



COMPLIANCE COMMITTEE

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**Report of the in-depth review of the fifth national communication
of Iceland**

Note by the secretariat

The report of the in-depth review of the fifth national communication of Iceland was published on 26 September 2012. 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/IDR.5/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.



Report of the in-depth review of the fifth national communication of Iceland

Parties included in Annex I to the Convention are requested, in accordance with decision 10/CP.13, to submit a fifth national communication to the secretariat by 1 January 2010. In accordance with decision 8/CMP.3, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol shall include in their fifth national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. In accordance with decision 15/CMP.1, these Parties shall start reporting the information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention for the first year of the commitment period. This includes supplementary information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. This report presents the results of the in-depth review of the fifth national communication of Iceland conducted by an expert review team in accordance with the relevant provisions of the Convention and Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. For Iceland, the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Under the Kyoto Protocol, Iceland committed itself to limiting the growth in its greenhouse gas (GHG) emissions to 10 per cent in relation to the base year¹ level during the first commitment period from 2008 to 2012. In implementing this target, Iceland availed itself of the provisions of decision 14/CP.7 on the impacts of single projects on emissions in the commitment period (see para. 32 below).

2. This report covers the in-country in-depth review (IDR) of the fifth national communication (NC5) of Iceland, coordinated by the UNFCCC secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 23 to 28 April 2012 in Reykjavik, Iceland, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Ms. Alma Jean (Saint Lucia), Mr. Vishwa Bandhu Pant (India), Mr. Erik Rasmussen (Denmark) and Ms. Andreja Urbancic (Slovenia). Ms. Jean and Mr. Rasmussen were the lead reviewers. The review was coordinated by Ms. Xuehong Wang and Mr. Bernd Hackmann (UNFCCC secretariat).

3. During the IDR, the expert review team (ERT) examined each section of the NC5. The ERT also evaluated the supplementary information provided by Iceland as a part of the NC5 in accordance with Article 7, paragraph 2, of the Kyoto Protocol. In addition, the ERT reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which was provided by Iceland in its 2012 annual submission under Article 7, paragraph 1, of the Kyoto Protocol.

4. In accordance with 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, in this final version of the report.

B. Summary

5. The ERT noted that Iceland's NC5 complies, to some extent, with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines). As required by decision 15/CMP.1, supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol² is provided in the NC5. Iceland considered some recommendations provided in the report of the centralized in-depth review of the fourth national communication of Iceland.³ The ERT commended Iceland for its improved reporting.

6. The supplementary information on the minimization of the adverse impacts referred to in paragraph 3 above is complete and transparent and was provided on time. During the review, Iceland provided further relevant information.

¹ "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

² Decision 15/CMP.1, annex, paragraphs 27–43.

³ FCCC/IDR.4/ISL.

1. Completeness

7. The NC5 covers all sections required by the UNFCCC reporting guidelines and most of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. However, the NC5 does not include the following information required by the UNFCCC reporting guidelines: summary tables on policies and measures (PaMs) by sectors, subdivided by gases (see para. 27 below); how Iceland believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals (see para. 27 below); emission projections presented on a gas-by-gas basis (see para. 59 below); emission projections related to fuel sold to ships and aircraft engaged in international transport (see para. 59 below); the expected impacts of climate change and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention, with regard to adaptation (see para. 78 below); information on 'new and additional' financial resources (see paras. 83 and 84 below).

8. Also, the NC5 does not include information on the steps taken to promote and/or implement any decisions by the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) in order to limit or reduce emissions of GHG not controlled by the Montreal Protocol from aviation and marine bunker fuels (see para. 99 below); information on how the Party strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects on other Parties (see para. 101 below); description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, which also contribute to the conservation of biodiversity and the sustainable use of natural resources (see para. 99 below). During the review week, the missing information was provided by Iceland. The ERT recommends that Iceland enhance the completeness of its reporting by providing this information in its next national communication.

2. Transparency

9. The ERT acknowledged that Iceland's NC5, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol is broadly transparent. The NC5 provides clear information on all aspects of implementation of the Convention and its Kyoto Protocol. The NC5 is structured following the outline contained in the annex to the UNFCCC reporting guidelines and the supplementary information submitted under Article 7, paragraph 2, of the Kyoto Protocol is easily identifiable. In the course of the review, the ERT formulated a number of recommendations that could help Iceland to further increase the transparency of its reporting with regard to policies and measures (see paras. 47 and 49 below), projections and total effects of policies and measures (see paras. 59 and 76 below), vulnerability, climate change impacts and adaptation (see para. 82 below), a description of the national system (see paras. 19 and 20 below), a description of the national registry (see para. 24 below), and information on minimization of adverse impacts (see para. 101 below).

3. Timeliness

10. The NC5 was initially submitted on 12 February 2010, after the deadline of 1 January 2010 mandated by decision 10/CP.13. A revised version was submitted on 12 March 2010 and the review was based on that revised version.

11. Iceland informed the secretariat about its difficulties with the timeliness of its national communication submission on 22 December 2009 in accordance with decision 22/CMP.1, paragraph 139. The ERT noted the delay in the submission of the NC5.

II. Technical assessment of the reviewed elements

A. National circumstances relevant to greenhouse gas emissions and removals, including legislative arrangements and administrative procedures

12. In its NC5, Iceland has provided a concise description of its national circumstances, and elaborated on the framework legislations and key policy documents on climate change. The NC5 also referred to the description of the national inventory report of the 2009 annual submission. Further technical assessment of the institutional and legislative arrangements for coordination and implementation of PaMs are provided in section II.B.1 of this report.

1. National circumstances

13. In its NC5, Iceland has provided a description of its national circumstances, and information on how these national circumstances affect GHG emissions and removals in Iceland and how changes in national circumstances affect GHG emissions and removals over time. Information was provided on the government structure, population, geography, climate, economy and relevant economic sectors. The ERT noted that the main drivers of emission trends in Iceland include population density and demographic development, geographical situation, primary energy profile and use, transport systems, and economic development, in particular development of industrial processes. The primary energy profile also gives Iceland a unique emission profile, with a very low contribution from energy industries (0.1 per cent in 2010) to total GHG emissions. This low share is due to the abundant availability of renewable energy sources (RES), mainly hydropower and geothermal power, which are widely used for the production of heat and electricity in Iceland. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

14. Iceland is a parliamentary democracy with a president elected by direct voting for a term of four years, with no limit as to the number of terms that may be served. The overall responsibility for climate change policymaking lies within the Ministry for the Environment and a number of national institutions are involved in the implementation of this policy. Implementation of the Kyoto Protocol is underpinned by Act No. 65/2007 on the emission of greenhouse gases, which was passed by the Icelandic legislature, the Althing, in March 2007. A significant part of the policies and measures are deferred to the local level. Further legislative arrangements and administrative procedures, including those related to the national system and the national registry are presented in sections II.A.2, II.A.3 and chapter II.B.

15. Iceland has provided a summary of information on GHG emission trends for the period 1990–2007. This information is mostly consistent with the 2009 national GHG inventory submission. Summary tables, including trend tables for emissions in carbon dioxide equivalent (CO₂ eq) (given in the common reporting format), are also provided in an annex to the NC5. During the review, the ERT assessed the recently submitted 2012 annual submission and reflected the findings in this report.

Table 1
Indicators relevant to greenhouse gas emissions and removals for Iceland

| | 1990 | 1995 | 2000 | 2005 | 2010 | Change ^a 1990–2000 (%) | Change 2000–2010 (%) | Change ^a 1990–2010 (%) |
|---|------|------|------|------|------|---|----------------------------|---|
| Population (million) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 7.7 | 14.3 | 23.1 |
| GDP (2000 USD billion using PPP) | 6.5 | 6.6 | 8.4 | 10.4 | 10.4 | 28.6 | 24.0 | 59.6 |
| TPES (Mtoe) | 2.1 | 2.3 | 3.1 | 3.5 | 5.4 | 45.1 | 74.9 | 153.7 |
| GDP per capita (2000 USD thousand using PPP) | 25.1 | 24.5 | 30.0 | 34.5 | 32.6 | 19.4 | 8.5 | 29.7 |
| TPES per capita (toe) | 8.2 | 8.4 | 11.0 | 11.8 | 16.9 | 34.7 | 53.1 | 106.2 |
| GHG emissions without LULUCF (Tg CO ₂ eq) | 3.5 | 3.3 | 3.8 | 3.8 | 4.5 | 9.8 | 18.1 | 29.7 |
| GHG emissions with LULUCF (Tg CO ₂ eq) | 4.7 | 4.4 | 4.8 | 4.7 | 5.3 | 3.4 | 8.8 | 12.5 |
| CO ₂ emissions per capita (Mg) | 8.3 | 8.6 | 9.8 | 9.5 | 10.6 | 18.7 | 8.3 | 28.5 |
| CO ₂ emissions per GDP unit (kg per 2005 USD using PPP) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | -0.7 | -16.1 | -16.7 |
| GHG emissions per capita (Mg CO ₂ eq) | 13.5 | 12.1 | 13.7 | 12.7 | 14.2 | 2.0 | 3.4 | 5.4 |
| GHG emissions per GDP unit (kg CO ₂ eq per 2005 USD using PPP) | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | -14.6 | -4.8 | -18.7 |

Sources: (1) GHG emissions data: Iceland's 2012 greenhouse gas inventory submission, version 14 April 2012; (2) Population, GDP and TPES data: International Energy Agency, 2012.

