COMPLIANCE COMMITTEE

CC/ERT/IRR/2007/8
9 October 2007

Report of the review of the initial report of Ireland

Note by the secretariat

The report of the review of the initial report of Ireland was published on 24 September 2007. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2), the report is considered received by the secretariat on the same date. This report, FCCC/IRR/2007/IRL, 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.

UNITED
NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/IRR/2007/IRL
24 September 2007

ENGLISH ONLY

Report of the review of the initial report of Ireland

According to decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Kyoto Protocol shall submit to the secretariat, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later, a report (the 'initial report') to facilitate the calculation of the Party's assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol, and to demonstrate its capacity to account for emissions and the assigned amount. This report reflects the results of the review of the initial report of Ireland conducted by an expert review team in accordance with Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. This report covers the in-country review of the initial report of Ireland, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 16 to 21 April 2007 in Dublin, Ireland, and was conducted by the following team of nominated experts from the roster of experts: generalist – Mr. Justin Goodwin (United Kingdom); energy – Mr. Jerome Elliot (Bahamas); industrial processes – Ms. Maria Jose Lopez (Belgium); agriculture – Mr. Marcelo Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Mr. Daniel Martino (Uruguay); waste – Ms. Kyoko Miwa (Japan). Mr. Justin Goodwin and Mr. Daniel Martino were the lead reviewers. In addition the expert review team (ERT) reviewed the national system, the national registry, and the calculations of the Party's assigned amount and commitment period reserve (CPR), and took note of the LULUCF parameters. 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.

B. Summary

1. Timeliness

3. Decision 13/CMP.1 requests Parties to submit their initial report prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later. The initial report was submitted on 19 December 2006, which is in compliance with decision 13/CMP.1. In its initial report Ireland refers to its 2006 GHG inventory submission of 13 April 2006. The Party submitted revised emission estimates on 11 May 2007 in response to questions raised by the ERT during the course of the in-country visit.

2. Completeness

4. Table 1 below provides information on the mandatory elements that have been included in the initial report and reflects any revised values of assigned amount and commitment period reserve provided by Ireland resulting from the review process. These revised values are based on revisions of the estimates of emissions of methane (CH_4) and nitrous oxide (N_2O) from manure management and nitrous oxide (N_2O) from agricultural soils, which resulted in revision of the estimates of total[1] GHG emissions for the base year, from 55,784,956 tonnes CO_2 equivalent (including 4.7 Gg CO_2 equivalent from land use change (deforestation)) as reported originally by the Party to 55,607,836 tonnes CO_2 equivalent (including 4.7 Gg CO_2 equivalent from land use change (deforestation)) (see para. 90).

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

Table 1. Summary of the reporting on mandatory elements in the initial report

Item	Provided	Value/year/comment
Complete GHG inventory from the base year to the most recent year	Yes	1990–2004
Base year for HFCs, PFCs and SF_6	Yes	1995
Agreement under Article 4	Yes	Quantified emission limitation of 113%
LULUCF parameters	Yes	Minimum tree crown cover: 20% Minimum land area: 0.1 ha Minimum tree height: 5 m
Election of and accounting period for Article 3, paragraphs 3 and 4, activities	Yes	No elected Article 3, paragraph 4 activities Accounting period: entire commitment period
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8	Yes	315,158,338 tonnes CO_2 eq.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8, revised value	Yes	314,184,272 tonnes CO_2 eq.
Calculation of the commitment period reserve	Yes	283,642,504 tonnes CO_2 eq.
Calculation of the commitment period reserve, revised value	Yes	282,765,845 tonnes CO_2 eq.
Description of national system in accordance with the guidelines for national systems under Article 5, paragraph 1	No	Ireland submitted further information to ERT that the Government adopted the National Atmospheric Inventory System (see paragraph 5).
Description of national registry in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for data exchange between registry systems adopted by the COP/MOP	Yes	

5. The information in the initial report did not cover all the elements required by decision 13/CMP.1, section I of the decision 15/CMP.1, and relevant decisions of the Conference of the Parties serving as the Meeting of the Parties (CMP). However, after the in-country visit Ireland submitted a notification to the ERT on Decision of 3 April 2007 whereby the Government of Ireland has adopted the National Atmospheric Inventory System (NAIS). This Decision establishes the institutional, legal and procedural arrangements necessary to compile consistent and transparent national inventories, and the NAIS designates the Environmental Protection Agency (EPA) as the single national entity with overall responsibility for the national inventory.

3. Transparency

6. The initial report is transparent. It clearly describes the individual components of the national system, national registry, activities and minimum values under Article3, paragraph 3, of the Kyoto Protocol, and the calculation of the assigned amount and commitment period reserve. Ireland informed the ERT during the course of the review of changes to the national system (e.g., single national entity), and the Party is recommended to document these changes in its next annual submission under the Kyoto Protocol.

4. Emission profile in the base year, trends and emission reduction target

7. In the base year (1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6), the most important GHG in Ireland was CO_2, contributing 58.6 per cent to total national GHG emissions expressed in CO_2 equivalent, followed by CH_4 (23.9 per cent) and N_2O (17.2 per cent) (see figure 1). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together contributed 0.36 per cent of total national emissions in the base year. The energy sector accounted for 56.9 per cent of the total GHG emissions in the base year, followed by agriculture (34.3 per cent), industrial processes (6.0 per cent) and waste (2.6 per cent) (see figure 2). Total GHG emissions

(excluding LULUCF) amounted to 55,603 Gg CO_2 equivalent in the base year and increased by 22.9 per cent between the base year and 2004.

Figure 1. Shares of gases in total GHG emissions, base year

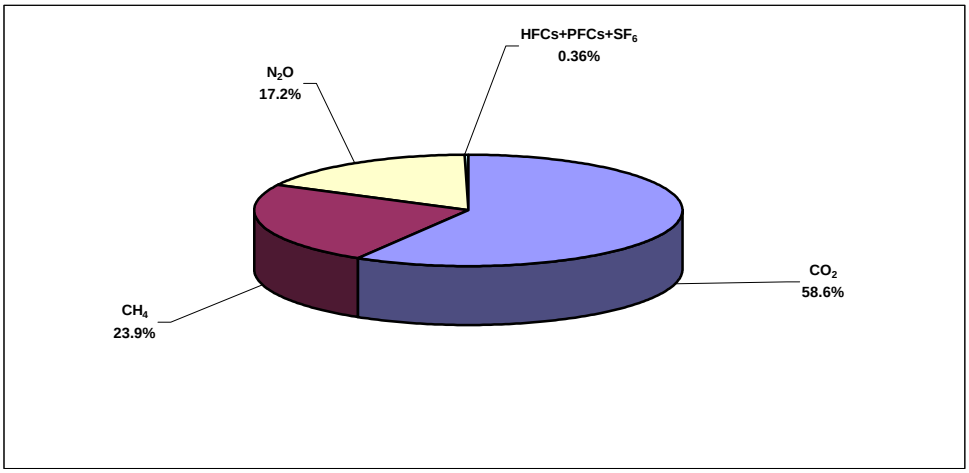
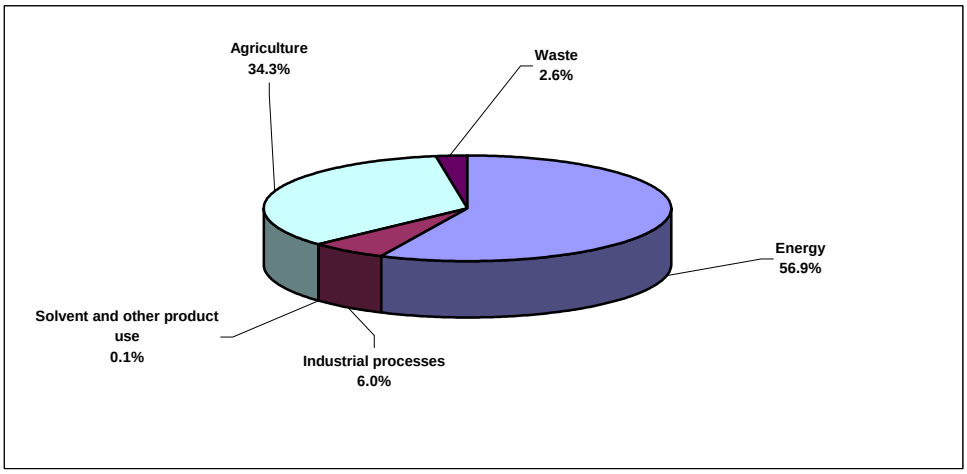


