and sheep), using default IPCC EFs for each category, adjusted on the basis of the animals' weight. As result, the IEFs for sheep and swine were lower than the default IPCC values. The ERT recommends that Ireland provide information to support the use of these adjusted default EFs.

2. Manure management – CH_4, N_2O

65. Emissions from manure management accounted for 3.1 per cent of the total GHG emissions and have decreased by 7.3 per cent since the base year. New information obtained from a national farm facilities survey[8] was used to derive the EFs. The ERT found that the results of this farm facilities survey provided a much improved representation of animal waste allocation among the relevant waste management systems in the country, while the excretion of organic matter by cattle was fully characterised as part of the analysis of their feed and energy requirements relating to enteric fermentation. The ERT welcomed the survey.

3. Direct soil emissions – N_2O

66. Direct soil emissions accounted for 3.0 per cent of the total GHG emissions and have decreased by 14.3 per cent since the base year. An IPCC tier 1 methodology and default EFs were used to estimate emissions for both of the Party's administrative regions. The inter-annual changes in N_2O emissions from nitrogen-fixing crops varied between +100 per cent and –50 per cent, but no explanation for this trend over the time series has been provided in the NIR. Therefore, the ERT recommends that Ireland in its next annual submission explain the emission trend observed for this category.

67. In response to a question raised by the ERT, Ireland indicated that recently published research studies conducted in Ireland at both field and lysimeter scales suggest that the rate of N_2O emissions from agricultural soils may be substantially higher than the value of 1.25 per cent given as the current IPCC default EF, and that the high inter-annual and spatial variability in emission estimates found in these studies requires further investigation along with data on emissions over the long term. Therefore,

[8] Hyde B., Carton O.T. and Murphy W.E. (2008). Farm facilities survey – Ireland 2003. Report prepared for the Department of Agriculture by Teagasc, Johnstown Castle, Co. Wexford.

the ERT encourages Ireland to investigate this matter further and report thereon in its next annual submission.

V. Land use, land-use change and forestry

A. Sector overview

68. In 2007, net removals from the LULUCF sector amounted to 984.93 Gg CO_2 eq. Since the base year, net removals have increased by 490.8 per cent. The key driver for the rise in removals is the net removals by forest land remaining forest land (1,491.03 Gg CO_2 eq). However, the effect of the forest land sink was largely offset by the net emissions from grassland (334.87 Gg CO_2 eq), particularly from grassland remaining grassland (604.49 Gg CO_2 eq). The most important GHG was CO_2, contributing 96.8 per cent of the total sectoral GHG emissions; N_2O followed with 3.1 per cent, and the amount of CH_4 was negligible.

69. The information reported on this sector is broadly complete and transparent, and has been provided for all years of the time series, which the ERT found to be consistent. CH_4 and N_2O have not been reported for land converted to forest land, cropland remaining cropland, grassland, wetlands, settlements and other land. Ireland has prepared the LULUCF section of its inventory generally in line with the IPCC good practice guidance for LULUCF in respect of the choice of methods, AD and EFs. The ERT noted that, with the exception of that used to estimate emissions from forest land, most methods were based on the IPCC tier 1 approach; therefore, the ERT recommends that Ireland explore the possibility of using higher-tier methods, particularly for estimating CO_2 emissions from land converted to grassland (recently identified as a key category) and land converted to cropland.

70. For those land categories or conversions identified as key (forest land remaining forest land, land converted to forest land, land converted to grassland, and grassland remaining grassland), the ERT reiterates the recommendation made in previous review reports that Ireland develop higher-tier methods to estimate emissions, in accordance with the IPCC good practice guidance for LULUCF.

71. The Party has presented land-use and land-use change area matrices covering the period 1990-2006, which show that grassland was the dominant land-use category, and that the major land-use change since 1990 has been the conversion of grassland and peatland to forest land.

72. Ireland did not estimate the uncertainty of either AD or EFs for any of the subcategories in this sector. While the ERT acknowledges the validity of the Party's arguments for not having done so (see section 7.9 of the 2009 NIR), it strongly recommends that the Party make every effort to estimate the uncertainty of this sector in accordance with the IPCC good practice guidance for LULUCF and to report thereon in its next annual submission.

73. The Party has reported recalculations arising from revisions in AD for all categories in this sector. The effect of these recalculations was relatively small, resulting in a figure for net removals which was only about 1 per cent lower than that reported in the previous annual submission.