Note: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

Abbreviations: GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

16. Total GHG emissions⁴ excluding emissions and removals from land use, land-use change and forestry (LULUCF) increased by 29.7 per cent between the base year and 2010, whereas total GHG emissions including net emissions or removals from LULUCF increased by 12.5 per cent. This increase was mainly attributed to CO₂ emissions, which increased by 58.1 per cent over this period. Emissions of methane (CH₄) also increased by 12.5 per cent, while emissions of nitrous oxide (N₂O) decreased by 11.7 per cent. Emissions of fluorinated gases accounted for about 12.0 per cent of total GHG emissions in 1990 and 4.8 per cent in 2010. A major increase was experienced between 2005 and 2008 (trends for 2005–2008: total GHGs – 29.8 per cent, CO₂ – 25.8 per cent, CH₄ – 2.4 per cent, N₂O – 12.2 per cent) followed by a decrease thereafter due to the global financial and economic crisis. Trends in total GHG emissions were mostly underpinned by GHG emission trends in industrial processes, mainly emissions from the aluminium industry, the energy sector, transport and fisheries, driven by the population increase and strong economic growth. Analysis of the drivers of GHG emission trends in each sector is

⁴ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

provided in section II.B. Table 2 provides an overview of GHG emissions by sector from the base year to 2010.

Table 2
Greenhouse gas emissions by sector in Iceland, 1990–2010

| Sector | GHG emissions (Tg CO ₂ eq) | | | | | | Change (%) | | Shares ^a by sector (%) | |
|---|---------------------------------------|------------|------------|------------|------------|------------|-------------|-------------|-----------------------------------|--------------|
| | 1990 | 1995 | 2000 | 2005 | 2009 | 2010 | 1990b–2010 | 2009–2010 | 1990 | 2010 |
| 1. Energy | 1.8 | 1.9 | 2.0 | 2.1 | 2.0 | 1.9 | 4.9 | -7.5 | 50.8 | 41.1 |
| A1. Energy industries | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -66.3 | -27.1 | 0.4 | 0.1 |
| A2. Manufacturing industries and construction | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.2 | -29.9 | -19.5 | 10.8 | 4.7 |
| A3. Transport | 0.6 | 0.6 | 0.7 | 0.8 | 0.9 | 0.9 | 45.0 | -4.8 | 17.7 | 19.8 |
| A4.–A5. Other | 0.7 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | -14.3 | 0.0 | 20.0 | 13.2 |
| B. Fugitive emissions | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 212.7 | 11.5 | 1.8 | 4.2 |
| 2. Industrial processes | 0.9 | 0.5 | 0.9 | 0.9 | 1.8 | 1.8 | 109.7 | 0.7 | 24.6 | 39.8 |
| 3. Solvent and other product use | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -32.2 | -2.6 | 0.3 | 0.1 |
| 4. Agriculture | 0.7 | 0.6 | 0.7 | 0.6 | 0.7 | 0.6 | -8.1 | -1.3 | 20.1 | 14.2 |
| 5. LULUCF | 1.2 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 | -38.2 | -3.3 | 33.9 | 16.2 |
| 6. Waste | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 44.6 | -4.4 | 4.2 | 4.7 |
| 7. Other | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| GHG total with LULUCF | 4.7 | 4.4 | 4.8 | 4.7 | 5.5 | 5.3 | 12.5 | -3.4 | NA | NA |
| GHG total without LULUCF | 3.5 | 3.3 | 3.8 | 3.8 | 4.7 | 4.5 | 29.7 | -3.4 | 100.0 | 100.0 |

Note: The changes in emissions and the shares by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA= not applicable.

^a The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions that was offset by GHG removals through LULUCF.

2. National system

17. In accordance with decision 15/CMP.1, Iceland provided in its NC5 a description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1 (decision 19/CMP.1). The description includes most of the elements as required in decision 15/CMP.1, except for a description of the process for recalculation of previously submitted inventory data.

18. The Environment Agency of Iceland (EA), under the supervision of the Ministry for the Environment, has overall responsibility for the national inventory. This agency compiles and manages all sectors of the inventory, except for the information on the LULUCF sector, which is compiled by the Agricultural University of Iceland. The EA is also responsible for preparing the national inventory reports (NIRs).

19. During the review, Iceland provided additional information on the national system, elaborating on the process of selecting emission factors, and providing a description of the

process for the recalculation of previously submitted inventory data. The ERT encourages Iceland to report this information in the NIR of its next annual submission.

20. The ERT took note of the recommendations of the report of the individual review of the annual submission of Iceland submitted in 2011.⁵ During the review, the ERT learned that the Party had made some efforts to provide additional information for each sector on the role of the different institutions in providing activity data and emission factors, and in producing emission estimates. The ERT also learned that the Party made some efforts to improve the institutional arrangements by conducting a series of regular meetings of a coordinating team, the official role of which is to review the emission inventory and to coordinate between involved institutions, especially with regards to the LULUCF and agriculture sectors. The ERT reiterated the recommendation of the previous ERT of the GHG inventory review that the Party should report this information in the relevant chapter of the NIR of its next annual submission.

21. The ERT concluded that the national system continued to perform its required functions as set out in decision 19/CMP.1.

3. National registry

22. At the time of the review, the Icelandic national registry was a stand-alone registry; it was not operated together in a consolidated form with the registries of other Parties. As of 30 June 2012, Iceland's national registry became a separate registry entity within the consolidated registries of the European Union (EU) registry. In its NC5, Iceland has provided information on the national registry, including a description of how its national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and how it complies with the requirements of the technical standard for data exchange between registry systems.

23. During the review, Iceland provided additional information on the measures put in place to safeguard, maintain and recover registry data; the security measures employed in the registry to prevent unauthorized manipulations; the measures put in place to protect the registry against security compromises; the test procedures related to the performance of the current version of the national registry; and the recording of the changes and discrepancies of the national registry. In response to questions raised by the ERT, Iceland provided documents demonstrating how it records the changes related to the national registry and how it maintains these records. The ERT noted that updates to databases and applications, implemented security measures, and changes to the national registry software are documented on a regular basis by nominated responsible staff.

24. The ERT took note of the conclusion of the standard independent assessment report (SIAR) that 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 also took note of the recommendation of the SIAR that Iceland should make available, on the website of its national registry, public information pursuant to decision 13/CMP.1, annex, paragraphs 44–48. During the review, the ERT learned that Iceland has already taken measures to address this recommendation. The ERT recommends that Iceland further improve the public information available on the website, and improve the reporting of this matter in its next annual submission.

25. 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 decisions 16/CP.10 and 12/CMP.1.

⁵ FCCC/ARR/2011/ISL.

B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

26. As required by the UNFCCC reporting guidelines, Iceland has provided in its NC5 some information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol. Each sector has its own textual, but general, description of the principal PaMs, supplemented by a combined summary table on some of these PaMs in the following chapter on projections. The NC5 contains a description of PaMs by sector similar to that in the NC4.

27. However, the ERT noted that Iceland did not provide the following reporting elements required by the UNFCCC reporting guidelines: information on PaMs subdivided by GHG and by sector; a textual description of the principal PaMs by sector with the name, objective, GHG(s) affected, type or types of policy or measure, status of implementation and the implementing entity or entities of each PaM; summary tables on PaMs by sector; and information on how Iceland believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals, consistent with the objective of the Convention. The ERT also noted that the NC5 did not include a description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources, and information on the effort that Iceland is making to implement PaMs in such a way as to minimize adverse effects, including the effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. During the review, Iceland has provided information on all these missing elements. The ERT recommends that Iceland follow the UNFCCC reporting guidelines more closely and provide these reporting elements in its next national communication.

