



---

**COMPLIANCE COMMITTEE**

**CC/ERT/ARR/2010/4  
27 January 2010**

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

**Note by the secretariat**

The report of the individual review of the annual submission of Iceland submitted in 2009 was published on 21 January 2010. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2009/ISL, 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**

---



**Framework Convention  
on Climate Change**

Distr.  
GENERAL

FCCC/ARR/2009/ISL  
21 January 2010

ENGLISH ONLY

---

**Report of the individual review of the annual submission of Iceland  
submitted in 2009\***

---

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

## CONTENTS

	<i>Paragraphs</i>	<i>Page</i>
I. OVERVIEW .....	1–34	4
A. Introduction.....	1–2	4
B. Emission profiles and trends.....	3–4	4
C. Annual submission and other sources of information .....	5–10	6
D. Main findings.....	11–17	7
E. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management.....	18–29	8
F. Follow-up to previous reviews .....	30	10
G. Areas for further improvement .....	31–34	10
II. ENERGY .....	35–48	11
A. Sector overview .....	35–39	11
B. Reference and sectoral approaches.....	40–44	12
C. Key categories .....	45–47	13
D. Non-key categories .....	48	13
III. INDUSTRIAL PROCESSES AND SOLVENT AND OTHER PRODUCT USE .....	49–57	13
A. Sector overview .....	49–53	13
B. Key categories .....	54	14
C. Non-key categories .....	55	14
D. Information provided under decision 14/CP.7.....	56–57	15
IV. AGRICULTURE .....	58–65	15
A. Sector overview .....	58–60	15
B. Key categories .....	61–64	15
C. Non-key categories .....	65	16
V. LAND USE, LAND-USE CHANGE AND FORESTRY .....	66–78	16
A. Sector overview .....	66–73	16
B. Key categories .....	74–78	18

		<i>Paragraphs</i>	<i>Page</i>
VI.	WASTE .....	79–85	19
	A. Sector overview .....	79–81	19
	B. Key categories .....	82	19
	C. Non-key categories .....	83–85	19
VII.	SUPPLEMENTARY INFORMATION REQUIRED UNDER ARTICLE 7, PARAGRAPH 1, OF THE KYOTO PROTOCOL .....	86–91	20
	A. Information on Kyoto Protocol units .....	86–89	20
	B. Changes to the national system .....	90	20
	C. Changes to the national registry .....	91	20
VIII.	CONCLUSIONS AND RECOMMENDATIONS .....	92–99	21
IX.	QUESTIONS OF IMPLEMENTATION .....	100	22
<u>Annexes</u>			
I.	Documents and information used during the review .....		23
II.	Acronyms and abbreviations.....		24

## I. Overview

### A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Iceland, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 14 to 19 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Katarina Mareckova, (European Community); energy – Mr. Christo Christov (Bulgaria), Mr. Takeshi Enoki (Japan) and Mr. Norbert Nziramasanga (Zimbabwe); industrial processes – Mr. Riccardo De Laurentis (Italy) and Ms. Valentina Idrissova (Kazakhstan); agriculture – Mr. Jorge Alvarez (Peru) and Ms. Anna Romanovskaya (Russian Federation); land use, land-use change and forestry (LULUCF) – Mr. Emil Cienciala (Czech Republic) and Mr. Xiaoquan Zhang (China); and waste – Ms. Medea Inashvili (Georgia) and Mr. Seungdo Kim (Republic of Korea). Ms. Romanovskaya and Mr. Zhang were the lead reviewers. The review was coordinated by Ms. Ruta Bubniene (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 Iceland, 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 greenhouse gas (GHG) in Iceland was carbon dioxide (CO<sub>2</sub>), accounting for 73.4 per cent of total GHG emissions<sup>1</sup> expressed in CO<sub>2</sub> eq, followed by methane (CH<sub>4</sub>) (10.8 per cent) and nitrous oxide (N<sub>2</sub>O) (8 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 7.8 per cent of the overall GHG emissions in the country. The energy sector accounted for 49.6 per cent of the total GHG emissions, followed by the industrial processes sector (33.2 per cent), agriculture sector (11.9 per cent), waste sector (5.1 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 4,482.2 Gg CO<sub>2</sub> eq and increased by 31.8 per cent between the base year<sup>2</sup> and 2007. Trends seem to be reasonable.

4. Tables 1 and 2 show 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.

---

<sup>1</sup> In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

<sup>2</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

**Table 1. Total greenhouse gas emissions by gas, 1990–2007<sup>a</sup>**

Greenhouse gas	Gg CO <sub>2</sub> eq							Change base year–2007 (%)
	Base year <sup>b</sup>	1990	1995	2000	2005	2006	2007	
CO <sub>2</sub>	2 159.89	2 159.89	2 312.64	2 761.15	2 863.56	3 037.60	3 288.66	52.3
CH <sub>4</sub>	451.98	451.98	448.79	454.99	441.91	466.77	484.43	7.2
N <sub>2</sub> O	367.73	367.73	346.91	356.71	310.10	338.11	358.62	–2.5
HFCs	NA, NE, NO	NA, NE, NO	4.36	27.44	49.38	52.97	59.36	NA
PFCs	419.63	419.63	58.84	127.16	26.09	333.22	281.28	–33.0
SF <sub>6</sub>	1.05	1.05	1.38	2.97	3.39	6.98	9.86	842.1

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

<sup>a</sup> “Total greenhouse gas emissions” includes emissions from Annex A sources only (and excludes emissions/removals from the LULUCF sector).

<sup>b</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

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

Sector	Gg CO <sub>2</sub> eq							Change base year–2007 (%)
	Base year <sup>a</sup>	1990	1995	2000	2005	2006	2007	
Energy	1 770.96	1 770.96	1 905.50	2 039.27	2 088.18	2 165.74	2 222.01	25.5
Industrial processes	862.97	862.97	535.07	946.04	917.68	1 335.09	1 485.95	72.2
Solvent and other product use	13.94	13.94	14.09	14.89	16.18	9.36	12.24	–12.2
Agriculture	572.84	572.84	524.34	529.61	478.79	512.04	534.01	–6.8
LULUCF	NA	1 505.55	1 449.91	1 354.30	1 250.51	1 226.30	1 211.86	NA
Waste	179.57	179.57	193.93	200.61	193.58	213.42	227.99	27.0
Other	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total (with LULUCF)</b>	NA	4 905.82	4 622.84	5 084.73	4 944.93	5 461.95	5 694.06	NA
<b>Total (without LULUCF)</b>	3 400.28	3 400.28	3 172.94	3 730.43	3 694.42	4 235.65	4 482.20	31.8