Figure 2. Shares of sectors in total GHG emissions, base year



8. Tables 2 and 3 show the greenhouse gas emissions by gas and by sector, respectively.

Table 2. Greenhouse gas emissions by gas, 1990–2004[a]

GHG emissions (without LULUCF)	Gg CO_2 equivalent								Change
	Base year Kyoto Protocol	1990	1995	2000	2001	2002	2003	2004	KP BY–2004 (%)
CO_2	32,559.5	32,559.5	34,782.7	44,240.9	46,704.3	45,700.5	44,519.4	45,266.5	39.0
CH_4	13,303.6	13,303.6	13,721.9	13,448.5	13,250.1	13,221.5	13,824.0	13,372.8	0.5
N_2O	9,537.2	9,537.2	9,990.0	10,271.9	9,809.7	9,321.6	9,158.2	9,003.8	–5.6
HFCs	44.6	0.7	44.6	228.9	253.1	288.8	357.9	399.3	795.2
PFCs	75.4	0.1	75.4	305.4	296.0	212.4	228.8	196.4	160.5
SF_6	82.8	35.4	82.8	55.9	69.4	70.2	118.6	70.0	–15.5

Note: BY = Base year; LULUCF = Land use, land-use change and forestry.

[a] Ireland submitted revised estimates for all years after the initial review on 11 May 2007. These estimates differ from Party's GHG inventory submitted in 2006.

Table 3. Greenhouse gas emissions by sector, 1990–2004[a]

Sectors	Gg CO_2 equivalent								Change
	Base year Kyoto Protocol[b]	1990	1995	2000	2001	2002	2003	2004	KP BY–2004 (%)
Energy	31,665.4	31,665.4	34,002.8	43,097.8	45,402.5	44,508.0	44,346.1	44,400.9	40.2
Industrial processes	3,333.0	3,166.4	3,062.8	4,186.7	4,294.3	3,734.4	3,050.9	3,169.7	–4.9
Solvent and other product use	80.9	80.9	86.2	80.3	79.5	77.2	75.7	74.5	–8.0
Agriculture	19,063.0	19,063.0	19,857.1	19,535.9	19,128.7	18,889.4	18,983.9	18,830.0	–1.2
LULUCF	NA	108.2	205.2	–2.0	–173.9	–191.1	–382.8	–71.6	NA
Waste	1,460.7	1,460.7	1,688.6	1,650.9	1,477.4	1,606.1	1,750.3	1,833.6	25.5
Other	0.0	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	**NA**	**55,544.7**	**55,902.6**	**68,549.6**	**70,208.6**	**68,624.0**	**67,824.1**	**68,237.2**	**NA**
Total (without LULUCF)	**55,603.12**	**55,436.5**	**58,697.4**	**68,551.5**	**70,382.5**	**68,815.1**	**68,206.9**	**68,308.8**	**22.9**

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable.

[a] Ireland submitted revised estimates for all years after the initial review on 11 May 2007. These estimates differ from Party's GHG inventory submitted in 2006.

[b] The LULUCF sector is a net source in the base year. In accordance with decision 13/CMP.1, total base year emissions for the purpose of calculating the assigned amount under the Kyoto Protocol shall include GHG emissions from conversion of forests (deforestation). In 1990, these emissions amounted to 4.7 Gg CO_2 eq. For Ireland, emissions from deforestation are neither shown separately nor included as a element of the emissions from the LULUCF sector in the rows for total emissions in this table. However, they were added to the total base year emissions for the purpose of calculating the assigned amount (see section II.D of this report).

9. Ireland's quantified emission limitation is 92 per cent as included in Annex B to the Kyoto Protocol. As Ireland is part of the European Community, whose member States will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol, Ireland's quantified emission limitation is 113 per cent. Ireland's assigned amount is calculated based on the Party's Article 4 commitment.

II. Technical assessment of the elements reviewed

A. National system for the estimation of anthropogenic GHG emissions by sources and sinks

10. Ireland's national system has generally been prepared in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). However, the ERT identified the following areas where further improvements are encouraged: formalized memoranda of understanding (MoUs) with data providers, with the MoUs including specific provisions for key data providers to participate in annual and extended review activities, and to provide uncertainty estimates (quantitative and qualitative); improvement of the indexing of hard copy archiving systems; formalization of the inventory improvement procedures; and the development of procedures for review of the inventory by experts not involved in the inventory

11. Table 4 shows which of the specific functions of the national system are included and described in the initial report.

Table 4. Summary of reporting on the specific functions of the national system

Reporting element	Provided	Comments
Inventory planning		
Designated single national entity*	No	See section II.A.1
Defined/allocated specific responsibilities for inventory development process*	Yes	See section II.A.1
Established process for approving the inventory*	Yes	See section II.A.1
Quality assurance/quality control plan*	Yes	See section II.A.2
Ways to improve inventory quality	Yes	See section II.B.3
Inventory preparation		
Key category analysis*	Yes	See section II.B.1
Estimates prepared in line with IPCC guidelines and IPCC good practice guidance*	Yes	See section II.B.2
Sufficient activity data and emission factors collected to support methodology*	Yes	See section II.B
Quantitative uncertainty analysis*	Yes	See section II.B.2
Recalculations*	Yes	See section II.B.2
General QC (tier 1) procedures implemented*	Yes	See section II.A.2
Source/sink category-specific QC (tier 2) procedures implemented	Yes	See section II.A.2
Basic review by experts not involved in inventory	Yes	See section II.A.2
Extensive review for key categories	Yes	See section II.A.2
Periodic internal review of inventory preparation	Yes	See section II.A.2
Inventory management		
Archive inventory information*	Yes	See section II.A.3
Archive at single location	Yes	See section II.A.3
Provide ERT with access to archived information*	Yes	See section II.A.3
Respond to requests for clarifying inventory information during review process*	Yes	See section II.A.1

* Mandatory elements of the national system.

1. Institutional, legal and procedural arrangements

12. During the in-country visit, Ireland explained the institutional arrangements, as part of the national system, for the preparation of the inventory. After the in-country visit Ireland informed the ERT that, by its Decision of 3 April 2007, the Government of Ireland has adopted an NAIS which establishes the institutional, legal and procedural arrangements necessary to compile consistent and transparent national GHG inventories, and designates the EPA as the single national entity with overall responsibility for the inventory. The ERT encourages Ireland to provide details of the relevant aspects of the NAIS in its next inventory submission under the Kyoto Protocol, and to include a summary of the organizational arrangements mandated in the Decision of 3 April (submitted by Ireland to the ERT) on the formalization of the NAIS. Other agencies and organizations as well as private institutes and individual experts are also involved in the preparation of the inventory and have specific responsibilities for the inventory development process. The overall responsibility for the inventory, as well as issues related to reporting, quality assurance/quality control (QA/QC) and general issues and, in addition, responsibility for the energy, industrial processes, agriculture, LULUCF and waste sectors belongs to the Irish EPA. A number of subcontracts are let for the development and management of the fluorinated gases (F-gases) inventory and components of the LULUCF inventory.