28. In February 2007, the Icelandic Government adopted an updated Climate Change Strategy, the third of its kind, aiming at ensuring compliance with Iceland's Kyoto Protocol target. The strategy sets forth a long-term vision for the reduction of total emissions of GHGs by 50–75 per cent in 2050 compared with the 1990 level. Emphasis is placed on cost-effective PaMs, including economic instruments, with co-benefits such as the introduction of new low- and zero-carbon technology. Also the strategy includes measures on carbon sequestration in vegetation and soil, and the financing of climate-friendly measures in other countries.

29. The strategy also sets forth the Government's five principal climate change objectives, which include the following: (a) fulfilling international obligations; (b) decreasing GHG emissions by reducing the use of fossil fuels in favour of renewable energy and climate-friendly fuels; (c) increasing carbon sequestration; (d) fostering research and innovation in fields related to climate change; and (e) preparing for adaptation to climate change. The strategy contains provisions for measures that will be adopted in order to achieve these objectives and two expert working groups were appointed to support the further development of climate policy. One group had the role of compiling and summarizing the best available scientific knowledge on the likely impact of climate change and presenting proposals on adaptation efforts. The other working group was given the task of assessing the effectiveness and economic efficiency of measures to mitigate climate change.

30. On the basis of the strategy, a draft Action Plan for Climate Change Mitigation (2010 Action Plan) was released in 2009. During the formulation of the 2010 Action Plan, PaMs to mitigate climate change were assessed in terms of their effectiveness and economic efficiency. The following conclusions were drawn: (a) there is a significant

mitigation potential in Iceland at low and moderate cost. Actions with negative mitigation cost could reduce net emissions by 4 per cent by 2020, while actions with a cost in the range EUR 0–20 could reduce net emissions by 19 per cent; (b) afforestation and revegetation offer the most significant mitigation potential; (c) there is a significant mitigation potential in transport and fisheries; and (d) the mitigation potential in energy production is insignificant, due to the fact that Iceland is almost 100 per cent reliant on renewables. On the basis of this work, the Government adopted the 2010 Action Plan with ten key actions (see table 3). The total effect of these key actions is estimated to be a reduction in net GHG emission in the range of 1,330–1,570 Gg per year by 2020.

31. As the 2010 Action Plan was not finalized at the time of the submission and publication of the NC5, the information contained in the NC5 on individual PaMs and their effects are limited. During the review, Iceland provided updated information on the development of its PaMs, especially those under the plan.

32. Iceland’s commitment under the Kyoto Protocol is to limit the growth in its GHG emissions to 10 per cent in relation to the base-year level during the first commitment period from 2008 to 2012. Iceland expects to achieve this target through emission reductions from the portfolio of existing PaMs and taking into account provisions of decision 14/CP.7. According to this decision, emissions from industrial process projects up to 1.6 Mt CO₂ eq annually that meet the criteria specified in this decision shall be reported separately and shall not be included in national totals under the condition that the emissions of a Party exceed its assigned amount. As this condition could be fully assessed only at the end of the commitment period, when the aggregated GHG emissions over the period would be known, during the commitment period Iceland reports both, total GHG emissions and emissions that meet the criteria of this decision (see paras. 48 and 49 below). In response to a question raised by the ERT during the review, Iceland confirmed that it is aware that this decision imposes restrictions on transfers and acquisition of the Kyoto units under Articles 6 and 17 of the Kyoto Protocol for a Party that chooses to avail itself of it.

33. One of the most important PaMs in the medium term (until 2020) is the implementation of the European Union emissions trading scheme (EU ETS). Iceland is part of the EU ETS as it is a member of the European Economic Area (EEA) under the ‘EEA agreement’. Until 2012, no installation in Iceland fell under the EU ETS. As of 1 January 2012, CO₂ emissions from aviation are regulated under the EU ETS and GHG emissions from heavy industries such as aluminium, ferrosilicon, mineral wool and fish-meal production will be regulated as of 1 January 2013. Benchmarking, gradual lowering of the cap and trading of allowances under the EU ETS are designed to encourage a shift towards cleaner technologies and lower emissions of GHGs in these industries. Table 3 provides a summary of the information on the PaMs contained in the NC5 as well as those provided during the review.

Table 3
Summary of information on policies and measures in Iceland

| <i>Major policies and measures</i> | <i>Examples/comments</i> |
|--|--|
| <i>Policy framework /cross-sectoral measures</i> | |
| Climate Change Strategy 2007 | Strategy aims to ensure compliance with the Kyoto Protocol target, reduce the use of fossil fuels, increase carbon sequestration, foster research and prepare for adaptation |
| Iceland’s 2010 Action Plan for Climate Change Mitigation | The plan includes 10 key actions that are outlined in this table |

| <i>Major policies and measures</i> | <i>Examples/comments</i> |
|--|--|
| Carbon tax on fossil fuel use* | Aims to reduce fossil fuel use (NA/25-50/50-100) |
| Participation in EU ETS* | Aims to reduce CO ₂ emissions in a cost-effective way (NA/50-75/100-150), with 40 per cent of Iceland's GHG emissions to be covered under the scheme |
| Research and development in climate-friendly technology* | Promotes innovations in renewable energy, CCS, processing of CO ₂ in geothermal steam, shipping emissions, fuel-efficient fishing methods, hydrogen engines, etc. (NA/10-20/50-100) |
| Information and public awareness | Aims to encourage alternative ways of transport, such as walking and cycling |
| <i>Policies and measures by sector</i> | |
| <i>Energy</i> | |
| CarbFix CCS project | Aims to capture carbon from geothermal emissions and store them permanently under ground |
| Provision of land-based electricity to ships in harbours | Aims to discourage the burning of fuel by ship engines (18/18/18) |
| Biofuels for the fishing fleet* | Aims to convert from fossil fuels to biofuels (NA/10-50/50-170) |
| Electrification of fish-meal production* | Aims to convert from fossil fuels (heavy oil) to electricity produced by renewable (NA/10-25/25-50) |
| <i>Transport</i> | |
| Oil charge tax | Aims to make small diesel cars more competitive |
| Exemption and reduction of excise tax on non- and low-polluting vehicles | Aims to encourage the purchase of low-polluting vehicles |
| Change in taxes and fees for cars and fuels* | Combines the two above-mentioned policies and measures (NA/10-50/20-100) |
| Official procurement of low-carbon and fuel efficient vehicles* | Aims to reduce emissions and create demand for low-carbon vehicles |
| Increased share of public transport, walking and cycling in transport* | Aims to reduce emissions from transport (NA/10-20/20-40) |
| <i>Industrial processes</i> | |
| Limit PFC emissions from aluminium smelters | Aims to encourage aluminium plants to cut PFC emissions |
| <i>Land use, land-use-change and forestry</i> | |
| Afforestation and revegetation* | Aims to increase carbon sequestration in soil and vegetation (NA/600/775) |
| Restoration of drained wetlands* | Aims to reduce CO ₂ emissions from drained wetlands (NA/10-20/50-100) |

| <i>Major policies and measures</i> | <i>Examples/comments</i> |
|---|--|
| <i>Waste</i> | |
| Capture of CH ₄ in landfills | Aims to reduce CH ₄ emissions |

Note: The GHG reduction estimates given in parentheses are reductions in Gg CO₂ eq for the years 2010, 2015 and 2020;

* indicates that the measure is included among the 10 key measures in the 2010 Action Plan.

Abbreviations: CCS = carbon dioxide capture and storage, EU ETS = European Union emissions trading scheme, GHG = greenhouse gas, NA= not applicable, PFC = perfluorocarbon.

1. Policy framework and cross-sectoral measures

34. The EA and the Ministry for the Environment have the main responsibility for monitoring climate change policies and measures, and are responsible for the submission of the national inventory reports and emission data, and national communications to the secretariat. Responsibility for the implementation of PaMs rests with different ministries and government agencies depending on the measures. The Ministry of Finance is, for example, responsible for the preparation of legislation proposals for environmental taxation.

35. Iceland has two levels of administration that include the central government and 75 regional municipalities. The regional municipalities work alongside the central government in implementing many of the climate-related policies. The regional municipalities have a key role in some fields, such as waste management. In recent years, municipalities in Iceland have undertaken considerable work in forming their own sustainable development policy under the label of 'Local Agenda 21'. The City of Reykjavík, the largest municipality in Iceland, adopted the Climate Change and Air Quality Policy that has the goal of reducing net GHG emissions by 35 per cent by 2020, and 73 per cent by 2050 compared with 2007 levels.

36. Act No. 65/2007 on GHG emissions provides the legal basis for GHG monitoring and reporting in accordance with the UNFCCC requirements. The stated purpose of the act is to create conditions to allow Icelandic authorities to comply with international obligations to limit Iceland's GHG emissions and report thereon. The act covers the national system for the estimation of GHG emissions by sources and removals by sinks, the establishment of a national registry, emission permits and the obligation of companies to report relevant information to the authorities. The act also provides the legal basis for operators to participate in the clean development mechanism and in joint implementation projects.