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

<sup>a</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. 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 27 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007. Iceland resubmitted its CRF tables on 8 May 2009 and submitted a national inventory report (NIR) on 26 May 2009. Iceland submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on changes to the national system and to the national registry. The standard electronic format (SEF) tables were not submitted. In response to the previous review stage, Iceland noted that the SEF tables were not submitted because its Kyoto Protocol National Registry has not yet been connected with the production environment of the international transaction log (ITL) and the Party did not transfer or acquire any Kyoto Protocol units in 2008. 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 addition, the expert review team (ERT) used the standard independent assessment report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units and on the national registry.<sup>3</sup>

7. During the review, Iceland provided the ERT with additional information. The documents concerned are not part of the annual submission but are in some 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

8. The inventory covers all main source and sink categories for the period 1990–2007 and is complete in terms of years and geographic coverage. The completeness of reporting has increased since the previous submission; for example, estimation of actual emissions of HFCs and SF<sub>6</sub>. However, there are still gaps in the reporting of categories, in particular in the energy sector (CO<sub>2</sub> and CH<sub>4</sub> emissions from distribution of oil products, and CO<sub>2</sub> and N<sub>2</sub>O emissions from the liquefied petroleum gas (LPG) used (see para. 38)), in the industrial processes sector (PFC emissions from refrigeration and air conditioning equipment (see para. 54)), in the LULUCF sector (carbon stock change for natural birch forests (see para. 74) and in the waste sector (CH<sub>4</sub> and N<sub>2</sub>O emissions from sludge from domestic and commercial wastewater and industrial wastewater (see para. 81)).

9. The ERT recommends that Iceland improve the completeness of its next annual submission, especially for those categories that are known to occur within the Party and for which methodologies to estimate emissions are available in the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the Intergovernmental Panel on Climate Change (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 emissions data for the first time for a given category, ensure that emissions data are provided for the entire inventory time series and that the choice of methods and EFs are clearly explained in the NIR. In response to the questions raised during the review, Iceland expressed its intention to address completeness in its next annual submission.

---

<sup>3</sup> The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5 (a), 6 (c) and 6 (k)), under the auspices of the 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 tables and their 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.



10. The ERT encourages Iceland to explore the approaches available in scientific literature to estimate emissions for categories for which there are no methodologies prescribed in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, with a view to enhancing further, to the extent possible, the completeness and accuracy of its inventory.

#### **D. Main findings**

11. The inventory is 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 noted that Iceland applies tier 1 methods and default parameters for many key categories, which is not good practice. The 2009 inventory submission shows improvement in the major issues and covers most sectors and categories (see paras. 24 and 28).

12. The Party has submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with section I of the annex to decision 15/CMP.1. Iceland did not submit the SEF tables, as the national registry is not connected with the production environment of the ITL, and Iceland has not yet transferred any Kyoto Protocol units. Information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol and information on the calculation of the commitment period reserve have not been provided in the NIR. In response to SIAR Part I, Iceland reported that its commitment period reserve remains 16,671,462 t CO<sub>2</sub> eq, calculated as 90 per cent of Iceland's assigned amount.

13. Iceland has not reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1. According to the SIAR no transactions happened, as the registry concerned is not connected with the ITL.

14. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1; however, according to the initial review report (IRR)<sup>4</sup> some mandatory elements of the national system were not presented fully in line with Article 5, paragraph 1, of the Kyoto Protocol. Iceland did not provide information on changes to its archiving system in the NIR of its 2009 submission.

15. 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 decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

16. The ERT encourages Iceland 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.<sup>5</sup>

17. In the course of the review, the ERT formulated a number of recommendations relating to the completeness (see paras. 38, 53, 76 74 and 99) and transparency (see paras. 28, 33 (b), 48, 60 and 99) of the annual submission.

---

<sup>4</sup> FCCC/IRR/2007/ISL.

<sup>5</sup> <[http://unfccc.int/files/national\\_reports/annex\\_i\\_ghg\\_inventories/reporting\\_requirements/application/pdf/annotated\\_nir\\_outline.pdf](http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf)>.

## **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. According to the NIR the national system is unchanged compared to the description given in the NIR of the 2008 submission. The ERT concluded that the national system continued to perform its required functions.

19. The NIR described the national system for the preparation of the inventory. The Environment Agency of Iceland (EA), an agency under the Ministry for the Environment (MFE), has overall responsibility for the national inventory. The EA compiles and maintains the GHG emission inventory, except for LULUCF which is compiled by the Agricultural University of Iceland (AUI). The EA reports to the MFE, which approves the inventory and submits it to the secretariat of the UNFCCC. Other organizations such as Statistics Iceland, the National Energy Authority (NEA), the Iceland Association of Farmers, the Soil Conservation Service and the Icelandic Forest Service are also involved in the preparation of the inventory, mainly by providing the required background data. Information on responsibilities related to the system of archiving the data is not provided in the NIR.

### 2. Inventory planning

20. The ERT welcomes information that in 2008 Iceland established a coordinating team consisting of representatives from the organizations involved in inventory preparation. Its main roles are to plan the inventory cycle, review the inventory before submission to the secretariat and propose inventory improvements. Iceland provided summary information on planned inventory improvements in the NIR.

21. The ERT recommends that Iceland elaborate a plan for improving the national system for inventory preparation and management, particularly the archiving system, documentation management and quality assurance/quality control (QA/QC) implementation and provide relevant information in its next annual submission.

### 3. Inventory preparation

#### Key categories

22. Iceland has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2009 submission. The key category analysis performed by the Party and that performed by the secretariat<sup>6</sup> produced similar results. Iceland has included the LULUCF sector in its key category analysis which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

#### Uncertainties

23. Uncertainty evaluation of the inventory was not prepared for this round of reporting. A preliminary estimate of the quantitative uncertainty (tier 1) of the Icelandic emission inventory was prepared last year. The uncertainty estimate revealed that the total uncertainty of the Icelandic 2008 submission (excluding LULUCF) is 7.4 per cent. The results of last year's uncertainty estimate are reported

---

<sup>6</sup> The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the 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.

in annex II to the NIR. The ERT encourages Iceland to follow the recommendations of the previous review and provide an update of uncertainty estimates for 2008 data and include LULUCF in the uncertainty analyses in its next annual submission.