13. Ireland informed the ERT during the course of the review that formal MoUs have been agreed between the designated single national entity and inventory agency (EPA Office of Climate Licensing and Resource Use (OCLR)) and the key data providers. MoUs have been exchanged for implementation in the 2007/2008 reporting cycle. The provision of data by trade associations and industrial or other ad hoc organizations is based on a less formal agreement with the EPA. The EPA also manages a number of contracts to update the emission estimates periodically. Of particular importance are the contracts for the F-gases inventory with the Clean Technology Centre, which are let periodically. The ERT recommends that Ireland ensure that MoUs with key data providers are maintained and to the extent possible include all data providers to the inventory.

14. During the in-country visit Ireland informed the ERT that there is an established process for the official consideration and approval of the inventory, including recalculations, prior to its submission and for responding to any issues raised by the inventory review. The organization responsible for managing the review activities is the Office of Climate Licensing and Resource Use (OCLR) department of the EPA. Periodic reviews are undertaken with data providers and relevant government departments. The ERT encourages Ireland to provide a fuller description of this review process in its next inventory submission under the Kyoto Protocol.

2. Quality assurance/quality control

15. Ireland has elaborated and implemented a QA/QC plan 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). This includes general QC procedures (tier 1) as well as source/sink category-specific procedures (tier 2) for key categories and for those individual categories in which significant methodological and/or data revisions have occurred.

16. Overall responsibility for QA/QC activities is with the OCLR. During the in-country visit Ireland presented its data collection, processing, archiving and QA/QC activities to the ERT. Within the OCLR team decisions are taken relating to the division of work and the allocation of responsibilities for the different sectors of the inventory, and this produces a common understanding of individual tasks in the annual compilation and reporting cycle. Core inventory estimations and QA/QC procedures are conducted on a round-robin basis so that the inventory experts involved in the checking and the QA/QC documentation for any given sector are not also the compilers. The ERT recommends that the above procedures and practices be documented in the NIR.

3. Inventory management

17. Ireland has a centralized archiving system. The OCLR archives all inventory data, including the CRF tables, background information and calculation sheets, disaggregated emission factors (EFs), activity data (AD), and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory, in either electronic or hard copy form. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, documentation on annual key categories and key category identification, and planned inventory improvements. The ERT recommends that Ireland provide some additional referencing in the source data and calculation spreadsheets so that the sources of non-linked values can be identified. The ERT also encourages Ireland to clearly and uniquely label that unpublished "hard copy only" material that is relevant to the inventory calculations and assumptions so that it can be properly referenced in the calculation spreadsheets, and to introduce a simple filing system and index for the "hard copy only" material that is relevant to the inventory calculations.

B. Greenhouse gas inventory

18. In conjunction with its initial report, Ireland has submitted a set of CRF tables for the years 1990–2004 and an NIR. The Party submitted revised emission estimates on 11 May 2007 in response to questions raised by the ERT during the course of the in-country visit.

19. During the review Ireland provided the ERT with additional information sources. These documents are not part of the initial report 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.

1. Key categories

20. The key category analyses performed by the Party and the secretariat[2] produced similar results. Ireland has included the LULUCF sector in its key category analysis. There are a few differences in the results of these analyses, which can be explained by the different levels of aggregation for the energy and agriculture sectors. The ERT acknowledges that Ireland has used key category analysis as a tool to support and guide the improvement of its inventory. The ERT encourages Ireland to complete a tier 2 key category analysis.

2. Cross-cutting topics

21. 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 Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The ERT identified that improved documentation in the NIR would improve the quality of the inventory and encourages Ireland to consider the areas for improvement detailed in the following paragraphs.

22. The inventory has been compiled in accordance with Article 7, paragraph 1, of the Kyoto Protocol and decision 15/CMP.1.

[2] The secretariat identified, for each Party, those source 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 Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) for the base year or base year period as well as the latest inventory year. Key categories according to the tier 1 trend assessment were also identified. 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.

Completeness

23. The inventory submitted in conjunction with the initial report covers all years from 1990 to 2004, and generally all sectors and gases, including actual and potential emissions of HFCs, PFCs and SF_6 (the F-gases). The ERT commends Ireland for submitting LULUCF tables in accordance with decision 13/CP.9 for the first time. Ireland has not submited CRF table 7 (key categories). The ERT noted several categories for which GHG emissions occur in Ireland but for which no emissions have been estimated as they are either assumed to be negligible or no available methodology (e.g., categories in the industrial processes and solvent and other product use (see para. 49), non-CO_2 emissions from biomass burning in forest fires (see paras. 72, 82), cultivation of histosols (see para. 63), N2O emissions from soil disturbance associated with conversion to cropland (see paras. 72, 81), and N_2O emissions from wastewater (see para. 87)). Ireland indicated during the review that it would consider the inclusion of these missing sources for future revisions. The ERT encourages Ireland to provide estimates for all categories where emissions occur in the country, even if they are minor, by using simple but reasonable approaches, and using expert judgement as necessary.

Transparency

24. The ERT noted that the quality of the 2006 submission is high in that it provided information in accordance with 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). However, the ERT had to request additional information and explanations in order to make a complete assessment of some categories for a number of sectors of the inventory (e.g., industrial processes (see paras. 50, 54, 55, 56, 57, 58, 60, 61), agriculture (see paras. 63, 66, 69), land use, land-use change and forestry (see paras. 74, 78) and waste sectors (see paras. 86, 87)). The additional information provided during the course of the review (see annex I) improved the ERT's understanding of methodology and emission factors used to estimate emissions. The ERT recommends that Ireland enhance the transparency of reporting by including: improved descriptions of methodologies for categories in the industrial processes sector; explanation of trends (including inter-annual variations) and the impact of recalculations on trends; and to improve reporting of notation keys that were identified in a couple of instances to be neither consistent through the time series (e.g., CO_2 emissions for iron and steel are reported as not estimated ("NE") or not occurring ("NO") or "0.00" in the period 1990–2003), nor used. This is a particular problem for the earlier years of the time series.

25. The ERT encourages Ireland to correct incorrect use of notation keys for a number of categories in the energy, industrial processes, LULUCF and waste sectors.

Consistency

26. The ERT concluded that Ireland's inventory is generally consistent, as defined in the UNFCCC reporting guidelines, and consistent with the IPCC good practice guidance. The ERT noted that the energy sector time series is not completely consistent as Ireland in its 2006 submission had recalculated the 1990 inventory and reported a 2004 inventory based on the revised energy balance. However, during the in-country visit Ireland presented to the ERT a consistent time series from the most recent (2007) submission of the inventory which incorporates the entire time series of the revised energy balance.

Comparability

27. Ireland's inventory is comparable with those of other Annex I Parties. Ireland generally allocates its source/sink categories in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

Accuracy

28. In accordance with the UNFCCC reporting guidelines, the Party has not overestimated base year emissions in its 2006 submission. Ireland applies the IPCC good practice guidance for its uncertainty estimates and is encouraged to include these in a tier 2 key category analysis. Ireland is encouraged to resolve the high uncertainties in the oil balance data which result from large fluctuations in statistical differences.

Recalculations

29. The national system can ensure that recalculations of previously submitted estimates of GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance. The rationale for these recalculations is provided in the NIR. They are due to improvements to methodologies and revisions in EFs and AD. The effect of the recalculations is to increase the estimates of total GHG emissions for the base year by 3 per cent (excluding LULUCF). Recalculations are dealt with by the OCLR and cross-checked with data providers during sector-specific review activities. The ERT encourages Ireland to provide further details of these review activities in its next inventory submission under the Kyoto Protocol.

30. The ERT noted that recalculations, along with revised estimates submitted by the Party during the in-country visit, had been generally undertaken for the whole time series. A revised energy balance for all years of the time series is reported in the NIR; however, only the 1990 energy emissions were recalculated.

31. The recalculations and the submission of revised estimates by the Party during the course of the review affect the calculation of the assigned amount and the CPR under the Kyoto Protocol.