37. The European Union directive 2003/87/EC that established a scheme for GHG allowance trading within the European Union was adopted by a decision of the EEA Joint Committee No. 146/2007 that is applicable to EEA members, including Iceland. However, there are currently no installations in Iceland that fall under the EU ETS. Following the inclusion of emissions from certain industries under the EU ETS from 2013 onwards, over 40 per cent of emissions will be regulated under the EU ETS. Much of these emissions fall currently under the provisions of decision 14/CP.7 for the first commitment period of the Kyoto Protocol, namely the four single projects (see paras. 48 and 49 below). During the review, Iceland clarified that decision 14/CP.7 will only be applied for the first commitment period under the Kyoto Protocol.

38. Iceland informed the ERT that measures have not yet been taken to implement the EU effort sharing decision, which regulates emissions for the non-ETS sectors since this decision is not considered by Iceland as EEA relevant. This decision would be

implemented, in the event that Iceland becomes an EU member, using the same institutional arrangement as for other climate legislation, for example the 2010 Action Plan.

2. Policies and measures in the energy sector

39. Iceland has a unique energy profile compared with other Annex I Parties. RES (hydropower and geothermal energy) are the primary energy sources used for heating and electricity production, and accounted for approximately 83 per cent of total primary energy supply in 2009. Therefore, GHG emissions from the energy sector are mainly from mobile sources, which use fossil fuels. Between 1990 and 2010, GHG emissions from the energy sector increased by 4.9 per cent (from 1,778 Gg CO₂ eq to 1,866 Gg CO₂ eq), driven mainly by an increase in emissions from energy use in transport and fisheries. However, it should be noted that underlying the general trend, there was a decrease in GHG emissions of 7.5 per cent between 2009 and 2010 driven by the global financial crisis.

40. In 2010, energy industries accounted for 0.1 per cent of total GHG emissions. Between 1990 and 2010, GHG emissions from this sector decreased by 66 per cent (from 13.7 Gg CO₂ eq to 4.6 Gg CO₂ eq). In contrast, GHG emissions from energy use in transport increased by 45 per cent (from 621 Gg CO₂ eq to 900 Gg CO₂ eq) over the same period. Between 1990 and 2010, emissions from energy use in other sectors decreased by 14.3 per cent (from 700 Gg CO₂ eq to 600 Gg CO₂ eq). Among this, fisheries is the largest source, contributing 13.2 per cent of total emissions and 32.1 per cent of energy-related emissions in 2010. During this period, emissions from fisheries have fluctuated around the 1990 value, largely reflecting the inherent nature of this industry.

41. The ERT noted that the unique emission and energy profile of Iceland presents a challenge to its emission mitigation goals and plans, as most of its energy-related emissions stem from mobile sources, for which mitigation effects are generally more difficult to achieve than they are for stationary energy sources. However, the ERT noted that the abundant availability of RES could provide an opportunity for Iceland to lower its GHG emissions from mobile sources including road vehicles (electric vehicles equipped with electrochemical batteries or fuel cells) and ships. Iceland's efforts in this area are not clear from its NC5. However, during the review, the ERT was informed of the steps taken through the 2010 Action Plan and the new Energy Strategy to promote the use of RES.

42. PaMs in the energy sector can be divided into two categories: those targeting the reduction of the use of fossil fuels and those targeting the reduction of CO₂ emissions from the production of geothermal power. While the latter is implemented through the CarbFix carbon dioxide capture and storage (CCS) project, reduction of the use of fossil fuels is achieved through the levying of a carbon tax on fossil fuel use, provision of land-based electricity from renewable sources in ships docked at harbours, promotion of biofuels for the fishing fleet, electrification of fish-meal production, the levying of oil charge tax, exemption and reduction of excise tax on non- and low-polluting vehicles, change in taxes and fees for cars and fuels, official procurement of low-carbon and fuel-efficient vehicles and increased share of public transport, walking and cycling in transport.

43. **Energy supply.** Geothermal energy production is not completely climate-neutral, as it causes dissolved CO₂ in geothermal fluid to be released more rapidly than would occur naturally. Such emissions are measured and accounted for in Iceland as fugitive emissions, and are about 4 per cent of total GHG emissions. These emissions are still miniscule compared with emissions that would occur if heating and electricity production, which is now produced from geothermal sources, was produced by fossil fuels. An experimental project (CarbFix) is under way at the Hellisheidi geothermal plant, injecting CO₂ captured in geothermal steam back into the basaltic rock underground. The aim of the CarbFix project is to study the feasibility of sequestering carbon dioxide into basaltic bedrock and storing it there permanently as a mineral. Depending on the results of this project, the

technique for sequestering carbon dioxide into basaltic bedrock might be replicable by other Parties since basaltic bedrock susceptible of CO₂ injections are widely found on the planet and CCS and mineralization in basaltic rock is not confined to geothermal emissions or areas.

44. During the review, the ERT was informed about Iceland's Energy Strategy 2011. The elements in this comprehensive Energy Strategy comprise: (a) replacing imported energy with RES; (b) adopting a precautionary and protective approach to hydroelectric and geothermal energy production; (c) supporting diversification of industry with emphasis on the development of ecologically beneficial high-technology industry. In the preparation of this strategy, around 80 different options/possibilities for hydropower and geothermal power plants have been analysed with regard to sustainability issues, preservation of natural environments and historic sites, tourism and alternative land use, regional development and economy. The final approval of the strategy is expected to take place in May 2012 in the form of a parliamentary resolution.

45. **Transport and fisheries.** Iceland's 2002 strategy for sustainable development states the goal of phasing out fossil fuels from the energy supply mix almost completely within a few decades. To achieve this goal, Iceland focuses mainly on the reduction in fossil fuel use in transportation and fisheries. In the transport sector, Iceland has implemented PaMs that favour low-emission cars. These include an exemption of excise tax on vehicles that are powered by electricity or hydrogen, reducing excise tax for hybrid automobiles, and the cancellation or refund of value-added tax on hydrogen-powered vehicles and on specialized spare parts that are imported. In addition, an oil-charge system was implemented in 2005 with the aim of increasing the number of smaller diesel vehicles in use.

46. During the review, Iceland informed the ERT that one of the key measures in the 2010 Action Plan is to put more emphasis on the modes of transport such as walking, cycling and public transport. Transport policy in Iceland is based on a multi-year National Transport Plan. After the submission of the NC5, a proposal for the National Transport Plan for 2011–2022 was submitted to Parliament in December 2011, accompanied by a proposal for a short-term project plan for 2011–2014. At the time of the review, the two proposals were being discussed by Parliament. The proposed National Transport Plan for 2011–2022 includes a 2010 Action Plan on Sustainable Transport with an emphasis on other modes of transport. A tenfold expansion of the cycling route network defined within the Greater Reykjavik Area from 10 km in 2010 to 100 km in 2020 is one of its elements. Another element is the agreement between the Government and the municipalities within the Greater Reykjavik Area, where 77 per cent of the population of Iceland lives, according to which the Government will invest IKR 1 billion in the public transport system within the next 10 years.

47. In the fisheries sector, PaMs include significant renewal of the fishing fleet to be more fuel-efficient, equipping ships with Icelandic-designed energy-saving devices based on information technology, and phasing out hydrofluorocarbons (HFCs) used in cooling systems in fishing ships. During the review, Iceland informed the ERT that the use of biodiesel in the fishing fleet has been analysed as an option. However, this has not been taken further mainly due to an increasing concern regarding the sustainability of the production of biofuels. The ERT commends Iceland for its efforts and encourages it to explore further the potential for using RES in mobile sources and to include information on this in its next national communication.

3. Policies and measures in other sectors

48. **Industrial processes.** GHG emissions from industrial processes accounted for 39.8 per cent of GHG emissions in 2010, compared with 24.6 per cent in 1990. Between 1990 and 2010, GHG emissions from the industrial processes sector marked the most

significant growth as they increased by 109.7 per cent (from 863 Gg CO₂ eq to 1,810 Gg CO₂ eq), driven mainly by an increase in CO₂ emissions from the aluminium industry through expansion of existing facilities and the building of two new factories. There are very few measures to address emissions from aluminium production. Instead, Iceland availed itself to the provisions of decision 14/CP.7 that under certain conditions allows the exclusion of these emissions in the national totals for accounting purposes. During the review, Iceland elaborated on its application of decision 14/CP.7 and why it considers that the four projects in the aluminium industry in operation since 1990 fulfil the criteria set forth in this decision.