#### Recalculations and time-series consistency

24. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by Iceland of the years 1990–2006 (table 8(a)) have been undertaken to take into account: improved activity data (AD) used for the estimation of emissions from a number of categories in the energy sector, an updated net calorific value (NCV) used in the energy (for steam coal) and the industrial processes sectors; estimation of the destruction of fluorinated gas reported using an updated method; inclusion of emissions from composting activities and the improvement of AD for landfills in the waste sector. The effect of the recalculations on the trends is minor: an increase in total GHG emissions in 1990 (0.4 per cent) and an increase in 2006 (1.7 per cent).

25. The ERT noted significant recalculations in data from 1990 in the LULUCF sector, particularly in grassland and other, where recalculations resulted in a decrease of GHG emissions by 18.9 per cent and 100 per cent, respectively. In 2006, major recalculations and their corresponding effects are as follows: energy industries (decrease by 54.4 per cent); category other (LULUCF) (decrease by 100 per cent), forest land (decrease by 45.3 per cent), wetlands (decrease by 35.2 per cent) and settlements (increase by 100 per cent).

26. The explanations for recalculations were not provided by Iceland in the CRF (table 8(b)), but limited explanations were provided in the NIR. The ERT recommends that Iceland provide sufficient information on recalculations in all sectors in its next annual submission.

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

27. Information on the QA/QC plan and its implementation in Iceland's NIR is general and rather limited. The NIR only reports that a QA/QC plan is elaborated and implemented and that Iceland is preparing a quality manual in line with International Organization for Standardization standard 9001. Based on the limited information provided, the ERT could not assess the scope or the level of implementation of the QA/QC plan. The ERT recommends that Iceland provide an elaborated QA/QC plan, including planned improvements (e.g. independent review), and sufficient information on QA/QC implementation procedures in its next annual submission.

#### Transparency

28. The NIR and CRF tables allow the ERT to generally assess the emission factors (EFs), AD and methods used for estimating emissions and also allow them to partly analyse the recalculations made. The ERT acknowledges the improvements made since the last review, mainly in the industrial processes and the LULUCF sectors. However, the ERT noted a number of areas where transparency should be further improved. This includes sufficient information on methods and underlying assumptions for parameters disaggregated at the category level for all sectors, complete information on recalculations and on the implementation of sector-specific QA/QC procedures.

#### 4. Inventory management

29. There is no information on Iceland's archiving system provided in the NIR of the 2009 annual submission. According to the initial review report<sup>7</sup> Iceland has an archiving system at the EA, which includes the archiving of disaggregated EFs, AD and additional background information. The EA is

---

<sup>7</sup> FCCC/ARR/2006/ISL.

responsible for managing the archiving system. Information on agriculture and LULUCF is archived at the AUI; the data on geothermal activities are archived at the NEA. Iceland did not identify any changes to the archiving system since the initial review in its NIR. The ERT encourages Iceland to improve its archiving system by establishing a centralized archive in line with the requirements of the national system, decision 19/CMP.1 and as recommended during the initial review. The ERT also recommends that Iceland provide sufficient information on the archiving procedures and the system in its next annual submission.

## **F. Follow-up to previous reviews**

30. Following the last review, Iceland implemented a number of improvements to its inventory which includes estimation of actual emissions of HFCs and SF<sub>6</sub>, improvement to the AD used in the LULUCF sector (a geographical land-use database has been established) and more accurate allocation of fuels in the energy sector. In addition, Iceland improved its key category analysis by including the LULUCF sector. Iceland also provided more detailed information on facilities reported under decision 14/CP.7. The ERT commends Iceland for these improvements.

## **G. Areas for further improvement**

### **1. Identified by the Party**

31. In its response to the recommendations of the previous reviews the NIR identifies several areas for improvement, in particular improvements to estimates in the LULUCF, agriculture and energy sectors. Iceland is planning to:

- (a) Prepare a national energy balance. It is expected that the NEA will prepare a national energy balance annually starting from the 2010 annual submission and will submit it to the EA in accordance with the formal agreement between the EA and the NEA;
- (b) Consider options for the division of land use into subcategories and improve time and spatial resolution of the land-use information; it is expected that the AUI will implement this task;
- (c) Improve estimates of forest land area and carbon stock changes using the results of the ongoing national forest inventory;
- (d) Improve the reporting of revegetation, as improved data on carbon stock changes and area of revegetated land is expected to become available in the near future as a result of the ongoing national inventory on revegetation areas (NIRA).

32. Iceland is also considering further improvements such as: improving methodologies to estimate emissions from road transportation; developing country-specific EFs for enteric fermentation; revising country-specific nitrogen excretion (N<sub>ex</sub>) factors; improving QA/QC for LULUCF; improving the time series for different land-use categories and estimates of past and present land-use changes; revising LULUCF emissions and removal parameters and aiming to apply higher tiers, estimating emissions and removals that were previously not estimated (“NE”) and the disaggregation of components presently reported as aggregated emissions.

### **2. Identified by the expert review team**

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

- (a) Improve the archiving system and provide sufficient information on the system and archiving procedures;

- (b) Improve transparency by providing sufficient details on the methods and rationale used for the selection of parameters and by providing sufficient information on recalculations for all sectors;
- (c) Consider options to improve the completeness of the GHG inventory by estimating emissions for subcategories currently reported as “NE” and for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance;
- (d) Collect country-specific data that would allow higher tiers to be applied for key categories, in accordance with the IPCC good practice guidance and provide an explanation as to why the default EF is appropriate for the national circumstances for the key categories for which the Party continues to use a tier 1 method;
- (e) Further improve the implementation of QA/QC procedures and consider updating the QA/QC plan;
- (f) Update the uncertainty estimates, including the LULUCF sector and the most recent inventory data.

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

## **II. Energy**

### **A. Sector overview**

35. The energy sector is the main sector in the GHG inventory of Iceland. In 2007, emissions from the energy sector amounted to 2,222.01 Gg CO<sub>2</sub> eq, or 49.6 per cent of total GHG emissions. Since 1990, emissions have increased by 25.5 per cent. The key driver for the rise in emissions is the increase in fuel consumption in transport, and manufacturing industries and construction. Within the sector, 45.8 per cent of the emissions were from transport, followed by 26.9 per cent from other sectors, 19.2 per cent from manufacturing industries and construction, and 6.8 per cent from fugitive emissions. Energy industries accounted for 1.3 per cent.

36. Recalculations were performed for the years 1990–2006 in the 2009 inventory submission, resulting in an overall increase in estimated emissions by 0.06 per cent in 2006. These recalculations are indicated to have been motivated by a revision of energy statistics conducted by the NEA and EA. All categories have been recalculated due to changes in fuel allocation. In addition, revisions were made for the NCV of coal consumed in the cement industry, CH<sub>4</sub> emissions from liquefied petroleum gas (LPG), and the NCV of and carbon content in petroleum coke. The ERT recommends that Iceland continue to improve its data quality and to document the QA/QC methods applied in the NIR. The ERT also recommends that Iceland address issues identified by previous reviews, such as the collection of country-specific fuel data.