32. The major changes in the base year include the following. In the energy sector, estimated emissions of CO_2, CH_4 and N_2O have increased by 2.0, 1.5 and 2.6 per cent, respectively. (The main reason for these changes was the revised energy balance.) In the industrial processes sector, estimated emissions of CO_2 and HFCs have increased by 8.5 and 115.4 per cent, respectively, and estimated SF_6 emissions have decreased by 0.3 per cent. (The main reasons for these changes are methodological improvements, including the use of country-specific data for cement plants and revised estimates for the F-gases.) In the agriculture sector, estimated CH_4 emissions have increased by 11.6 per cent, and N_2O emissions have decreased by 6.4 per cent. (In this case the recalculations are due to methodological improvements and the rectification of errors identified in spreadsheets (revised estimates).) In the waste sector, estimated CH_4 emissions have increased by 9.1 per cent, and N_2O emissions have decreased by 0.5 per cent.

Uncertainties

33. Ireland has provided a tier 1 uncertainty analysis for each category and for the inventory as a whole, following the IPCC good practice guidance. Uncertainties have been reduced compared with previous years through the introduction of higher-tier methods and re-evaluation of the uncertainty values for some sectors. The ERT encourages Ireland to address the relatively high uncertainties for the oil energy balance, and recommends that the Party engage with key data providers on uncertainty analysis as a means to improve the accuracy of the inventory and to prioritize improvements.

3. Areas for further improvement identified by the Party

34. The NIR identifies several areas for improvement. These include: further implementation of the institutional arrangements and QA/QC; improving the oil energy balance; and further improvements to the agriculture sector estimates, with a focus on the methane emissions model, N_2O measurement studies, and process modelling of N_2O emissions.

4. Areas for further improvement identified by the ERT

35. The ERT identified the following cross-cutting issues for improvement. The Party should:

(a) Include in the NIR additional information provided to the ERT during the course of the review (see annex I) on methodology descriptions; missing references for country specific emission factors; and rationale for selection of default EFs and parameters;

(b) Provide a detailed explanation of its emission trends and the drivers of the trends;

(c) Proceed to formalize MoUs with government data providers covering the provision of information, core requirements on the uncertainty and accuracy of the data, and quality control;

(d) Further formalize agreements with non-government data providers where possible;

(e) Improve the coverage of QA/QC across the inventory, and the archiving system.

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

5. Energy

Sector overview

37. In the base year, GHG emissions in Ireland from the energy sector amounted to 31,665 Gg CO_2 equivalent, contributing 56.9 per cent of total national GHG emissions. Emissions in this sector increased by 40.2 per cent between 1990 and 2004. The dominant gas in the sector is CO_2, accounting for 96.0 per cent of total sectoral emissions, while CH_4 and N_2O represented 1.0 per cent and 3.1 per cent, respectively. Emissions from fuel combustion represented 99.1 per cent of total emissions from this sector, with energy industries and other sectors in the base year accounting for 36.4 and 33.0 per cent, respectively. The residential subsector contributed 23.2 per cent of total sectoral emissions. Fugitive emissions, a relatively minor source, contributed 1 per cent to total sectoral emissions.

38. Ireland's 2006 submission for the energy sector has improved the base year emission estimate with the use of a revised energy balance and the reporting of all GHGs for key categories. CO_2 emission factors are mostly country-specific and are determined directly from information on the carbon content and net calorific value of the fuels used in stationary and mobile sources. The inventory is complete with the exception of minor sources for a number of categories under oil (1.B.2a) which are reported as not estimated. The ERT encourages Ireland to improve the transparency of the inventory by reporting units for peat in CRF table 1.A(b).

39. AD in the major energy use categories, such as energy industries and manufacturing, industry and construction, are verified using data obtained from the European Union (EU) emissions trading scheme (ETS). The ERT encourages Ireland to explain the differences between the energy data in the CRF and the corresponding data from the International Energy Agency (IEA).

40. Ireland has included the revised energy balance for 1990 and 2004. However, the ERT observed differences in the implied emission factor (IEF) between the 2006 and 2005 submissions with respect to the following: solid fuel used in energy industries (there is a 4 per cent difference for solid fuels for the base year between the 2005 and 2006 submissions); and other non-specified liquid fuels used in manufacturing industries and construction (there is a 7.6 per cent difference between the 2005 and 2006 submissions). Ireland is encouraged to provide explanations for these differences in its next inventory submission.

41. The ERT noted that the 2006 inventory is more complete than the 2005 submission in that it includes estimates for non-ferrous metals (solid and gaseous fuels) and solid fuel use in manufacturing industry and construction. However, no explanation is provided in the NIR for this change. Ireland is encouraged to provide explanations for the addition of new fuels/sources in its future NIR submissions.

42. The ERT noted that information on carbon content of fuels is available, but this information is not included as part of the official record-keeping and archiving of the inventory agency. The ERT recommends that this information be formalized and included in the official records of the agency.

Reference and sectoral approaches

43. Ireland reports differences between the reference and sectoral approaches of 3.3 and 5.9 per cent for CO_2 emissions and apparent fuel consumption, respectively, for the base year, in the recalculated (2006 submission) inventory estimate. The previous (2005) estimate showed differences of 5.4 and 4.5 per cent, respectively, for apparent fuel consumption and emissions for CO_2. The difference following the recalculations is observed in the CRF mainly with respect to emissions from gaseous fuels in the base year as a result of the use of natural gas as a feedstock for ammonia production. The NIR only provides a very limited explanation of the differences.

International bunker fuels

44. Ireland estimates GHG emissions from domestic and international bunkers separately. Currently it estimates domestic emissions based on aircraft movements. However, Ireland's revised energy balance provides separate estimates of fuel consumption for domestic and international aviation.

Feedstocks and non-energy use of fuels

45. A significant amount of natural gas feedstock was formerly used in ammonia production in Ireland, but the company concerned ceased operations in 2002. Ireland does provide some brief explanation about naphtha in the NIR, but it is not clear how this fuel is handled in the inventory. The ERT encourages Ireland to provide a more detailed description of these estimates in the NIR.

Key categories

Manufacturing industries and construction: biomass – CH_4, N_2O

46. Ireland has reported emissions from biomass under other (1A2f) for all manufacturing industries and construction activities in 1990. Activity data for biogas is reported for food processing, beverages and tobacco, however, emissions are reported as not estimated by the Party with an explanation provided in CRF table 9.

6. Industrial processes and solvent and other product use

Sector overview

47. In the base year (1990 for CO_2, CH_4 and N_2O, and 1995 for the F-gases), the industrial processes sector accounted for 6.0 per cent (3,333 Gg CO_2 eq.) of total national GHG emissions. In 2004 the share was 4.6 per cent (3,170 Gg CO_2 eq.). Emissions decreased by 4.9 per cent between the base year and 2004. CO_2 is the dominant gas in the base year in both the industrial processes and the solvent and other product use sectors, contributing 62.9 per cent and 100 per cent, respectively, while N_2O contributed 31.1 per cent to industrial processes emissions. Emissions of F-gases contributed 6.1 per cent in the base year (1995). Solvent and other product use represented 0.1 per cent of total national emissions in Ireland in the base year. Estimated CO_2 emissions from the oxidation of the carbon in non-methane volatile organic compounds (NMVOCs) emissions decreased by 8 per cent from 1990 to 2004. Recalculations in the industrial processes sector have resulted in increases in estimated emissions of CO_2 and HFCs, by

8.5 and 115.4 per cent, respectively, and a decrease in estimated SF_6 emissions, by 0.3 per cent. The main reasons for these changes are methodological improvements and revised AD.

48. The main sources of emissions for industrial processes in the base year are CO_2 from mineral products and chemical industry (33.2 and 29.7 per cent, respectively, of sectoral emissions), and N_2O emissions from chemical industry (31.1 per cent). F-gas emissions from the consumption of halocarbons and SF_6 collectively contributed 6.1 per cent to total sectoral emissions.