49. According to the NIR 2012 and information provided to the ERT during the review, Iceland is applying a broader interpretation of the definition of an expansion as a single project that falls under the provisions of decision 14/CP.7. In particular, the expansion for the Alcan aluminium plant involved the establishment of a new-build potline while at the same time increasing the capacity of the two existing potlines. In this context, the ERT acknowledged that the definition of an expansion of an industrial process facility at a single site in decision 14/CP.7 could be interpreted differently, namely, that only the new-build potline would count as an expansion. Since calculations show that the different interpretations of an expansion could lead to different results based on the same data from Iceland's NIR, the ERT recommended that Iceland carefully consider both interpretations and take a precautionary approach in the lead-up to the end of the first commitment period of the Kyoto Protocol.

50. The other measures in the industrial processes sector include the limit set on perfluorocarbon (PFC) emissions from aluminium smelters and the switch from coal to biomass – in particular wood – as a carbon source in ferroalloy production, which is only partly implemented. While the effect of the switch from coal to biomass has not been estimated, the limit on PFC emissions led to a reduction in emissions by 300,000 tons from 1990 to 2004, despite the fact that aluminium production increased during that period.

51. **Agriculture.** Agriculture accounted for 14.2 per cent of total GHG emissions in 2010, compared with 20.1 per cent in 1990. Between 1990 and 2010, GHG emissions from the agriculture sector decreased by 8.1 per cent (from 703 Gg CO₂ eq to 646 Gg CO₂ eq), driven mainly by a decrease in CH₄ emissions from livestock and manure as well as a decrease in N₂O emissions from fertilizer application. Studies have been undertaken to explore the possibilities of improved manure management as the most promising method to reduce agricultural emissions that mainly result from fertilizer application.

52. **LULUCF.** The LULUCF sector was a net source of 734 Gg CO₂ eq in Iceland in 2010 and net GHG emissions decreased by 455 Gg CO₂ eq or 38.2 per cent since 1990. The trend was mainly driven by revegetation and reforestation, which are the elected activities under the Kyoto Protocol with high priority in Iceland. There is significant potential to enhance carbon sequestration beyond the present level due to the high proportion of land available for revegetation and reforestation.

53. The Icelandic Government implemented a four-year programme of revegetation and tree planting during 1997–2000 to increase the sequestration of CO₂ in the biomass. Efforts to increase the annual carbon sequestration rate resulting from these programmes have continued since then. A strategic plan for soil conservation and revegetation for the period of 2003 to 2014, adopted by the Icelandic Parliament in 2002, lists carbon sequestration as one of the four main objectives of this plan. Increased afforestation and revegetation as well as the restoration of drained wetlands are also among the 10 key actions in the Government's 2010 Action Plan.

54. **Waste management.** Between 1990 and 2010, GHG emissions from the waste sector increased by 44.6 per cent (from 148 to 214 Gg CO₂ eq), mainly driven by the continuation

of organic waste being disposed of in landfills. The total amount of waste has been increasing in recent years, although some reduction has occurred since the economic downturn in 2008. Despite the increase in waste, GHG emissions from the sector have declined due to increased recycling and technological advances in waste handling.

55. The two most important measures in waste management are the reduction of the organic waste fraction being disposed of in landfills and the collection of CH₄ from the largest landfill in the country, which started in 1997. Captured methane is currently not used for electricity production. An electricity production unit was in operation from 2002–2009, but it did not function properly. The number of vehicles using methane as fuel has increased substantially for the last couple of years. In 2010, around 50 vehicles ran either solely or partially on methane. The rest of the captured methane is flared. It is estimated that the methane from landfill could power at least 2,000 cars annually. The difference between this estimate and actual methane production stems from difficulties in collecting methane. Together the reduction in the amount of organic waste being disposed of in landfills since 2005 and the increase in methane collection led to a reduction of methane emissions by 4.4 per cent from 2009 to 2010. This reduction is expected to continue in the future.

4. Minimization of adverse effects in accordance with Article 2, paragraph 3, of the Kyoto Protocol

56. In its NC5, Iceland did not provide information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts, on other Parties, especially developing country Parties. During the review, Iceland made a reference to information under Article 3, paragraph 14, of the Kyoto Protocol reported in its 2012 annual submission. This is presented in chapter II.I of this report. The ERT recommends that Iceland provide information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects in its next national communication.

C. Projections and the total effect of policies and measures, and supplementarity relating to the Kyoto Protocol mechanisms

57. The projections reported in the NC5 were prepared in 2008 and presented relative to the 2007 inventory data that were the latest data available at that time. A number of new PaMs have been adopted after the submission of the NC5. These were included in Iceland's 2010 Action Plan and reflected in updated projections that were provided to the ERT during the review. The total effect of new policies and measures has been assessed in the framework of the 2010 Action Plan and reflected in this review report. Due to Iceland's unique energy and emission profile, emphasis of GHG projections is placed on the following sectors: industry and chemical use, transport, fisheries, agriculture, waste and electricity, and heat productions.

1. Projections overview, methodology and key assumptions

58. The GHG emission projections provided by Iceland in the NC5 include two "with measures" scenarios until 2050, presented relative to actual inventory data for 2007. Projections were presented on a sectoral basis for some sectors (see para. 57 above), although in graphical format rather than numerical values. The sectors used in projections are not exactly the same as those used in the PaMs section.

59. The ERT noted that in the NC5 Iceland did not provide the following reporting elements required by the UNFCCC reporting guidelines: projections presented on a gas by gas basis for the following GHGs: CO₂, CH₄, N₂O, PFCs, HFCs and sulphur hexafluoride; aggregated projections for the energy and LULUCF sector as well as for a national total, using global warming potential values; and emission projections related to fuel sold to ships and aircrafts engaged in international transport. In addition, projections in numerical format were not provided in the NC5. During the review, this missing information was provided by Iceland. The ERT recommends that Iceland provide this information in its next national communication.

60. The two 'with measures' scenarios presented in the NC5 include PaMs that had been adopted before 2007. These two scenarios were developed based on different assumptions with regard to economic growth, population growth, and the size of production of aluminium and ferrosilicon industries that have the largest impact on total national emissions in Iceland. Scenario 1 assumes no added capacity to the energy-intensive industries after 2008, whereas scenario 2 assumes that production volumes by 2015 will reach the maximum levels allowed according to environmental permits already issued.

61. Methodologies used for GHG projections were not transparently described in the NC5. During the review, Iceland provided additional information on methodologies, including those used for different sectors. Methods used are influenced by the size of the country, since some activities in the industry and energy sector need to be modelled on a plant by plant (project) basis due to the high share of individual plants/projects in the total national emissions. Detailed databases with activity data are available for analytical purposes (car fleet, afforestation data, etc.). The ERT noted that significant improvements have been made in the quantitative assessment of the impacts of PaMs and the total effects of PaMs during the preparation of the 2010 Action Plan compared with the information reported in the NC5. The economic and technical feasibility of the set of PaMs in most of the sectors and the potential effect of these PaMs on emission reduction have been analysed during the preparation of 2010 Action Plan.

62. Based on information provided during the review, the ERT noted that the methodologies used for preparing projections by sector are based on the following approaches: (a) industrial processes: projections are prepared mostly on the basis of an overview of planned and potential future projects in metal production; (b) transport: projections are based on modelling vehicle stock change subject to the penetration of more efficient or improved technologies and use of alternative fuels, as well as to changes in car ownership and annual mileage that are highly dependent on economic growth; (c) fisheries: projections are based on assumptions related to activities (future fish catch), expected penetration of biofuels as a fuel for fishing vessels and the penetration of electricity in fish-meal production; (d) agriculture: projections are based on assumptions related to activity data; (e) afforestation: projections are based on empirical data on carbon uptake from previous afforestation (forest growth in recent years) and planned afforestation activities; (f) wetland restoration: projections are prepared on the basis of planned activities; and (g) waste: projections are based on assumptions related to the disposal of organic matter and landfill gas use.

63. Key assumptions on important variables influencing future GHG emission trends for sectors with the highest share in Iceland's GHG emissions (industrial processes, transport, fisheries, LULUCF) as well as for the other sectors were provided in the NC5 and elaborated on during the review. The most important assumptions include those on the economic and population growth, the size of production of aluminium and ferrosilicon industries, the volume of the fish catch and afforestation activities. Another assumption is that the penetration of new and alternative energy sources in the transport sector is expected to be predominantly market driven. As projections of fuel use following the recent

economic development were prepared in 2012 only, related GHG emission projections were not available during the review.