37. Iceland mostly used the IPCC tier 1 methodologies and default parameters to estimate emissions in the energy sector. The NCV for steam coal and emissions from geothermal power was estimated using country-specific data. The ERT recommends that Iceland collect country-specific data and apply higher tiers for key categories in accordance with the IPCC good practice guidance. For example, Iceland may consider using the data from the Green Accounts, which present bottom-up data collected from industry, to revise fuel parameters.

38. The inventory is generally complete. Emissions from some categories were reported as “NE”, such as CO<sub>2</sub> and CH<sub>4</sub> emissions from the distribution of oil products. In addition, distribution of natural gas was reported as not occurring (“NO”); however, LPG is used in the country and thus may be estimated and

reported as gaseous fuels. The ERT noted that default CO<sub>2</sub> and N<sub>2</sub>O EFs for fugitive emissions from forms of transport that use LPG (to be reported in CRF table 1.b.2.b. natural gas iv. Distribution) is provided in table 2.16 of the IPCC good practice guidance, page 2.86. In response to questions raised by the ERT, Iceland indicated that fugitive emissions from oil and natural gas transport are minor and hence were “NE”. The ERT recommends that Iceland investigate how much fugitive emissions were emitted from these, even minor sources, and include all GHGs in the next annual submission.

39. There is a recommendation in the initial review that Iceland strengthen its national system through formal agreements between the EA and the NEA; however, NEA has yet to provide the EA with the energy balance in accordance with the agreement. The absence of the comparison analysis of the AD used for the compilation of the inventory and the energy balance resulted in differences between the data submitted to the International Energy Agency (IEA) and data used for the inventory compilation. The ERT noted inter-annual fluctuations of emissions and implied emission factors (IEFs) for a number of categories. During the review, Iceland indicated its intention to encourage the NEA to provide the energy balance. The ERT strongly recommends that Iceland strengthen its institutional arrangements to ensure the timely provision of the necessary fuel data for inventory compiling.

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

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

40. CO<sub>2</sub> emissions from fuel combustion were estimated using reference and sectoral approaches. The difference between emissions is large for all of the time series, being 14.2 per cent larger in 2007. This indicates an apparent inconsistency in the data used. The NIR did not explain this difference but indicated that a comparison of the reference and sectoral approach would be included in the next annual submission. The ERT reiterates the recommendation from the previous reviews that Iceland improve data collection for the energy sector.

41. The apparent fuel consumption reported in the CRF tables is 2 per cent lower than IEA data, mainly due to differences in international bunkers and stock changes. During the review, in response to a question raised by the ERT, Iceland noted that some harmonization of the energy statistics had taken place but no report was available on the subject. The ERT recommends that Iceland continue to reconcile CRF data with IEA data and document all improvements made in its next annual submission.

### **2. International bunker fuels**

42. For international aviation, discrepancies higher than 10 per cent occurred in 1991 and 1995 with jet kerosene quantities in the CRF tables being larger than IEA data. For international marine bunkers, the quantity of gas/diesel oil in the CRF data is larger than IEA data for most years except for 2003–2005, when they were significantly smaller. The ERT learned that Iceland is planning to explain discrepancies between the inventory data and the IEA data but no follow-up information is provided in the NIR. The ERT reiterates the recommendation of the previous review that Iceland provide information on the method for determining the split between international and domestic fuel use in the NIRs of its future annual submissions.

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

43. Iceland presented non-energy use of fuels in CRF table 1.A (d) but in the NIR did not offer a transparent explanation of how these fuel applications were analysed to compute the carbon stored. The ERT recommends that Iceland provide transparent documentation of this issue in its next annual submission.

#### 4. Country-specific issues

44. Geothermal energy is recognized as the major source of energy in Iceland. It is appreciated that Iceland continued to estimate CO<sub>2</sub> emissions from geothermal wells in the absence of an approved IPCC methodology. The ERT encourages Iceland to provide a detailed description of the method applied and the related AD in its next annual submission.

#### C. Key categories

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

45. The CO<sub>2</sub> IEF for liquid fuels from the commercial/institutional category has a fluctuating trend. The IEF has increased by 27.5 per cent between 1990 and 2007. In addition, the values of IEFs for 1990 (52.15 t CO<sub>2</sub>/TJ), 1994 (39.32 t CO<sub>2</sub>/TJ) and 2006 (37.66 t CO<sub>2</sub>/TJ) are the lowest among all reporting Parties (37.66 t/TJ – 95.57 t/TJ) and far below the IPCC default range (63.07–100.83 t/TJ). The ERT recommends that Iceland verify the value of the IEF, the inter-annual variations and the overall trend, and provide an explanation of this in the NIR of its next annual submission.

##### 2. Road transportation: liquid – CO<sub>2</sub> and N<sub>2</sub>O

46. As identified in previous reviews, the CO<sub>2</sub> IEF for gasoline (68.61 t/TJ) for all years of the time series is below the IPCC default value (73 t/TJ), and is one of the lowest among all reporting Parties (66.79 t/TJ–75.98 t/TJ). An EF of 3,070 g-CO<sub>2</sub>/kg fuel was applied for estimating CO<sub>2</sub> emissions from gasoline instead of the default value of 3,180 g-CO<sub>2</sub>/kg fuel, as provided in table 1-36 of the Revised 1996 IPCC Guidelines, resulting in the low IEF. The CO<sub>2</sub> EF of 3,180 g-CO<sub>2</sub>/kg fuel was applied for estimating CO<sub>2</sub> emissions from diesel instead of 3,140 g-CO<sub>2</sub>/kg fuel as provided in table 1-36 of the Revised 1996 IPCC Guidelines. The ERT recommends that Iceland make efforts to estimate country-specific EFs or substantiate the use of the selected value and that the Party choose the appropriate CO<sub>2</sub> EFs for road transportation in its next annual submission.

47. The N<sub>2</sub>O IEF for gasoline has increased by 815.5 per cent between 1990 and 2007, and there are large inter-annual changes: 204 per cent in 1994–1995, 67.3 per cent in 1996–1997 and 50.1 per cent in 1998–1999. The NIR states that the proportion of passenger cars with three-way catalysts has steadily increased since 1995 when they became mandatory in all cars, however, this cannot fully explain the inter-annual changes. The ERT recommends that Iceland include a discussion of the drivers behind the emission trend and the assumptions made in the NIR of its next annual submission.