74. The ERT noted improvements made in the LULUCF section of the inventory following recommendations made in the previous review report, including the revision of the assumed timespan for the restoration of biomass in harvested peatlands from the year of conversion to a transition period of five years, and the reporting of N_2O emissions from the draining of commercially exploited peatlands. The ERT also noted that the Party intends to improve its reporting tools and refine the estimation of carbon stock changes in forest for its reporting under both the Convention and the Kyoto Protocol. The Party is also working on the development of a single dataset regarding the coverage and attributes of its forest, which in its final version will include location, planting year, species area and open space area, for all forest greater than 0.5 ha in area (with the post-1990 data on afforestation for areas down to 0.1 ha in

area). The ERT recommends that Ireland make efforts to complete the above-mentioned improvements in time for its next annual submission, which is to include activities under Article 3, paragraph 3, of the Kyoto Protocol.

75. The ERT also recommends that Ireland provide documentation in the NIR as to how and to what extent QA/QC activities are applied in the LULUCF sector, in its next annual submission.

B. Key categories

1. Forest land remaining forest land – CO_2

76. For this category, removals of CO_2 (1,491.13 Gg CO_2) were estimated on the basis of changes in the carbon stocks in living biomass (above and below-ground) using the CARBWARE model. This model does not estimate deforestation – it does not provide information on forest land converted to other land uses. Therefore, the ERT reiterates a recommendation made in the previous review report that the Party remedy this deficiency in the model or implement another compatible methodology to obtain separate data on the gains and losses in living biomass associated with deforestation.

77. Ireland acknowledges that there is not enough country-specific information available to enable it to estimate carbon stock changes in dead organic matter, and, therefore, it uses the IPCC default assumption of there being no change in those carbon stocks.

78. The Party has made a major advance by moving to a tier 2 approach using the CARBWARE model. However, some emission and expansion factors used were still IPCC default values. Therefore, the ERT recommends that Ireland develop country-specific parameters in order to improve the accuracy of its current methodological approach.

2. Grassland remaining grassland – CO_2

79. For this category, emissions of CO_2 (604.49 Gg CO_2) were estimated on the basis of soil carbon stock changes only, using tier 1 methods and IPCC default EFs. CO_2 emissions were estimated for the two types of grassland existing in Ireland – improved and unimproved grasslands – and, in this sense, the reporting is complete. The unimproved native grasslands were assumed to be in a carbon-steady state. Using the data available from Ireland's Central Statistics Office, it was difficult to estimate changes in area within grassland remaining grassland. As a consequence, soil emissions resulting from any intensive grazing of cattle and sheep on these grasslands have not been reported. The ERT recommends that Ireland examine the transparency, accuracy (i.e. possible underestimations) and comparability (i.e. the possibility of using of a higher-tier method) of the reporting for this category.

80. The ERT reiterates the recommendation made in the previous review report that the Party disaggregate this category into subcategories related to the management regimes adopted in Ireland, thereby facilitating the reporting of CO_2 emissions in accordance with the IPCC good practice guidance for LULUCF.

VI. Waste

A. Sector overview

81. In 2007, emissions from the waste sector amounted to 1,936.25 Gg CO_2 eq, or 2.8 per cent of total GHG emissions. Since the base year, emissions have increased by 32.5 per cent. The key driver for the rise in emissions is the high level of CH_4 emissions from solid waste disposal on land. Within the sector, 91.4 per cent of the emissions were from solid waste disposal on land, followed by 8.6 per cent from wastewater handling.

82. The ERT noted that Ireland had addressed all of the recommendations made in the previous review report.

83. The ERT identified a number of categories that had been reported as "NE" by the Party. In response to a question raised by the ERT on this issue, the Party indicated that it would address in its next annual submission the completeness of the waste sector section of the inventory by reporting N_2O emissions from industrial wastewater and domestic and commercial wastewater (without human sewage). The Party also indicated that it would revise the attribution of the notation key from "NE" to "NO" for emissions from other (non-specified) activities under waste incineration, in its next annual submission. The ERT recommends that the Party ensure the inclusion in its next annual submission of emissions for categories which have currently been reported as "NE" and for which methods to estimate emissions are available in the Revised 1996 IPCC Guidelines and/or in the IPCC good practice guidance; where emissions cannot be estimated for any category, the Party is to provide sufficient explanation for this in the NIR.

84. In Ireland, the incineration of municipal waste has not been used as a means to manage waste. However, Ireland has reported GHG emissions from waste incineration as "NE" in CRF table 6, as waste incineration does currently take place in a small number of chemical and pharmaceutical facilities. The ERT recommends that Ireland report GHG emissions from waste incineration that is currently occuring in the country, using methods outlined in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance. Also, Ireland explained to the ERT that the incineration of municipal waste may become an additional source of GHG emissions in the coming years with the granting of waste licences for two municipal waste incinerators whose emissions will need to be reported once these incinerators become operational in the near future.