64. Sensitivity analysis has been carried out for GHG emissions in two scenarios with different assumptions on economic growth, population growth and industrial production. Overall, fuel use in transport and related emissions are the most sensitive to economic development. During the review, additional information was provided on the sensitivity of projections based on qualitative parameters: (a) the scale of the impact of afforestation will depend on the availability of financial resources under the Government incentive programmes; (b) the penetration rate of electricity in fisheries (fish-meal production and other activities) will depend on electricity grid expansion and related costs; (c) the penetration rate of biofuels will depend on the availability of biofuels that meet the sustainability criteria; and (d) technological development will have a very important impact on GHG emissions in Iceland in the longer term from 2020 to 2050, particularly for the transport sector, aluminium production and geothermal energy production.

2. Results of projections

65. Iceland's Kyoto Protocol target, that is to limit the growth in its GHG emissions to 10 per cent in relation to the base-year level, translates into an average assigned amount of 3.71 Tg CO₂ eq per year during the Kyoto Protocol first commitment period (2008–2012). The projections provided in the NC5 for 'with measures' scenario 1 (see para. 60 above) show that Iceland's total GHG emissions are expected to amount to 4.68 Tg CO₂ eq on average during the first commitment period without the application of decision 14/CP.7. This results in an estimated gap of 0.97 Tg CO₂ eq annually for the first commitment period.

66. In the NC5, Iceland estimated that under scenario 1, the average annual emissions from industrial processes from sources that meet the criteria set forth in decision 14/CP.7 amount to 1.25 Tg CO₂ eq during the period of 2008–2012. As this estimate is higher than the estimated gap to the emission target, with the use of provisions of decision 14/CP.7, Iceland is expected to meet its Kyoto Protocol target for the first commitment period for 'with measures' scenario 1.

67. Due to higher levels of the industrial process emissions projected under 'with measures' scenario 2, total GHG emissions are expected to amount to an average 5.19 Tg CO₂ eq during the first commitment period without the application of decision 14/CP.7. This results in a gap of 1.48 Tg CO₂ eq annually during the first commitment period. Under scenario 2, Iceland estimated that the average annual emissions from sources that meet the criteria of decision 14/CP.7 amount to 1.53 Tg CO₂ eq during the period of 2008–2012. Hence, with the use of the provisions of decision 14/CP.7, Iceland is expected to meet its Kyoto Protocol target also for 'with measures' scenario 2.

68. According to the NC5, total GHG emissions are expected to amount to 4.65 Tg and 5.99 Tg CO₂ eq in 2020 under 'with measures' scenarios 1 and 2, respectively. Under the two scenarios, emissions from industry and chemical use will contribute the most to total GHG emissions, making up 47.6 per cent and 57.8 per cent, respectively of the total emissions. This will be followed by the transport sector, which will contribute 18.2 per cent and 15.7 per cent, respectively, to total emissions by 2020 under the two scenarios. Emissions from the fisheries sector will account for 12.8 per cent and 10.0 per cent of total emissions, while emissions from the agriculture sector will contribute 10.8 per cent and 8.4 per cent to total emissions by 2020 under the two scenarios. By 2020, emissions from the waste sector will be around 5.9 per cent and 4.6 per cent of total emissions under scenarios 1 and 2. Finally, emissions from electricity and heat production will contribute 4.7 per cent and 3.6 per cent of total emissions by 2020 under the two scenarios.

69. According to Iceland, no significant changes in the shares of GHG emissions by gas are expected in 2020 compared to those in 2010. Specifically, under ‘with measures’ scenario 1, the shares of CH₄ and N₂O emissions are expected to decrease by 2.1 and 1.3 per cent, respectively, in 2020 compared with the 2010 level due to a decrease in agricultural activities and the effect of PaMs in the waste and agricultural sectors. A further decrease in the share of PFCs (by 0.8 per cent points in 2020 compared with the 2010 level) is expected, while the level of PFC emissions will remain stable at the 2010 level. However, future levels of PFC emissions will also depend on the possible expansion of aluminium production in the country. The share of CO₂ emissions is expected to increase by 3 per cent points in 2020 compared with the 2010 level.

70. The most recent projections were prepared in 2012 taking into account the effects of 2010 Action Plan (see para. 30). The expected emissions after the implementation of the plan are projected to be between 4.12 and 5.32 Tg CO₂ eq by 2020, which represents an increase in emissions of around 22.3–57.9 per cent compared with the base-year levels. By sector, emissions from the industry sector are projected to be between 1.70 and 2.90 Tg CO₂ eq; from the transport sector, around 0.75 Tg CO₂ eq; from fisheries, around 0.45 Tg CO₂ eq; from the agricultural sector, around 0.45 Tg CO₂ eq; from the waste sector, 0.20 Tg CO₂ eq; from power production, around 0.22 Tg CO₂ eq; and from sector others, around 0.35 Tg CO₂ eq. Removals from LULUCF activities are expected to reach 0.80 Tg CO₂ eq annually. The results of the projections are shown in table 4 and the figure below.

Table 4
Summary of greenhouse gas emission projections for Iceland

| | <i>Greenhouse gas emissions (Tg CO₂ eq per year)</i> | <i>Changes in relation to base year level (%)</i> | <i>Changes in relation to 1990 level (%)</i> |
|--|---|---|--|
| Inventory data 1990 ^a | 3.50 | 3.9 | NA |
| Inventory data 2010 ^a | 4.54 | 34.7 | 29.7 |
| Kyoto Protocol base year ^b | 3.37 | NA | -3.7 |
| Kyoto Protocol target ^b | 3.71 | 10.0 | 6.0 |
| NC5 ‘with measures’ projections for 2010 (scenario 1/scenario 2) ^c | 4.68/5.19 | 38.9/54.0 | 33.6/48.3 |
| NC5 ‘with measures’ projections for 2020 (scenario 1/scenario 2) ^c | 4.65/5.99 | 38.0/77.7 | 32.9/71.1 |
| Updated ‘with additional measures’ projections for 2020 ^d | 4.12~5.32 | 22.3~57.9 | 17.7~52.0 |

^a *Source:* Iceland’s 2012 greenhouse gas (GHG) inventory submission; the emissions are without land use, land-use change and forestry (LULUCF).

^b *Source:* Based on the initial review report contained in document FCCC/IRR/2007/ISL.

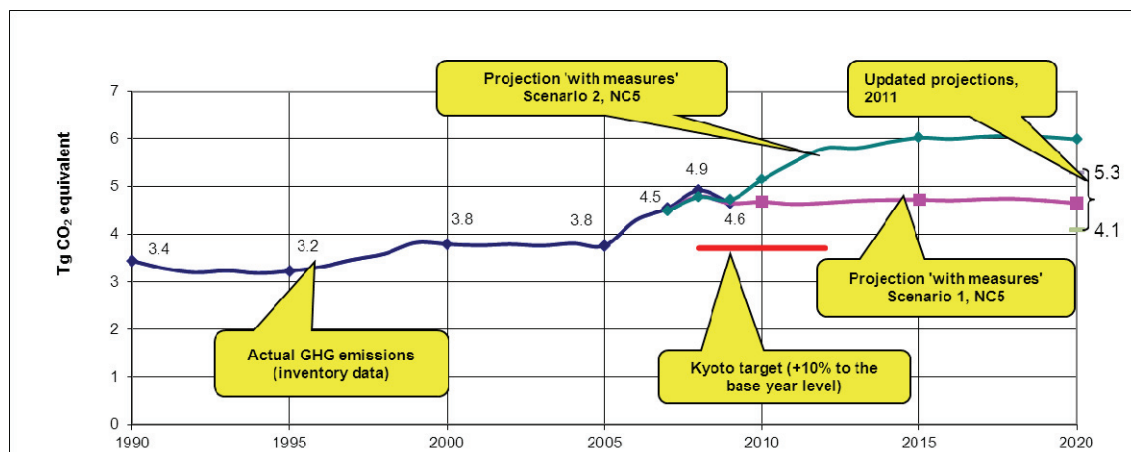
^c *Source:* Iceland’s fifth national communication.

^d *Source:* Updated projections provided by the Party during the in-depth review; the projections are for GHG emissions without LULUCF and taking into account the effect of the Action Plan for Climate Change Mitigation 2011.

71. In the 2010 Action Plan, Iceland set the national target for GHG emission reduction for sectors not included in the EU ETS, which is a 16 per cent reduction by 2020 compared with the 2005 levels. The achievement of this medium term target will mostly depend on the effective implementation of the 2010 Action Plan. LULUCF will be an important sector for GHG emission reductions in Iceland in the mid to long term. At the time of the review, the financial resources were not yet allocated for the implementation of measures specified

in the 2010 Action Plan to enable planned afforestation activities. The electricity sector expansion is a necessary condition for fuel switch to low-carbon electricity in fish-meal production and is not yet implemented. Moreover, the expected emission reduction is not yet fully underpinned by necessary measures (e.g. agriculture). It is also not yet clear whether fuel switch in the transport sector led by the market and stimulated by tax policy will be sufficient to achieve the targets set in the plan.