#### D. Non-key categories

##### Stationary combustion: other fuels, biomass – CO<sub>2</sub>

48. Emissions from the incineration of municipal solid waste in heat plants are estimated in energy industries. CO<sub>2</sub> emissions from this activity are included in the NIR but without sufficient detail to understand whether biomass has been taken into consideration. The ERT recommends that Iceland improve the transparency of the estimation of emissions from the combustion of waste by including a detailed description of the characteristics of types of waste 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 1,485.95 Gg CO<sub>2</sub> eq, or 33.2 per cent of total GHG emissions and emissions from the solvent and other product use sector amounted to 12.24 Gg CO<sub>2</sub> eq, or 0.3 per cent of total GHG emissions. Since 1990, emissions have increased by

72.2 per cent in the industrial processes sector and decreased by 12.2 per cent in the solvent and other product use sector. The key driver for the rise in emissions in the industrial processes sector is the expansion of energy-intensive industry, in particular CO<sub>2</sub> and PFC emissions from aluminium production and CO<sub>2</sub> emissions from ferroalloys. Within the industrial processes sector, 91 per cent of the emissions were from metal production, followed by 4.7 per cent from consumption of halocarbons and SF<sub>6</sub>, and 4.3 per cent from mineral products.

50. Iceland estimated emissions from industrial processes and solvent and other product use according to the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. However, some inconsistencies among different parts of the NIR and between the NIR and the CRF tables have been identified, especially for the reporting of CO<sub>2</sub> emissions from the single projects. In its 2009 submission, Iceland estimated actual HFC and SF<sub>6</sub> emissions for the consumption of halocarbons and SF<sub>6</sub> that were not estimated in the previous submission. The ERT encourages Iceland to assess if PFC emissions from the consumption of halocarbons and SF<sub>6</sub>, and in particular from refrigeration and air conditioning equipment, occur and to estimate them in its next annual submission.

51. QA/QC activities for this sector were not explicitly reported in the NIR. Detailed information on methodology and data and parameters collection, which often referred to single plants, was provided in the NIR for each category. Considering that in Iceland industrial processes categories often relate to only a single industrial facility and being aware of the large contribution of these categories to sectoral and national emissions, the ERT recommends that Iceland implement and document QA/QC procedures in its next annual submission, especially for PFC and CO<sub>2</sub> emissions from aluminium and cement production.

52. Recalculation reduced GHG emissions in the sector by 0.4 per cent in the base year and 0.5 per cent in 2006, mainly owing to the inclusion of actual HFC and SF<sub>6</sub> emissions from the consumption of halocarbons and SF<sub>6</sub> instead of potential emissions.

53. Minor categories are reported as "NE", including CO<sub>2</sub> emissions from road paving with asphalt and from food and drink production, CH<sub>4</sub> and N<sub>2</sub>O emissions from silicon and mineral wool production, CH<sub>4</sub> emissions from fertilizer and aluminium production, N<sub>2</sub>O emissions from fire extinguishers and aerosol cans, and HFC and PFC emissions from electrical equipment. The ERT recommends that Iceland assess and estimate emissions for which estimation methods are available in the Revised 1996 IPCC Guidelines and/or in the IPCC good practice guidance in its next annual submission.

## **B. Key categories**

### Consumption of halocarbons and SF<sub>6</sub> and HFCs

54. In response to the previous review, Iceland estimated actual HFC and SF<sub>6</sub> emissions from this key category. The ERT commends the Party for this effort. The emissions of perfluorocarbon-218 (PFC-218) from refrigeration and air conditioning equipment are reported as "NE". The ERT recommends that Iceland assess whether these emissions from refrigeration and air conditioning equipment occur, and if so, recommends that the Party estimate and report them in its next annual submission.

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

### Solvent and other product use – CO<sub>2</sub>

55. The ERT encourages Iceland to provide more transparent information in the NIR with regard to methodologies, emission estimates, including AD and EFs used, emission trends and inter-annual variations.



#### **D. Information provided under decision 14/CP.7**

56. Iceland has provided information (in annex VI to the NIR) on a voluntary basis in order to fulfil the requirements of decision 14/CP.7 concerning the impact of single projects on emissions in the commitment period. Iceland identified three single projects under ferroalloy and aluminium production. Following the recommendation of the previous review, Iceland has provided additional detailed information about single projects, as defined by decision 14/CP.7, such as EFs, the extent of GHG emission reductions resulting from the use of renewable energy, and how best available technologies and best environmental practices were applied. In addition, Iceland has also provided clarification for the same projects defined as expansions on which part is considered an expansion and which part already existed in and remains part of the original facility. During the review process, minor inconsistencies were identified and clarified with Iceland. Transparency could be further improved in the reporting of the information needed to fulfil the requirements in paragraph 2 (b) of decision 14/CP.7 (renewable energy used resulting in a reduction in GHG emissions per unit of production).

57. The ERT encourages Iceland to compare the average EFs for producing electricity in the projects, in grams of CO<sub>2</sub> per kWh produced, with different fuel-powered power plants. The average EF could also be compared with the average EFs from electricity production in different countries, including Iceland, which in 2007, as noted by the Party during the centralized review, was equal to 15.5 g/kWh. Furthermore, the ERT suggests that Iceland report production ADs and EFs, and average EFs for each line of each single project in a more structured way, to facilitate the review process and reduce the risk of inconsistencies in reporting data.

### **IV. Agriculture**

#### **A. Sector overview**

58. In 2007, emissions from the agriculture sector amounted to 534.01 Gg CO<sub>2</sub> eq, or 11.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 6.8 per cent. The key driver for the fall in emissions is the decreasing number of livestock. Nevertheless, since 2005 emissions have risen due to the increased use of synthetic fertilizer. Within the sector, 45.8 per cent of the emissions were from agricultural soils, followed by 44.8 per cent from enteric fermentation and 9.3 per cent from manure management.

59. Emissions in most of the categories and gases were estimated using the IPCC tier 1 method, including the key categories that used default EFs from similar Parties. No QA/QC procedures have been implemented for this sector. The ERT recommends that Iceland use higher tier methods and country-specific EFs to estimate emissions from the key categories, develop and implement a complete QA/QC procedure and conduct uncertainty analysis for the latest inventory year in its next annual submission.

60. The transparency of reporting has slightly improved due to an explanation of the differences between the data sources used for animal population. The ERT noted from the CRF tables that emissions estimates have been revised (e.g. for agricultural soils) for the entire time series; however, the NIR did not describe this. The ERT recommends that Iceland provide a description of the recalculations, if any occur, in its next annual submission.