B. Key categories

Solid waste disposal on land – CH_4

85. Ireland estimated CH_4 emissions from solid waste disposal on land using a modified form of the IPCC tier 2 first order decay method. The country-specific method calculates methane release on the basis of bulk waste with no distinction between half life for individual components of the waste by using a single duration for the production of CH_4 (21 years) regardless of the waste composition. In order to estimate CH_4 emissions more accurately, Ireland is considering using the method from the 2006 IPCC Guidelines for its next annual submission. The ERT recommends that the Party include in its next annual submission documentation supporting its use of this method, and also that Ireland ensure that resultant recalculations are time-series consistent and reported in accordance with the IPCC good practice guidance.

86. In Ireland, total CH_4 production in landfill sites significantly increased by 140.4 per cent between 1990 (46.68 Gg CO_2 eq) and 2007 (112.21 Gg CO_2 eq) owing to the increase in municipal waste disposed of in landfill sites. CH_4 recovery from landfill sites has been reported since 1996 and, after 2001, the efficiency of this CH_4 recovery reached approximately 40 per cent. As a result, CH_4 emissions from landfill sites accounted for 68.29 Gg CO_2 eq in 2007.

87. The recovery of landfill gas has become increasingly important when estimating CH_4 emissions over the last decade in Ireland. However, no information has been provided in the NIR about the estimation of CH_4 recovered and flared. In response to a question raised by the ERT, Ireland explained that the data on CH_4 flaring are based on the European Pollution Emission Register (EPER), and that the Party has initiated a major study to quantify the amount of CH_4 flared in all years since this practice commenced with the results of this study to be incorporated in the next annual submission. The ERT recommends that the Party include in its next annual submission documentation on EPER and the

above-mentioned study, and also that Ireland ensure that resultant recalculations are time-series consistent and reported in accordance with the IPCC good practice guidance.

C. Non-key categories

Wastewater handling – CH_4

88. Ireland has reported CH_4 emissions from septic tanks as "NO", since the temperature in septic tanks is not conducive to the occurrence of methanogenesis. CH_4 emissions from wastewater treatment plants have also been reported as "NO", since wastewater sent to wastewater treatment plants is treated aerobically. The ERT recommends that Ireland provide reasonable justification for reporting CH_4 emissions from these sources as "NO", and encourages the Party to consider the possibility that CH_4 is emitted from both septic tanks and wastewater treatment plants, taking into consideration the seasonal ground temperature and the wastewater treatment conditions in Ireland.

89. Ireland estimated CH_4 emissions from both wastewater and sludge treatment in line with the Revised 1996 IPCC guidelines. However, country-specific parameters were used for the fraction of biochemical oxygen demand that readily settles and for the organic content of industrial sludge, without any explanation or justification. Furthermore, the estimation of the key parameter of population equivalent has not been documented and annual data are unknown. The ERT recommends that Ireland improve the transparency of its reporting with regard to the use of these parameters, in its next annual submission.

VII. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

A. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

90. Ireland has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF and the SEF comparison report.[9] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the recommendations contained in the SIAR.

91. The ERT noted from the SIAR that Ireland had reported information on the accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1. The ERT also noted that Ireland had reported information on the national registry that is complete and was submitted in accordance with the annex to that same decision.

92. The ERT further noted from the SIAR that Ireland had identified as confidential the public information pursuant to paragraphs 44 to 48 of the annex to decision 13/CMP.1. The ERT reiterated the recommendation made in the SIAR that Ireland should improve the website of its registry by clearly stating the confidential nature of this public information, and should report, in its next annual submission, on any changes to its public information.

2. National registry

93. The ERT took note of the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, including transaction procedures, security, data integrity and recovery measures, and continues to adhere to the

[9] The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

94. The ERT noted from the SIAR that Ireland's national registry is experiencing a number of reconciliation events being terminated for technical reasons, significantly exceeding the average number of such terminated events for all registries. Therefore, the ERT reiterated the recommendation of the SIAR that Ireland, in accordance with paragraphs 25(e) and 26 of the annex to decision 24/CP.8, should improve its registry in order to reduce the number of reconciliation events terminated and report in its next annual submission on any changes related to the handling of the reconciliation process in its registry, including the relevant test plans and test reports.

3. Calculation of commitment period reserve

95. Ireland has reported its commitment period reserve in its 2009 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (282,765,845 t CO_2 eq) as it is based on the assigned amount and not on the most recently reviewed inventory. The ERT agrees with this figure.