49. Emissions are reported for most sources and gases, except for asphalt roofing, road paving with asphalt, glass production, pulp and paper, and food and drink, for which no emissions have been estimated (the notation key "NE" is reported). In the solvent and other product use sector, emissions from the direct use of N_2O for anaesthesia have not been estimated ("NE" is reported). The ERT encourages Ireland to improve the completeness of reporting by providing estimates for the above categories, even if they are minor, by using simple but reasonable approaches (or the EU ETS, where applicable), and using expert judgement as necessary.

50. The 2006 submission of the CRF is generally transparent. The ERT noted several instances where the use of the notation keys is inconsistent through the time series (CO_2 emissions for iron and steel are reported as "NE", "NO" or "0.00" in the period 1990–2003) or where they are not used; this is more evident in the earlier years of the time series. Ireland is encouraged to use the notation keys consistently across the time series and to improve transparency by reporting explanatory information on the use of the notation key "NE" in CRF table 9(a), particularly for the other subcategories.

51. Ireland has applied IPCC good practice guidance for key categories of the industrial processes sector. The ERT commends Ireland for implementing higher-tier methods to the extent possible for the first time in the 2006 submission for the cement and lime production categories. Data for these categories are obtained directly from the operators, which corresponds directly to the higher-tier method recommended by the IPCC good practice guidance.

52. Ireland applies the IPCC good practice guidance for its uncertainty estimates using a tier 2 Monte Carlo analysis for the category consumption of halocarbons and SF_6, while tier 1 analysis is used for all other categories in this sector.

53. QC procedures have been applied in this sector using data from the EU-ETS (e.g., emissions for the years 2003–2004 for mineral products). Ireland has also commissioned specific studies for the F-gases and solvent and product use with the aim of improving the quality of its estimates for these categories. Ireland indicated to the ERT that it plans to continue outsourcing contracts for the emission estimates of F-gases, and that it will use the verified CO_2 emission estimates for cement and lime production that are available from the EU ETS. The ERT encourages Ireland to explore alternatives to the current method (extrapolations) of estimating F-gas emissions as a means to ensure time series consistency. Further, Ireland is encouraged to improve the documentation of the current F-gas methodology in the next inventory submission.

Key categories

Cement production – CO_2

54. Emissions from cement production are estimated using information recently acquired from the four cement plants in connection with the EU ETS. From 2003, CO_2 emissions have been verified by using this information. In its 2006 submission, Ireland has updated all estimates using data on process CO_2 emissions disclosed by the cement plants for the years 1990–2004, coupled with AD for the years 2003–2004. The ERT recommends Ireland to review and clarify this methodology in its next inventory submission.

55. Only a single cement manufacturer was operational between 1990 and 2000, and its emissions data are deemed confidential. As an alternative, Ireland has used production statistics or data from unpublished sources. For the 2006 submission, Ireland has reviewed the AD and the EF (0.5 t CO_2/t cement clinker) used in the estimation of emissions for the years 1990–2002, using CO_2 emissions data from the cement production plants in connection with Directive 2003/87/EC on emissions trading. The ERT encourages Ireland to improve the documentation in the NIR on this methodology.

Consumption of halocarbons and SF_6 – HFCs

56. Ireland reports recalculations for the major sources of HFCs (refrigeration, air conditioning and aerosols) for all years of the time series. The recalculation is based on a revised methodology that has been applied to all years from the base year (1995) to 2004, and a splicing technique for the years 1991–1994. This has increased the estimates of 1995 emission in this category by 115 per cent. During the in-country visit Ireland informed the ERT that the basis of the revised methodology is three F-gas studies. However, the methodology applied was not fully documented in these studies. Ireland informed the ERT that data for the years 1991–1994 were obtained through a combination of interpolation between 1990 and 1995 for stationary refrigeration and air conditioning, international production data for foams, and United Kingdom data for aerosols adjusted for population size. The ERT recommends that the documentation on these methods be improved in Ireland's next inventory submission, including the underlying assumptions (from the studies) and explanations of the inter-annual fluctuations.

Non-key categories

Lime production – CO_2

57. Ireland has used plant-specific data disclosed by operators for 2004 in the context of the EU ETS. These plant-specific EFs were used to recalculate the time series 1990–2003. The ERT encourages Ireland to enhance the transparency of this information in the NIR by including information on data sources, the assumptions made to estimate AD, and explanations of the trend.

58. Emissions arising from captive lime production are not estimated. The Party informed the ERT that there is captive lime production in sugar production facilities but that there are no process emissions from this activity. The ERT encourages Ireland to provide in the NIR a justification as to why captive lime production is not included in the lime production estimates.

Limestone and dolomite use – CO_2

59. For the first time Ireland has reported CO_2 emissions for limestone and dolomite use for the period 1990–2004. Estimates of CO_2 process emissions from bricks and ceramics production plants were obtained recently from the EU ETS. CO_2 emissions from the use of limestone in a new peat-burning power station are included in this source. The 1990 CO_2 IEF (0.07 t CO_2/t limestone) is considered by the ERT to be very low (it is the lowest of all reporting Parties except for 1990, when it is the second-lowest) and is outside the IPCC default range (0.44–0.48 t CO_2/t limestone). The ERT concluded that the CO_2 IEF reflects the IEF for bricks and ceramics production in Ireland up to 2000, and after 2000 it includes emissions from limestone use for environmental applications in a peat-burning power station. In order to improve the time-series consistency of the emission estimates and comparability with other Parties' inventories, the ERT recommends Ireland to reallocate bricks and ceramics production data to the subcategory other under mineral products (2.A.7).

60. The ERT encourages Ireland to provide more information in the NIR on the methodology applied, the assumptions made for estimating AD and the data sources used.

Other use of solvents – NMVOCs

61. Other use of solvents is the major source of emissions in the solvent and other product use sector. No information on this source is provided in the NIR or as explanatory information in the documentation box of the CRF table.

7. Agriculture

Sector overview

62. In 1990, the agriculture sector accounted for 34.3 per cent of total national GHG emissions (19,063 Gg CO_2 eq.). In 2004, the share was 27.6 per cent (18,830 Gg CO_2 eq.). Emissions decreased by 1.2 per cent between 1990 and 2004. The main drivers of the decrease were general agriculture policies and economic activities. Ireland submitted revised estimates to the ERT during the review based on revisions of the estimates of emissions of CH_4 and N_2O from manure management and N_2O from agricultural soils, which resulted in revision of the estimates of total sector emissions for the base year, from 19,240 Gg CO_2 equivalent to 19,063 Gg CO_2 equivalent.

63. The agriculture inventory is complete, with cultivation of histosols the only exception. The ERT recommends that Ireland include emissions from this category in its next inventory submission. The transparency of the inventory could be improved by including information in the NIR on country-specific parameters (e.g., country-specific FRACs obtained from Ireland's tier 2 NH_3 inventory).

64. The ERT acknowledged that estimates of CH_4 emissions from enteric fermentation and manure management have been significantly improved by the implementation of a tier 2 method. The time series has been recalculated, resulting in an increase of 3.8 per cent in total sectoral emissions.

65. Ireland uses the IPCC good practice guidance methodology (tiers 1a and 1b) to estimate N_2O emissions from agricultural soils. The ERT noted the effort made in developing a tier 2 NH_3 inventory and the continuing investigation of N_2O emission models and encourages the Party to use detailed AD (tier 1b method) to the maximum possible extent while that development takes place.

Key categories

Enteric fermentation – CH_4

66. The ERT notes the improvement that Ireland has made by using a tier 2 method to estimate CH_4 emissions from dairy and non-dairy cattle for the first time in this submission. The method is based on a net energy system for cattle. This method (and the underlying AD and EFs) is consistent with the IPCC good practice guidance. The ERT recommends that Ireland improve the documentation of this method in the NIR by providing information and explanations on the collection of AD (e.g., descriptions of the two different censuses) and the estimation of country-specific EFs (e.g., the cattle herd).