#### **B. Key categories**

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

61. Iceland used an IPCC tier 1 method and a default EF to estimate CH<sub>4</sub> emissions from enteric fermentation for dairy cattle. As identified by the previous ERT, due to the use of the default EF, emissions are likely to be overestimated because the average milk production per head of cattle in Iceland was found to be higher than criteria for the IPCC default EF (5,500 litres/head/year). Iceland stated in its NIR that all the

data required for a higher tier method are available at the AUI. The ERT recommends that Iceland use a tier 2 method for enteric fermentation for dairy cattle and other cattle in its next annual submission.

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

62. The country-specific N excretion rate used for dairy cattle, (60 kg N/head/year) was derived based on data from 1991 and is lower than the default value (70 kg N/head/year) in the Revised 1996 IPCC Guidelines for Western Europe and is the lowest value used by all Parties. Based on the feeding and productivity information available in the country, it seems that N<sub>2</sub>O emissions from the manure management of dairy cattle are underestimated. The ERT recommends that Iceland reconsider the N<sub>ex</sub> rate in its next annual submission.

## 3. Direct emissions from agricultural soils – N<sub>2</sub>O

63. Direct emissions from agricultural soils of crop residues covered only potatoes and barley crops. According to national statistics other crop production does exist in Iceland. The ERT recommends that Iceland review the national information and demonstrate that only potatoes and barley residuals are used as fertilizer or estimate and report N<sub>2</sub>O emissions from all crops in its next annual submission.

64. N<sub>2</sub>O emissions from drained cropland and grassland were incorrectly reported as part of an aggregate number under wetland converted to grassland in the LULUCF sector. The default EF value for peat extraction (1.8 kg N<sub>2</sub>O-N ha<sup>-1</sup>) was used, which is much lower than the default value for drained cropland and grassland (8 kg N<sub>2</sub>O-N ha<sup>-1</sup>). The ERT recommends that Iceland, in its next annual submission, reconsider the default value and report the N<sub>2</sub>O emissions from drained cropland and grassland in the agriculture sector following 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).

## C. Non-key categories

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

65. Iceland estimates CH<sub>4</sub> emissions from manure management using the IPCC tier 1 method and default EFs for Western Europe, cool climate region for major animals and for fur animals the Party uses an EF from a Party with similar climate conditions (Norway). As indicated in the NIR, using the IPCC default values is likely to overestimate CH<sub>4</sub> emissions due to smaller numbers of domestic cows, horses and sheep in Iceland compared to other European countries. The ERT encourages Iceland to use country-specific EFs in its next annual submission.

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

### A. Sector overview

66. In 2007, the emissions from the LULUCF sector amounted to 1,211.86 Gg CO<sub>2</sub> eq. Since 1990, net emissions decreased by 19.5 per cent. The key driver for the fall in emissions was the increased removals in forest land and other land converted to grassland due to revegetation. Within the sector, 934.50 Gg CO<sub>2</sub> eq emissions were from grassland, followed by 322.43 Gg CO<sub>2</sub> eq from N<sub>2</sub>O emissions from wetland converted to grassland, reported under the category other (CRF table 5.G). Emissions were offset by 80.04 Gg CO<sub>2</sub> eq removals from forest land.

67. GHG emissions by sources and removals by sinks have been reported for forest land remaining forest land, and land-use conversions to forest land, grassland, wetland and settlements. Emissions from organic soils were reported as an aggregate number under land converted to grassland. Other land-use categories were reported as “NE” and “NO”. For the purpose of LULUCF reporting, land use and land-use

change categories were determined based on the newly established Icelandic Geographic Land use Database (IGLUD) and AD on afforestation and deforestation from Icelandic Forest Research (IFR) and on revegetation from the Soil Conservation Service of Iceland (SCSI), and were well documented in the 2009 submission. IPCC higher tier (tier 2/3) methods and country-specific parameters were used for the estimate of major emissions by sources and removals by sinks reported.

68. All lands being revegetated were reported under other land converted to grassland although some areas might previously have been classified as grassland. Cropland and settlements were not subcategorized. Noting that Iceland is continuing to improve the IGLUD, including updating and improving satellite images, geographic information systems (GIS) maps and field surveys, the ERT recommends that Iceland improve the subcategorization of grassland and wetland, and further subcategorize the categories cropland and settlements in its next annual submission.

69. CO<sub>2</sub> and N<sub>2</sub>O emissions from all drained organic soils except those under forest land were estimated and reported as an aggregate number under wetland converted to grassland and the category other, respectively. Carbon stock changes in mineral soils of grassland, the largest managed land-use category in Iceland, were not estimated given that there is evidence of soil organic carbon loss due to severe erosion. N<sub>2</sub>O emissions from the drainage of organic cropland and cropland soils should be reported in the agriculture sector rather than the category other in the LULUCF sector. Default values for both CO<sub>2</sub> and N<sub>2</sub>O emissions from drained organic soils were incorrectly chosen. The ERT recommends that Iceland report CO<sub>2</sub> and N<sub>2</sub>O emissions from drained organic soils in respective sectors and source land-use categories and reconsider the default value for CO<sub>2</sub> and N<sub>2</sub>O for drained organic soils in its next annual submission.

70. Formal sector-specific QA/QC procedures have not been applied, although tier 1 QC was applied in preparation for the inventory of the LULUCF sector. Quantitative uncertainty analysis has not been implemented. Recalculation has been implemented through 1990–2006. The recalculations resulted in an increase of emissions from LULUCF by 2.0 per cent in 1990 and by 8.8 per cent in 2006. The ERT recommends that Iceland develop and implement sector-specific QA/QC procedures and conduct quantitative uncertainty analysis in its next annual submission.

71. In its NIR, Iceland voluntarily provided information under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in accordance with some of the requirements of decision 15/CMP.1. Significant improvement has been made since the 2008 submission. Given that there is no clear harvesting of forests, the age of plantations provides a rigorous basis for Iceland to identify areas of afforestation and reforestation. The newly established IGLUD and AD on afforestation and deforestation from IFR make it possible to identify lands under Article 3, paragraph 3.

72. Concerning revegetation activity, Iceland's elected activity under Article 3, paragraph 4, of the Kyoto Protocol, SCSI has mapped all revegetation activities that have occurred since 1990. The NIRA involves systematic sampling of predefined grid points. The basic unit of this grid is 1.0 x 1.0 km. A subset of approximately 1,000 grid points that fall within the land mapped as an area where revegetation has occurred since 1990 has been randomly selected and will be visited. Data available from the NIRA has already resulted in reduced estimates of revegetated land. The reported size of the area where revegetation has occurred since 1998 is based on simultaneous global positioning system recordings and is increasing.