Greenhouse gas emission projections



Sources: (1) Data for the years 1990–2010: Iceland’s 2012 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry (LULUCF). (2) Data for the years 2009–2020: Iceland’s fifth national communication; the emissions are without LULUCF.

Note: The estimated gap does not exceed the threshold of 1.6 Tg CO₂ eq of emissions that are allowed to be offset by decision 14/CP.7 under the condition that the criteria set forth in decision 14/CP.7 are met.

72. In the longer term, Iceland has a target of reducing emissions by 50–75 per cent by 2050 compared with the 1990 level (see para. 28 above). The NC5 projections indicate that by 2050 total GHG emissions in Iceland will reach 4.03 Tg and 5.62 Tg CO₂ eq, respectively, under ‘with measures’ scenarios 1 and 2, which are higher than the 1990 level. Hence, fulfilment of the long-term target will depend significantly on future technological development in aluminium production and in the transport sector. However, due to the size of its economy, Iceland is not in a position to influence global technological development in these fields significantly. It remains unclear to the ERT how this long-term target will be met through present and future PaMs and how the technological uncertainty will be addressed.

3. Total effect of policies and measures

73. In the NC5, Iceland presented very limited information on the expected total effect of implemented and adopted PaMs. The total effect of PaMs was estimated as an aggregation of policy effects from afforestation and revegetation activities as well as the provision of land-based electricity to ships in harbours for 2010 and 2020. The effects of other measures were not presented in the NC5, but were provided during the review.

74. In addition, in the NC5, Iceland did not provide the following reporting elements required by the UNFCCC reporting guidelines: an estimate of the total effect of its PaMs, in accordance with the ‘with measures’ definition, compared with a situation without such PaMs, presented in terms of GHG emissions avoided or sequestered, by gas (on a CO₂ eq basis) in 1995 and 2000, and relevant information on factors and activities for each sector

for the years 1990 to 2020. Significant improvement has been made in the quantitative analysis of measures during the preparation of the 2010 Action Plan.

75. Table 5 provides an overview of the projected effects in 2020 of the planned PaMs specified in the 2010 Action Plan. An assessment of the projected effects of PaMs in 2010 was not provided in this table, as such information was not reported in the NC5. As table 5 shows, PaMs implemented in the LULUCF sector will deliver the largest emission reductions, followed by the effect of PaMs implemented in transport and fisheries sectors. The most effective PaMs and drivers behind GHG emission reductions are described in sections II.B.1 and II.B.2.

Table 5
Projected effects of planned, implemented and adopted policies and measures in 2020

| <i>Sector</i> | <i>Effect of planned measures (Tg CO₂ eq)</i> | <i>Relative value (% of 1990 emissions excluding LULUCF)</i> |
|---|--|--|
| Energy (without CO ₂ from transport) | 0.24 | 6.9 |
| Transport – CO ₂ | 0.22 | 6.4 |
| Industrial processes | NA | NA |
| Agriculture | 0.12 | 3.3 |
| Land-use change and forestry | 0.78 | 22.1 |
| Waste management | 0.02 | 1.6 |
| Total | 1.38 | 39.4 |

Source: Action Plan for Climate Change Mitigation, 2010.

Note: The total effect of *planned* policies and measures is defined as the difference between the ‘with measures’ scenario as implemented and planned in 2011 relative to emissions in 2008.

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

76. The ERT encourages the Party to follow the UNFCCC reporting guidelines more closely in the submission of its next national communication, particularly in reporting on methodology and the sensitivity of projections to changes in external parameters and implementation issues. The ERT also encourages the Party to report the total effect of PaMs separately from measures already implemented and those of new and additional measures.

4. **Supplementarity relating to mechanisms pursuant to Articles 6, 12 and 17**

77. Iceland in its NC5 provided sufficient information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. It is expected that Iceland will meet its commitments under the Kyoto Protocol for the first commitment period without making use of the Kyoto Protocol mechanisms under Articles 6, 12 and 17, but by applying provisions of decision 14/CP.7.

D. **Vulnerability assessment, climate change impacts and adaptation measures**

78. In its NC5, Iceland has provided the required information on the expected impacts of climate change in the country. However, the ERT noted that Iceland did not provide information on vulnerability assessment and adaptation options as well as the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. During the review, Iceland provided information on mitigation options in various sectors,

which have components that can be reported as adaptation options. Initial elements of vulnerability assessment were actually included in the impact assessment, although this has not been outlined in the NC5. The ERT was informed during the review that studies are ongoing across most sectors that will subsequently inform the adaptation options. Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC5 and provided during the review.

Table 6
Summary of information on vulnerability and adaptation to climate change

| <i>Vulnerable area</i> | <i>Examples/comments/adaptation measures reported</i> |
|-------------------------------------|--|
| Agriculture and food security | <p><i>Vulnerability:</i> Frost heaving resulted in damaged hayfields frequently, and reduced the potential production by 20–30 % between 1960 and 1980. However, increased temperatures since 2000 have improved the yield as spontaneous adaptation has occurred. Consequently, a significant increase in production is anticipated. Warmer temperatures have also meant an increase in other crops such as barley and wheat, and other cereals. Animal husbandry is also not very vulnerable to increased temperatures, but rather beneficial as fodder increased. Concern was expressed about the pressure being placed on new areas, which have not been traditionally used for agriculture</p> <p><i>Adaptation:</i> N.A.</p> |
| Biodiversity and natural ecosystems | <p><i>Vulnerability:</i> Higher temperatures could bring pests and diseases, and result in the introduction of new invasive species that would compete with indigenous species</p> <p><i>Adaptation:</i> The use of fertilizer, with the potential risk of it becoming a source of pollution</p> |
| Fisheries | <p><i>Vulnerability:</i> Not vulnerable, but could benefit from global warming. Warming is likely to improve the survival of larvae and juveniles of most species, and is likely to contribute to the increased abundance of commercial stock. However, some species have been observed to decline. The uncertainty of the effect of acidification was expressed</p> <p><i>Adaptation:</i> Studies that will inform adaptation options are ongoing</p> |
| Forests | <p><i>Vulnerability:</i> The impact assessment suggests that this sector is vulnerable to an increase in pests and diseases from high temperatures. Downy birch was cited as an example, as some of them were defoliated by alien insects. Warmer temperatures are also likely to result in longer growing seasons and increased coverage of natural and managed forest. Warmer temperatures can cause an early start in the growth cycle, increasing the chances of frost damage</p> <p><i>Adaptation:</i> Studies to inform these options are ongoing</p> |
| Human health | <p><i>Vulnerability:</i> Frequency and intensity of climate-related natural disasters or extreme events will pose a severe threat to human health. The capacity of the health system to respond is limited. There is an indication that further studies are warranted.</p> <p><i>Adaptation:</i> Ongoing studies will inform adaptation options</p> |
| Infrastructure and economy | <p><i>Vulnerability:</i> Melting glaciers and increasing surface water may increase the frequency of river and coastal flooding and erosion. The capacity of existing infrastructure of drainage, roads and bridges would need to be modified to accommodate a greater capacity of water</p> <p><i>Adaptation:</i> Climate change factored into future design and location of infrastructure. Studies are ongoing</p> |
| Water resources | <p><i>Vulnerability:</i> Increase in surface water from melting glaciers</p> <p><i>Adaptation:</i> Excess water is channelled to hydropower for use in operations</p> |

79. The reporting in the NC5 on vulnerability, impacts and adaptation has been improved compared with that in the NC4. Specifically, the NC5 includes more rigorous and detailed information on current climate variability and climate projections, using the

scenarios and models of the Intergovernmental Panel on Climate Change (IPCC) and detailed impact assessment. The two main climate elements are temperature and precipitation, the latter is projected to increase by about 2.5 per cent for each degree of warming. Although the Party has not demonstrated the use of a specific framework or methodology to facilitate a thorough vulnerability and impact assessment to determine current climate variability, there is detailed information on vulnerability and the likely impacts with climate change projections. These include glaciers and oceans, fisheries, land ecosystem, forests, soils, and agriculture. Although not outlined in extensive detail, there was a brief mention in the NC5 of the impacts on society.

80. There is extensive research that has taken place or is ongoing in Iceland that will further inform on vulnerability, impacts on different sectors and consequent adaptation options. A structured methodology was not defined in the NC5, and the ERT noted that research has been conducted in different sectors without harmonization or coordination. With the exception of increased frequency and intensity of natural disasters and climate-related risks, Iceland has not anticipated any significant socioeconomic impact. According to Iceland, the impact of increasing temperature is likely to be positive.