67. In accordance with good practice guidance, a tier 1 method has been used for all other livestock categories. However, the ERT encourages the Party to make efforts to continuously improve the collection of detailed AD and the derivation of country-specific factors for some of these categories.

Manure management – CH_4

68. Ireland has used a tier 2 method to estimate CH_4 emissions from cattle (dairy and non-dairy) manure management. A tier 1 method is used for all other relevant livestock categories. Both methods are consistent with the IPCC good practice guidance, and Ireland uses appropriate country-specific or default EFs and AD.

Manure management – N_2O

69. Ireland has used a tier 1 method to estimate N_2O emissions from this category. Nitrogen excretion rates have been applied for all animal categories for which annual census data are published by the Central Statistics Office (CSO). These rates are used and endorsed by the Department of Agriculture and Food and by the Irish Agriculture and Food Development Authority (TEAGASC) for national use and as guidance for farmers in relation to implementation of the EU Nitrates Directive. The ERT recommends Ireland to provide more documentation on the NH_3 inventory and the linkages between the NH_3 inventory and N_2O emissions in the NIR of its next inventory submission. Additionally, documentation on the Farm Facilities Survey undertaken by TEAGASC and the Department of Agriculture in 2003 to establish baseline data on Ireland's farm manure management practices and facilities should be provided in the NIR.

Direct soil emissions – N_2O

70. Emissions from the cultivation of histosols are reported as "NO". However, the ERT noted that 6,622 ha of organic soils are reported for cropland Remaining Cropland in the LULUCF sector. The ERT recommends Ireland to revise the AD for this source and, if applicable, estimate N_2O emissions from this category.

8. Land use, land-use change and forestry

Sector overview

71. Total net GHG emissions from LULUCF activities amounted to 108.2 Gg CO_2 equivalent in 1990, which represented 0.2 per cent of total national emissions (including LULUCF). A small fraction of the LULUCF emissions in the base year (4.7 Gg CO_2 eq., or 4.3 per cent of total LULUCF emissions) arose from conversion of forest land to settlements. Net emissions in the sector have decreased with time, and during the period 1998–2004 it was a net sink due to the implementation of a policy for promoting afforestation. The decrease in net GHG emissions observed since 1990 in this sector was largely driven by an increase in the forest plantation area. The annual change in carbon (C) stocks in plantations increased from an average of –198 Gg CO_2/year over the period 1990–1993 to +704 Gg CO_2/year over the four years 2001–2004. The average annual changes in carbon stocks of forest land remaining forest land decreased from 966 Gg CO_2/year over the period 1990–1993 to 581 Gg CO_2/year over the four years 2001–2004.

72. Ireland has reported the inventory categories of LULUCF according to decision 13/CP.9 for the first time in its 2006 submission. The ERT noted the efforts made by Ireland to improve its coverage of sink and source categories, as well of relevant carbon pools. The ERT encourages Ireland to include in the NIR an explanation of how the LULUCF categories map on to the categories of the Revised 1996 IPCC Guidelines. Ireland has provided a complete set of CRF tables for the LULUCF sector as required by decision 13/CP.9, covering the entire period 1990–2004. The data reported in the NIR and the CRF tables do not include estimates for the categories emissions of N_2O from disturbance associated with land-use conversion to cropland (5(III)) and emissions of CH_4 and N_2O from biomass burning (5(V)). These activities do occur in Ireland and, although they are not extensive, an effort should be made to report them in future submissions to improve the completeness of the inventory. CO_2 is the only gas for which emissions and removals have been estimated for the base year and throughout the time series. Relevant CH_4 and N_2O emissions are either not estimated or indicated as included elsewhere. Ireland is recommended to report emissions of non-CO_2 gases in its next inventory submission.

73. Ireland has used tier 2 and some tier 3 methods for estimating C stock changes in the forest land category. For all the other categories, tier 1 methods have been used. These emission estimates are largely derived from the National Forest Inventory, data from Coillte (the state forest company) and

various other sources, and use of the Carbware model. The ERT noted that Ireland has allocated increased resources to implementing the LULUCF inventory.

74. During the in-country visit, Ireland provided the ERT with information and documentation on the choice of methods, AD and EFs used and assumptions made, and on the Carbware model used for estimating carbon stock changes in forest land. The ERT recommends that the Party improve the transparency of its LULUCF inventory by including in the NIR clearer descriptions of the methods and assumptions used, including more precise references to annexes or relevant supporting material; and tables with complete time-series data for key AD (e.g., annual area of plantation, annual volume of wood harvest, etc.).

Key categories

Forest land remaining forest land – CO_2

75. According to information from CARBWARE provided by the Party during the in-country visit, the area of forest land increased from 370 to 522 kha over the period 1990–2004, a 41 per cent increase. The area of forest land remaining forest land increased from 194.7 kha in 1990 to 242 kha in 2004 (a 24 per cent increase) and the area of land converted to forest increased from 175 kha in 1990 to 281 kha in 2004 (a 60 per cent increase). Policies implemented during the period led to an increase in the area of annual afforestation from an average 7.7 kha/yr over the ten-year period 1980–1989 to 15.6 kha/yr in the period 1990–2004. The forest land category was a net sink in every year of the period 1990–2004, with net annual CO_2 removals tending to increase, from 768 Gg CO_2/yr in the period 1990–1993 to 1,285 Gg CO_2 in the period 2001–2004.

76. Ireland reports net changes of carbon stocks in living biomass instead of reporting increases and decreases separately, as recommended by the IPCC good practice guidance. This is due to constraints in the availability of data. The ERT recommends that Ireland report increases and decreases of carbon stocks in living biomass separately in its future submissions.

77. Carbon stocks in forest C pools for which country-specific data are still not available have been estimated conservatively using tier 1 methods with a number of assumptions leading to underestimation of C gains and overestimation of losses. The ERT noted the efforts being made by the Party to develop country-specific factors and methods in order to improve the accuracy of the estimates in the future.

78. The C stock factors chosen for estimating C stock changes in the litter carbon pool in forest land for age classes higher than 20 years (0.8 and 1.3 t C/ha/year for broadleaf and conifers, respectively) are not the IPCC default values, as indicated in the NIR. The values selected (taken from the IPCC good practice guidance for LULUCF) correspond to a transition period of 20 years, while a transition period of 50 years (0.3 and 0.5 t C/ha/year for broadleaf and conifers, respectively) should have been selected. The Party expressed that the values were correctly derived from national information, but were wrongly referenced to as IPCC default values. However, documentation supporting the choice of country-specific factors has not been provided during the review. The ERT encourages the Party to improve the documentation of these factors in future submissions.

Grassland remaining grassland – CO_2

79. Changes in the soil organic carbon pool have been estimated using a simplified version of the tier 1 method: a single combination of adjustment factors for land-use management and inputs has been used for the whole of Ireland. Subcategories of grassland have been identified (unimproved pasture, improved pasture, rough grazing), but no management systems have been identified for these land-use subcategories (management practice may include seeding of productive species, soil tillage, irrigation, fertilization, etc.). The area of each grassland subcategory should be attributed to different management systems (e.g., unique combinations of different practices). Adjustment factors should be applied at a

disaggregated level (i.e., for each combination of land use subcategory and management system). The ERT encourages Ireland to provide more disaggregated estimates for this category in its future submissions.

Non-key categories

Cropland remaining cropland – CO_2

80. Changes in the soil organic carbon pool have been estimated using a simplified version of the tier 1 method: a single combination of adjustment factors for land-use management and inputs has been used for the whole of Ireland. Neither the land-use subcategories of cropland nor the prevailing management systems for cropland (e.g., crop rotation, soil tillage, crop residue management, irrigation, fertilization, etc.) have been identified. Cropland area should be attributed to different land-use subcategories (e.g., perennial crops, annual crops, set-aside land, etc.) and management systems (e.g., unique combinations of different practices). Adjustment factors should be applied at a disaggregated level (i.e., for each combination of land-use subcategory and management system). The ERT encourages Ireland to provide more disaggregated estimates for this category in its future submissions.