73. One of the improvements planned by Iceland is the introduction of a sample based approach, combined with GIS mapping, to identify land areas being revegetated and to improve emission/removal factors and quality control of different activity practices. The approach aims to confirm that areas subject to revegetation are correctly identified and to monitor changes in carbon stocks. Correction and adjustment will be an ongoing effort by Iceland in the coming years in the commitment period as information is gathered and knowledge is accumulated.

## B. Key categories

### 1. Forest land remaining forest land and land converted to forest land – CO<sub>2</sub>

74. In 2007, forest land remaining forest land and land converted to forest land amounted to a net removal of 52.10 Gg CO<sub>2</sub> and 29.06 Gg CO<sub>2</sub>, respectively. Carbon stock change for natural birch forests was reported as “NE”. Carbon stock changes in living biomass were estimated based on field sampling of the latest national forestry inventory. The IPCC tier 1 method and a default EF were used to estimate CO<sub>2</sub> emissions from organic soil. CO<sub>2</sub> emissions/removals from mineral soils and dead organic matter as well as potential CO<sub>2</sub> emissions due to thinning were not estimated. The ERT noted that the Party has a plan to estimate carbon stock changes for natural birch forests, as well as in mineral soils, dead organic matter and thinning activities in its future annual submissions. The ERT welcomes this intention.

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

75. In 2007, land converted to grassland amounted to net emissions of 934.50 Gg CO<sub>2</sub>, the largest emission source in the LULUCF sector. The emissions are mainly CO<sub>2</sub> emissions from drained organic soils and carbon stock changes due to revegetation that were reported under other land converted to grassland. However, CO<sub>2</sub> emissions from all drained organic soils (including those under grasslands, croplands, wetlands and settlements), except those under forest land, were estimated and reported under wetland converted to grassland. The IPCC tier 1 method was used to estimate CO<sub>2</sub> emissions from drained organic soils but the IPCC default EF value (1.1) for peat extraction was chosen instead of the default value for grassland (0.25), which caused the emissions to be overestimated.

76. An IPCC tier 2 method and country-specific parameters were used to estimate carbon stock changes in living biomass and mineral soils for other land converted to grassland. Iceland reported carbon stock changes for those lands revegetated before 1990 and after 1990, which will facilitate the reporting of the revegetation activity elected by Iceland under Article 3, paragraph 4, of the Kyoto Protocol. The ERT recommends that Iceland report CO<sub>2</sub> emissions from drained organic soils in respective land-use categories and reconsider the default EF value for drained organic soils in its next annual submission.

### 3. Other – N<sub>2</sub>O

77. In 2007, category other amounted to a net N<sub>2</sub>O emission of 322.43 Gg CO<sub>2</sub> eq, mainly coming from N fertilization for revegetation and wetland converted to grassland. N<sub>2</sub>O emissions from all drained organic soils (including those under grasslands, croplands, wetlands and settlements) except those under forest land were estimated and reported as an aggregate estimate of wetland converted to grassland under the category other in CRF table 5(II). Based on the UNFCCC reporting guidelines, N<sub>2</sub>O emissions from drained cropland and grassland soils should be reported in the agriculture sector and only N<sub>2</sub>O emissions from wetland should be reported under category wetland in CRF table 5(II). The ERT recommends that Iceland further disaggregate land-use categories and report N<sub>2</sub>O emissions from drained soils in the correct sectors and respective land-use categories.

78. The tier 1 method and IPCC default EF value were used to estimate N<sub>2</sub>O emissions from drained organic soil. However, Iceland has applied the default value (1.8 kg N<sub>2</sub>O-N ha<sup>-1</sup>) for peat extraction instead of that for drained grassland and cropland (8 kg N<sub>2</sub>O-N ha<sup>-1</sup>) contained in table 4.17 of the IPCC good practice guidance. The applied value is much lower than the default value and resulted in a significant underestimation of the emissions. The ERT recommends that Iceland reconsider the default N<sub>2</sub>O EF value for drained organic soils in its next annual submission.

## VI. Waste

### A. Sector overview

79. In 2007, emissions from the waste sector amounted to 227.99 Gg CO<sub>2</sub> eq, or 4.0 per cent of total GHG emissions. Since 1990, emissions have increased by 27.0 per cent. Within the sector, 88.7 per cent of the emissions were from solid waste disposal on land, followed by 10.1 per cent from wastewater handling and waste incineration accounted for 0.5 per cent.

80. Emissions from solid waste disposal on land and wastewater handling increased by 51 per cent and 14.2 per cent, respectively, while emissions from waste incineration dramatically decreased by 96.9 per cent, due mainly to the incineration of a higher portion of waste with energy recovery. An increasing trend in GHG emissions is more significant in this sector than in terms of the national total, owing to an increase in the landfilled amounts of solid waste as well as those in managed waste disposal sites.

81. The CH<sub>4</sub> and N<sub>2</sub>O emissions from sludge from domestic and commercial wastewater and industrial wastewater are reported as “NE”. The ERT recommends that Iceland estimate and report these emissions in its next annual submission.

### B. Key categories

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

82. Iceland applied the tier 1 method with default parameters from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). Iceland assumed that AD on waste were linearly related to gross domestic product (GDP). Deviations between the trends of per capita waste generation and GDP were observed, especially during the period 1950–1990. Key parameters for estimating default EFs were shown without elaborating the estimation procedures. The ERT recommends that Iceland use trend extrapolation for AD, transparently document the reasons for the trends in the waste generation rate and GDP growth and explain why the 2006 IPCC Guidelines would reflect the CH<sub>4</sub> generation pattern in Iceland more accurately than the Revised 1996 IPCC Guidelines.

### C. Non-key categories

#### 1. Wastewater handling – CH<sub>4</sub>

83. Iceland used the tier 1 method of the 2006 IPCC Guidelines but applied methane conversion factors corresponding to treatment methods without justification or verification. The ERT recommends that Iceland transparently elaborate and justify the parameters used in the NIR of its next annual submission.

#### 2. Wastewater handling – N<sub>2</sub>O

84. Iceland used the IPCC default method to estimate N<sub>2</sub>O emissions from human sewage based on a constant per capita protein intake over the entire time series. It is good practice to report yearly per capita protein intake. The ERT recommends that Iceland estimate emissions based on the yearly per capita protein intake in its next annual submission.

#### 3. Waste incineration – CO<sub>2</sub>

85. Iceland estimated the CO<sub>2</sub> emissions from this category in accordance with the 2006 IPCC Guidelines but adopted key parameters without explanation. The ERT recommends that Iceland elaborate transparently the parameters used in the NIR of its next annual submission, explaining why the application of the 2006 IPCC Guidelines better reflects the national circumstances than the application of the Revised 1996 IPCC Guidelines.