B. Changes to the national system

96. Ireland reported no change in its national system compared with the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

C. Changes to the national registry

97. Ireland reported changes in the contact information of the registry system administrator compared with the previous annual submission. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

98. The ERT noted from Ireland's 2009 annual submission that the production environment of Ireland's national registry migrated to a new data centre on 17 March 2009, and that the training and test environments are expected to follow in April 2009. The migration will not require further interoperability testing. The connectivity testing for the production environment was successfully completed with the ITL administrator. The complete readiness documentation associated with this migration is still being compiled with the assistance of Ireland's new hosting provider and will be submitted to the ITL administrator as soon as possible. The ERT recommends that Ireland report these changes in its next annual submission.

VIII. Conclusions and recommendations

99. Ireland made its annual submission on 9 April 2009. The Party indicated that the 2009 annual submission is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (CRF tables and NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on accounting of Kyoto Protocol units and on changes in the national registry). This is in line with decision 15/CMP.1.

100. The ERT concludes that the inventory submission of Ireland has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is in general complete in terms of geographical coverage, years, sectors and gases, and the Party has submitted a complete set of CRF tables for the years 1990–2007 and an NIR. However, the ERT also concludes that the

completeness of the inventory submission could be improved in terms of the coverage of categories, notably categories that have currently been reported as "NE" in the industrial processes, solvent and other product use and waste sectors and for which methodologies to estimate emissions are available in the Revised 1996 IPCC Guidelines and in the IPCC good practice guidance.

101. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. Ireland did not report on a voluntary basis information on activities under Article 3, paragraph 3, of the Kyoto Protocol, nor information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

102. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. In general, higher-tier methods have been used to estimate emissions for key categories. However, the ERT concluded that the Party was still using tier 1 methods for some key categories (e.g. categories in the LULUCF sector).

103. The inventory submission includes data from the EU ETS that is used in the energy and the industrial processes sectors. However, the ERT concludes that the transparency of information on the use of these data is insufficient with regard to whether these data have been prepared and incorporated into the inventory submission in line with the principles of the IPCC good practice guidance; whether these data has been subject any QA and/or verification and if so, which tier approach from the EU ETS guidelines has been used and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance; and information on how the Party has ensured time series consistency when using these data and the impact of using EU ETS data on the emission trends.

104. Ireland has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

105. Ireland reported in its 2009 submission that there had been no change in its national system since the previous annual submission. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

106. Ireland reported a change in its national registry in accordance with section G of the annex to decision 15/CMP.1. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

107. In the course of the review, the ERT formulated a number of recommendations[10] relating to the completeness and transparency of the information presented in Ireland's annual submission. The key recommendations are that Ireland:

(a) Provide improved information on its uncertainty analysis and QA/QC activities;

(b) Provide information on whether EU ETS data has been prepared and incorporated into the inventory submission in line with the principles of the IPCC good practice guidance; whether these data has been subject any QA and/or verification and if so, which tier approach from the EU ETS guidelines has been used and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice

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

guidance; and information on how the Party has ensured time series consistency when using these data and the impact of using EU ETS data on the emission trends;

(c) Ensure, to the extent possible, the inclusion in its next annual submission of emissions for categories currently reported as "NE" and for which methods for estimating emissions are available in the Revised 1996 IPCC Guidelines and/or in the IPCC good practice guidance, and where emissions cannot be estimated for any category then the Party is to provide sufficient explanation for this in its NIR.

IX. Questions of implementation

108. No questions of implementation were identified by the ERT during the review.

Annex I

Documents and information used during the review

A. Reference documents

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

Intergovernmental Panel on Climate Change. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

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

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B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Michael McGettigan and Mr. Paul Duffy (Environmental Protection Agency), including additional material on the methodology and assumptions used. The following documents were also provided by Ireland:

Hyde B., Carton O.T. and Murphy W.E. (2008). Farm facilities survey – Ireland 2003. Report prepared for the Department of Agriculture by Teagasc, Johnstown Castle, Co. Wexford.

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Annex II

Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
CER	certified emission reduction unit
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EC	European Community
EIT	economy in transition
EF	emission factor
ERT	expert review team
EU	European Union
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10^9 joule)
GWP	global warming potential
HFCs	hydrofluorocarbons
IEA	International Energy Agency
lCER	long-term certified emission reduction unit
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1 thousand grams)
kgoe	kilograms of oil equivalent
LULUCF	land use, land-use change and forestry
m^3	cubic metre
Mg	megagram (1 Mg = 1 tonne)
Mt	million tonnes
Mtoe	millions of tonnes of oil equivalent
NA	not applicable
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SO_2	sulphur dioxide
tCER	temporary certified emission reduction unit
Tg	teragram (1 Tg = 1 million tonnes)
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change

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