Disturbance associated with land use conversion to cropland – N_2O

81. This source is reported as not occurring for the grassland conversion category. However, this is inconsistent with the fact that this land-use change does occur in Ireland, as reported in CRF table 5.B. This source should therefore be estimated. Ireland reports AD showing an increase with time in the conversion of land to cropland. This land-use conversion category was almost negligible in the base year, but now covers almost 70,000 ha in 2004. The Party should report the associated emissions in its next inventory submission.

Forest fires – CH_4, N_2O

82. This mandatory source is not reported. Forest fires occurring on managed land must be reported (even if they are accidental). Forest fires do occur in Ireland, although not over large areas. The Party has expressed, during the review, that it will include this source in future submissions.

9. Waste

Sector overview

83. In 1990, emissions from the waste sector contributed 2.6 per cent (1,461 Gg CO_2 equivalent) to total national GHG emissions, and they increased by 25.5 per cent between 1990 and 2004. CH_4 is the dominant gas in the base year, contributing 92.2 per cent to total sectoral emissions, while N_2O contributed 7.8 per cent. Solid waste disposal on land contributed 91.2 per cent to the estimated emissions from this sector in 1990, and wastewater handling 8.8 per cent.

84. CH_4 emissions from sewage sludge have been estimated by Ireland for the first time. Emissions from this activity are allocated to solid waste disposal on land, wastewater handling, and agricultural soils. Ireland has also reported for the first time flaring of landfill gases between 2001 and 2003.

85. Ireland reports recalculations for the entire waste sector time series to reflect revised population statistics. This has resulted in an 8.3 per cent increase in estimated base year emissions for this sector.

Key categories

Solid waste disposal on land – CH_4

86. Ireland uses a country-specific tier 2 method to estimate the CH_4 production potential of municipal solid waste (MSW) sent to landfill in accordance with the IPCC good practice guidance. While Ireland reports in the NIR the typical CH_4 production pattern in solid waste disposal sites and provides a table of annual potential CH_4 production, Ireland is encouraged to provide a more detailed explanation in its next inventory submission on how the production pattern in figure 8.1 of the NIR was developed from a first order decay model. This information is necessary to support an expert review of this category.

Non-key categories

Wastewater handling – CH_4 and N_2O

87. CH_4 emissions from wastewater handling in the base year amounted to 14.7 Gg CO_2 equivalent. In 2004, they amounted to 24.2 Gg, having increased by 65 per cent over the time series. CH_4 emissions from industrial wastewater sludge increased by 144 per cent over the same period. N_2O from human sewage is estimated, while N_2O from wastewater handling has not been estimated. Ireland informed the ERT that it does not estimate N_2O emissions from wastewater as no method is prescribed by the revised 1996 IPCC guidelines, nor does it consider new methods included in recently published recognized international scientific literature as suited to national circumstances. The ERT encourages Ireland to provide an explanation in CRF table 9(a) and the NIR on the use of the notation key not estimated.

C. Calculation of the assigned amount

88. The assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1.

89. Ireland's base year is 1990 and it has chosen 1995 as its base year for HFCs, PFCs and SF_6. Ireland's quantified emission limitation is 92 per cent as included in Annex B to the Kyoto Protocol. As Ireland is part of the European Community, whose member States will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol. Ireland's quantified emission limitation of Ireland is 113 per cent. Ireland's assigned amount is calculated based on the Party's Article 4 commitment.

90. Land-use change and forestry constituted a net source of GHG emissions in 1990 and, in accordance with decision 13/CMP.1, Ireland's aggregate anthropogenic GHG emissions in 1990 from land-use change (all emissions by sources and removals by sinks reported in relation to the conversion of forest (deforestation)) are included in the total base year emissions for the purpose of calculating the assigned amount.

91. Based on its base year emissions including land-use change – 55,608 Gg CO_2 equivalent – and its Kyoto Protocol target 113 per cent, the Party calculated its assigned amount to be 315,158,338 tonnes CO_2 equivalent.

92. During the course of the review Ireland submitted revised estimates of its base year inventory, which resulted in a recalculation of the assigned amount. Based on the revised estimates, the Party calculates its assigned amount to be 314,184,272 tonnes CO_2 equivalent. The ERT agrees with this figure.

D. Calculation of the commitment period reserve

93. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11.CMP.1.

94. Based on its calculated assigned amount, 315,158,338 tonnes CO_2 equivalent, Ireland calculated its commitment period reserve to be 283,642,504 tonnes CO_2 equivalent.

95. Ireland during the course of the review Ireland submitted revised estimates of its base year inventory, which resulted in a recalculation of the commitment period reserve. Based on the revised estimates, the Party calculates its commitment period reserve to be 282,765,845 tonnes CO_2 equivalent. The ERT agrees with this figure.

E. National registry

96. Table 5 summarizes the information on the mandatory reporting elements on the national registry of Ireland, as stipulated by decisions 13/CMP.1 and 15/CMP.1, which describes how its national system performs functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1.

Table 5. Summary of information on the national registry system

Reporting element	Provided in the initial report	Comments
Registry administrator		
Name and contact information	Yes	
Cooperation with other Parties in a consolidated system		
Names of other Parties with which Ireland cooperates, or clarification that no such cooperation exists	No	
Database structure and capacity of the national registry		
Description of the database structure	Yes	Greta software
Description of the capacity of the national registry	Yes	Further information provided to the ERT
Conformity with data exchange standards (DES)		
Description of how the national registry conforms to the technical DES between registry systems	No	Covered in the independent assessment report (IAR)
Procedures for minimizing and handling of discrepancies		
Description of the procedures employed in the national registry to minimize discrepancies in the transaction of Kyoto Protocol units	No	Further information provided to the ERT
Description of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction	No	Further information provided to the ERT
Prevention of unauthorized manipulations and operator error		
An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error	No	Covered in the independent assessment report (IAR)
An overview of how these measures are kept up to date	No	Further information provided to the ERT
User interface of the national registry		
A list of the information publicly accessible by means of the user interface to the national registry	No	Covered in the independent assessment report (IAR)
The Internet address of the interface to Ireland's national registry	No	
Integrity of data storage and recovery		
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	Yes	Covered in the independent assessment report (IAR)
Test results		
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	No	Covered in the independent assessment report (IAR)

97. Ireland has provided most of the information on the national registry system required by the reporting guidelines under Article 7, paragraphs 1 and 2, of the Kyoto Protocol (decision 15/CMP.1).

The information provided is broadly transparent and largely follows the requirements of these reporting guidelines. No information was provided to the ERT on how the national registry conforms to the technical standards for data exchange between registry systems (item j) of paragraph 32 in the annex to decision 15/CMP.1. The ERT recommends that Ireland report more complete and detailed information in its next inventory submission under the Kyoto Protocol on the requirements outlined in paragraph 32 of the annex to decision 15/CMP.1.

98. During the initial review, the ERT was provided with additional information on the national registry of Ireland. Ireland presented the current system, the security hardware and infrastructure, the security software and governance, the registry parameters and capacity, and the expected delivery of the initialization of the system. During the initial review, Ireland also provided the ERT with additional documentation on the technical and administrative procedures for the operation of the national registry (management procedures of the files and documents, the users, the accounts, the transactions, the recorded emissions and the system) as well as the results of an audit of the administrative procedures underlying the registry system which was undertaken by external contractors in February 2007. The ERT recommends Ireland to include the above information in its next inventory submission under the Kyoto Protocol.

99. During the in-country visit, the ERT was informed that the internal operational test of the registry for network connection would be completed by 9 July 2007. The initialization process was completed by 27 August 2007 and the registry is ready for full operation with the ITL. Information on the registry is not yet publicly available on the Internet.

100. The ERT was also informed on the procedures and security measures in place to minimize discrepancies, terminate transactions and correct problems, and minimize operator error. The ERT acknowledged the effort made by Ireland to put in place these procedures and security measures. The ERT gained the overall impression that Ireland attached adequate importance, and allocated adequate resources, including human resources, to the development, operation and maintenance of the registry.