## **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**

86. Iceland has not 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, as the national registry is not connected with the production environment of the ITL and Iceland has not transferred any Kyoto Protocol units.

#### **2. National registry**

87. The ERT took note of the findings and recommendations included in the SIAR. The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR. The reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT took note of the SIAR and its finding that the national registry continues to meet the requirements 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 decisions 16/CP.10 and 12/CMP.1. Also, the national registry has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

88. However, the SIAR identified that the information in the registry is not currently publicly available. Iceland stated that the required information will become publicly available but the stated website is currently inaccessible. In response to this finding in the SIAR, Iceland stated that the website is under construction. The ERT recommends that Iceland provide the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1 and report, in its next annual submission, on any changes to that public information.

#### **3. Calculation of commitment period reserve**

89. Iceland has not reported its commitment period reserve in its 2009 annual submission. In response to questions raised by the ERT during the review, Iceland stated that its commitment period reserve has not changed since the initial report review (16,671,462 t CO<sub>2</sub> eq), as it is based on the assigned amount. The ERT agrees with this figure and recommends that Iceland report its commitment period reserve in its next annual submission.

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

90. Iceland reported that there has been no change to its national system since 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**

91. Iceland reported that there has been no change to its national registry since the previous annual submission. Annex V to the NIR provides a description of the national registry. The NIR states that, due to organizational changes within the EA, the contact details of the registry administrators had changed though the individuals in charge of the registry management remain the same. The ERT concluded that Iceland'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.

## VIII. Conclusions and recommendations

92. Iceland made its annual submission on 27 April and resubmitted its CRF tables on 8 May 2009 and its NIR on 26 May 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 an NIR) and, in part, supplementary information under Article 7, paragraph 1, of the Kyoto Protocol submitted on a voluntary basis (information on changes to the national system and to the national registry). This is in line with decision 15/CMP.1.
93. The ERT concludes that the inventory submission of Iceland has improved since the previous annual submission and has been prepared and reported generally in accordance with the UNFCCC reporting guidelines. The Party has submitted a complete set of CRF tables for the years 1990–2007 and an NIR; these are complete in terms of geographical coverage, years and sectors and generally complete in terms of categories and gases.
94. 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. Iceland did not report on a voluntary basis information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, or information on the Kyoto Protocol units in the SEF tables, as these tables were not submitted.
95. Iceland'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. The ERT noted that Iceland is not using higher tier methods for some key categories.
96. Iceland has not reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and has not used the reporting format tables as required by decision 14/CMP.1, as the registry is not yet connected to the production environment of the ITL and Iceland has not yet transferred or acquired any Kyoto Protocol units.
97. The national system of Iceland continues to perform its required functions as set out in the annex to decision 19/CMP.1.
98. The national registry continues to meet the requirements 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. However, the ERT noted a change to the contact details of the registry administrator.
99. In the course of the review, the ERT formulated a number of recommendations<sup>8</sup> relating to the national system, implementation of QA/QC and the transparency and completeness of the annual submission. The key recommendations are that Iceland:
- (a) Improve its archiving system and provide sufficient information on the system and archiving procedures in its next submission;
  - (b) Further elaborate a QA/QC plan including planned improvements and sufficient information on QA/QC implementation procedures;
  - (c) Improve the transparency of the annual submission by providing sufficient details about the methods and rationale for the selection of parameters and information on recalculations, particularly for key categories;

---

<sup>8</sup> For a complete list of recommendations, the relevant chapters of this report should be consulted.

- (d) Ensure, to the extent possible, the inclusion in its next annual submission of emissions from 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. When emissions cannot be estimated for a category then the Party should provide sufficient explanation for this in its NIR; verify and/or improve the estimates of emissions where potential underestimations may occur;
- (e) Improve the quality of the inventory by using higher tier methodology to estimate emissions for the key categories and those from the individual plants reported under decision 14/CP.7 and provide an explanation as to why the default EF is appropriate for its national circumstances for the key categories for which it continues to use a tier 1 method;
- (f) Include information on the commitment period reserve;
- (g) Explore the possibility of structuring its reporting, in the next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.

### **IX. Questions of implementation**

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

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

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/SBSTA/2006/9. Available at <<http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>>.

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at <<http://unfccc.int/resource/docs/cop8/08.pdf>>.

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>>.

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Decision 15/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>>.

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for Iceland 2009. Available at <<http://unfccc.int/resource/docs/2009/asr/isl.pdf>>.

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

FCCC/ARR/2008/ISL. Report of the individual review of the greenhouse gas inventory of Iceland submitted in 2007 and 2008. Available at <<http://unfccc.int/resource/docs/2009/arr/isl.pdf>>.

FCCC/IRR/2006/ISL. Report of the review of the initial report of Iceland. Available at <<http://unfccc.int/resource/docs/2008/irr/isl.pdf>>.

UNFCCC. Standard independent assessment report, Parts I and II. Unpublished document.

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

Responses to questions during the review were received from Ms. Kristín Harðardóttir and Ms. Birna Sigrún Hallsdóttir (Department for Environmental Quality, Environment Agency of Iceland) and Mr. Jón Guðmundsson (Agricultural University of Iceland), including additional material on the methodology and assumptions used.

Annex II**Acronyms and abbreviations**

AD	activity data	ITL	international transaction log
CH <sub>4</sub>	methane	kg	kilogram (1 kg = 1 thousand grams)
CO <sub>2</sub>	carbon dioxide	LPG	liquefied petroleum gas
CO <sub>2</sub> eq	carbon dioxide equivalent	LULUCF	land use, land-use change and forestry
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol	NCV	net calorific value
CRF	common reporting format	NE	not estimated
EF	emission factor	N <sub>ex</sub>	nitrogen excretion
ERT	expert review team	NO	not occurring
GDP	gross domestic product	N <sub>2</sub> O	nitrous oxide
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF	NIR	national inventory report
GIS	geographic information systems	PFCs	perfluorocarbons
HFCs	hydrofluorocarbons	QA/QC	quality assurance/quality control
IEA	International Energy Agency	SEF	standard electronic format
IEF	implied emission factor	SF <sub>6</sub>	sulphur hexafluoride
IPCC	Intergovernmental Panel on Climate Change	SIAR	standard independent assessment report
IRR	initial review report	t	tonne
		TJ	terajoule (1 TJ = 10 <sup>12</sup> joule)
		UNFCCC	United Nations Framework Convention on Climate Change

-----