101. The ERT took note of the results of the technical assessment of the national registry, including the results of standardized testing, as reported in the independent assessment report (IAR) which was forwarded to the ERT by the administrator of the international transaction log, pursuant to decision 16/CP.10 on 19 September 2007.

102. The ERT reiterates the main findings of this report, including that the registry has fulfilled all of its obligations regarding conformity with the Data Exchange Standards. These obligations include having adequate transaction procedures; adequate security measures to prevent and resolve unauthorized manipulations; and adequate measures for data storage and registry recovery. The registry is therefore deemed fully compliant with the registry requirements defined in decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding Operational Performance or Public Availability of Information prior to the operational phase.

F. Land use, land-use change and forestry parameters and election of activities

103. Table 6 shows the Party's choice of parameters for forest definition as well as elections for Article 3, paragraphs 3 and 4, activities in accordance with decision 16/CMP.1.

Table 6. Selection of LULUCF parameters

Parameters for forest definition		
Minimum tree cover	20%	
Minimum land area	0.1 ha	
Minimum tree height	5 m	
Elections for Article 3, paragraphs 3 and 4, activities		
Article 3, paragraph 3 activities	**Election**	**Accounting period**
Afforestation and reforestation	Mandatory	Commitment period
Deforestation	Mandatory	Commitment period
Article 3, paragraph 4 activities		
Forest land management	Not elected	Not applicable
Cropland management	Not elected	Not applicable
Grazing land management	Not elected	Not applicable
Revegetation	Not elected	Not applicable

104. The LULUCF parameters chosen by Ireland to define forest are within the range specified by decision 16/CMP.1 and are fully compatible with the definition of forest used by Ireland for the Food and Agriculture Organization of the United Nations (FAO) Forest Resources Assessment. In addition, Ireland has adopted the minimum width of 0.1 ha to define its forests. However, this value is lower than the spatial resolution of the satellite images to be used by the Party to identify the areas encompassing units of land under Article 3, paragraph 3, activities. This may cause problems for the national system in identifying the boundaries of such areas, as required by decision 16/CMP.1. The ERT recommends Ireland to take measures to improve the spatial resolution of the methods used for identification of these lands, taking into consideration that their tracking needs to start in 1990.

II. Conclusions and recommendations

A. Conclusions

105. The ERT concluded that the information provided by Ireland in its initial report is complete and submitted in accordance with the relevant provisions of paragraphs 5, 6, 7 and 8 of the annex to decision 13/CMP.1, section I of the annex to decision 15/CMP.1, and other relevant decisions of the CMP; that the assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol has been calculated in accordance with the annex to decision 13/CMP.1, and is consistent with the Party's reviewed and revised inventory estimates; and that the calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1.

106. Ireland has made significant improvements to its inventory since the 2005 submission, most of them in response to recommendations made by the ERT. Some major improvements include: recalculations in the energy sector to include revised energy balance data; the use of higher-tier methods in the agriculture, LULUCF and waste sectors; the reporting of LULUCF in accordance with decision 13/CP.9 for the first time; and general improvements in the completeness and transparency of the inventory.

107. Ireland's national system has been prepared in accordance with the guidelines for national systems under Article 5, paragraph 1 of the Kyoto Protocol (decision 19/CMP.1) and can perform the general and the specific functions required by these guidelines. Ireland submitted to the ERT the NAIS and information on the single national entity that is designated by the April 2007 Decision of the

Government of Ireland by which it adopted the NAIS. In its initial report, Ireland has submitted a complete set of CRF tables for the years 1990–2004 and a comprehensive NIR. The inventory covers all categories for the entire inventory time series 1990–2004 and is complete in terms of geographical coverage.

108. Based on Ireland's base year emissions (55,607,836 tonnes CO_2 equivalent, including emissions from deforestation and also the revised estimates provided in the agriculture sector) and its Kyoto Protocol target of 113 per cent, the Party calculates its assigned amount to be 314,184,272 tonnes CO_2 equivalent and its commitment period reserve to be 282,765,845 tonnes CO_2 equivalent. The ERT agrees with these figures.

109. Ireland's choice of parameters to define forest are in accordance with decision 16/CMP.1. This includes minimum tree crown cover of 20 per cent, minimum land area of 0.1 hectares and minimum tree height of 5 metres. Ireland also provides the minimum width of 20 metres to define its forests, following the IPCC good practice guidance for LULUCF. Ireland has chosen to account for Article 3, paragraph 3, activities for the entire commitment period.

B. Recommendations

110. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of Ireland's information presented in the initial report. The key recommendations[3] are that Ireland:

- Improve the transparency of the inventory by:
    - (a) Structuring the NIR according to the UNFCCC reporting guidelines;
    - (b) Including a reasonable amount of the information it presented to the ERT during the in-country visit in the NIR of its next inventory submission;
    - (c) Providing detailed explanations of emission trends in the NIR, including the identification of the main drivers underpinning the trend;
    - (d) Providing detailed descriptions of the rationale for the selection of EFs or methodologies; appropriate referencing in the NIR of country-specific methods and EFs; and detailed description of the models and model parameters used directly, or in part, in generating an emission estimate;
- Prepare formalized procedures within the inventory team for the recording and prioritization of future improvements to the inventory, including a procedure for engaging key data providers in this process;
- Include in its next inventory submission under the Kyoto Protocol information on the National Atmospheric Inventory System in all its components.

C. Questions of implementation

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

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

Annex I

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

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UNFCCC secretariat. Ireland: Independent assessment report of the national registry of Ireland. Reg_IAR__IE_2007_1. Will be available at <www.unfccc.int>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Michael McGettigan, Mr. Paul Duffy and Mr. Bernard Hyde, all from the Irish Environmental Protection Agency (EPA), were received by the ERT, along with additional material provided during the course of the in-country visit. The following information was provided.

Black K and Farrell E (eds). 2006. *Carbon Sequestration and Irish Forest Ecosystems*. Coford, Dublin. 76 pp.

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Changes in Agriculture 1990–2004.doc (resubmission).

Climate Change, Emissions of Industrial Greenhouse Gases. EPA: Environmental Research Technological Development and Innovation (ERTDI).

Climate Change, Inverse Modelling Assessment of Greenhouse Gas Emissions from Ireland. EPA: ERTDI.

Climate Change: Development of Emissions Factors for the Irish Cattle Herd. Special Report, ERDTI Report Series No. 46.

Compiling Emission Inventories of HFCs, PFCs and SF_6 for inclusion in Ireland's submission to the EU under Decision 280/2004/EC under the United Nations Framework Convention on Climate Change. Final Report, December 2005. AEA Technology Environment.

Crowley AM, Keane MG, Agabriel J and O'Mara F. 2002. Prediction of net energy requirements of beef cattle. Conference paper, p. 19.

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Yan T, Agnew, RE, Gordon FJ and Porter MG. 2000. Prediction of methane energy output in dairy and beef cattle offered grass silage-based diets. *Livestock Production Science* 64:253-263.

Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CMP	Conference of the Parties serving as the Meeting of the Parties
CO_2	carbon dioxide
CO_2 eq.	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
EC	European Community
EF	emission factor
EIT	economy in transition
EPA	Environmental Protection Agency
ERT	expert review team
ETS	emissions trading scheme
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
IEF	implied emission factor
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)
MoU	memorandum of understanding
MSW	municipal solid waste
Mt	million tonnes
Mtoe	millions of tonnes of oil equivalent
N_2O	nitrous oxide
NA	not applicable
NAIS	National Atmospheric Inventory System
NE	not estimated
NH_3	ammmonia
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
OEA	Office of Environmental Assessment
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
SF_6	sulphur hexafluoride
SO_2	sulphur dioxide
TEAGASC	Irish Agriculture and Food Development Authority
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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