81. Iceland has undertaken a number of initiatives to support developing country Parties to prepare for adaptation. These cover areas such as sustainable fisheries, soils and ecosystems, land reclamation, gender and climate change. The environment and climate change courses attended by students from developing countries, and knowledge-sharing help to build their capacity to conduct in-country research on impact assessment.

82. Iceland has undertaken significant work on climate variability assessment and climate projections, which form the basis for conducting the vulnerability assessment. In order to enhance efforts to successfully formulate adaptation options, the ERT encourages Iceland to develop a framework within which vulnerability and adaptation assessment could be developed. This will facilitate a more thorough vulnerability and impacts assessment for all important sectors and the development of practical adaptation options. Although the ERT was informed that there is a lack of funding to pursue adaptation options, further research may yield practical and effective options, which may be relatively inexpensive. The ERT notes that a focus on adaptation research and the formulation of adaptation options will facilitate closer collaboration among the different actors and result in the sectoral integration that Iceland seeks.

E. Financial resources and transfer of technology, including information under Articles 10 and 11, of the Kyoto Protocol

1. Provision of financial resources, including ‘new and additional’ resources and resources under Article 11 of the Kyoto Protocol

83. The information provided in the NC5 covers most of the issues on which information is required under the Convention and its Kyoto Protocol. However, the ERT noted that the Party did not provide an indication of what ‘new and additional’ financial resources it has provided pursuant to Article 4, paragraph 3. The ERT recommends that Iceland enhance completeness of reporting by including this information in its next national communication.

84. In its NC5, Iceland provided details on measures taken to give effect to its commitments under Article 4, paragraphs 3–5, of the Convention as required by the UNFCCC reporting guidelines and under Article 11 of the Kyoto Protocol, as required by the Guidelines for the preparation of information required under Article 7 of the Kyoto Protocol. During the review, Iceland provided information on how it defines ‘new and

additional' financial resources. According to Iceland, the increasing volume of official development assistance (ODA) since 2005 as well as an increase in climate-related ODA in the last couple of years can be considered as 'new and additional' financial resources, despite a decrease in total ODA during 2010–2012 due to the financial crisis experienced earlier. According to the Strategy for Iceland's International Development Cooperation, Iceland aims to increase the percentage of ODA in gross national income to 0.7 per cent by 2019. Another element of the 'new and additional' financial resources involves a separate budget item that has been included in the state budget since 2012, which focuses on environmental and climate change issues. This budget item includes Iceland's fast-start finance commitments. With the new budget item, allocations to climate change projects now have earmarked funding, instead of being a part of the general budget line.

85. Iceland has also provided detailed information on the assistance it has made available to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them meet the costs of adaptation to those adverse effects. Furthermore, Iceland has provided information on other financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels. In particular, Iceland provided financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels, including the Global Environment Facility and the UNFCCC. Table 7 summarizes information on financial resources and technology transfer.

Table 7
Summary of information on financial resources and technology transfer for 2007–2011

| <i>Channel of financial resources</i> | <i>Years of disbursement (Unit: thousand USD)</i> | | | | |
|---------------------------------------|---|-------------|-------------|-------------|-------------|
| | <i>2007</i> | <i>2008</i> | <i>2009</i> | <i>2010</i> | <i>2011</i> |
| Official development assistance (ODA) | 34 397.9 | 48 732.2 | 34 503.0 | 28 596.8 | 25 506.0 |
| Climate-related aid in bilateral ODA | 2 247.1 | 4 948.3 | 5 413.0 | 5 896.5 | 6 333.6 |
| Other (bilateral/multilateral) | 4 473.7 | 7 286.8 | 6 452.3 | 5 212.1 | 5 558.1 |

86. According to the Strategy for Iceland's International Development Cooperation, priority areas for the financial flows include natural resources (renewable energy and fisheries), human capital and peacebuilding. Cross-cutting priority issues include gender equality and environmental sustainability. Climate change related financial flows fall mostly under natural resources, including the United Nations University (UNU) Geothermal and Fisheries Training Programmes, the UNU Land Restoration Training Programme and fast-start finance. Other important climate-related activities include support to geothermal energy projects in Nicaragua and East Africa, and a new compact with the World Bank with the aim of enabling the countries along the African Rift Valley to acquire reliable mapping of geothermal areas and plans for resource testing through drilling. Iceland has furthermore engaged in several water and sanitation projects as well as projects on gender and climate change. In terms of priority regions, high emphasis has been placed on Sub-Saharan Africa, including Malawi, Mozambique and Uganda. In addition, the Strategy for Iceland's International Development Assistance reflects the need to support small island developing States (SIDs) in adapting and mitigating the effects of climate change.

87. During the review, Iceland elaborated on financial resources provided to the climate change related funds set up under the Copenhagen Accord. Iceland has committed itself to

provide USD 1 million for the period 2011 to 2012 under the fast-start finance programme. The allocation of this fund will be balanced between mitigation and adaptation, with a focus on least developed countries and SIDS. The ERT noted that specific projects funded by fast-start finance include those addressing the gender dimension of climate change on fisheries sector livelihoods, geothermal energy and technical assistance to Dominica, gender sensitive climate change mitigation and adaptation in Uganda, as well as those that are supported by the UNFCCC Least Developed Countries Fund and the Women's Delegates Fund.

2. **Activities related to transfer of technology, including information under Article 10, of the Kyoto Protocol**

88. In its NC5, Iceland has provided details of measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound technologies. It also reports on activities related to technology transfer in specific areas such as the development of geothermal energy and its activities for financing access by developing countries to 'hard' or 'soft' environmentally sound technologies. Furthermore, Iceland has reported in textual format on the steps taken by governments to promote, facilitate and finance the transfer of technology, and to support the development and enhancement of endogenous capacities and technologies of developing countries. According to Iceland, all of the reported activities are undertaken by the public sector or international organizations. Therefore, no distinction was made between public- and private-sector activities in the NC5.

89. The ERT noted that although technology transfer and capacity-building focused more on mitigation, they also have some indication of adaptation benefits. According to the NC5, these projects focus on the following: emphasizing the sustainable utilization of natural resources; strengthening the United Nations University Fisheries Training Programme and Geothermal Training Programme through involving more students and setting up training courses in developing countries; establishing the Land Restoration Training Programme that specializes in the restoration of degraded land and sustainable land management in order to assist developing countries in capacity development within this field; establishing the Gender Equality Training Programme that offers courses on gender and climate; focusing the Icelandic International Development Agency's bilateral development cooperation on energy and strengthening collaboration with international institutions in the field of fisheries, renewable energy and gender equality.

90. According to Iceland, for the time being no ODA is channelled through the private sector. However, an analysis is under way within the Ministry of Foreign Affairs on the possibilities of promoting private-sector engagement in development cooperation. Currently the Ministry of Foreign Affairs does not actively monitor non-ODA flows, including financial flows from non-governmental organizations (NGOs) and the private sector to developing countries. Iceland is, however, in the process of implementing the Rio markers⁶ developed by the Organisation of Economic Co-operation and Development and will in the future attempt to measure non-ODA flows, such as those from NGOs and the private sector.

F. **Research and systematic observation**

91. Iceland has provided information on its actions relating to research and systematic observation, and addressed both domestic and international activities, including the World Climate Programme, the International Geosphere–Biosphere Programme, the Global

⁶ <<http://www.oecd.org/dac/aidstatistics/48785310.pdf>>.

Climate Observing System (GCOS) and the IPCC. The NC5 also reflects action taken to support related capacity-building in developing countries. Furthermore, Iceland has provided a summary of information on its GCOS activities.

92. In the NC5, Iceland outlined its climate modelling and monitoring activities, most of which have a domestic focus. The ERT notes that the output of this research is beneficial to all countries including developing countries. Iceland has also been actively involved in international activities through working with overseas universities on a number of projects including paleoenvironmental studies, such as those on fossils, soils and sediment.

93. According to the NC5, emphasis on research and development has increased in Iceland and is facilitated by legislation and promoted by the Science and Technology Policy Council. Around 55 per cent of research and development expenditure is from the private sector and 43 per cent from the public sector, including support provided to higher education institutions. The NC5 indicated that academic research on the socioeconomic dimensions of the climate change issue has yet to be established. The ERT notes that the information contained in the NC5 focuses on research on climate processes, the climate systems and the impacts of climate change.

94. Iceland engages in extensive GCOS related work such as monitoring the climate system, detecting climate change, assessing the impacts of climate change on soils, flora and fauna, oceans, and water resources, supporting adaptation to climate variability and climate change, and conducting research to improve understanding, modelling and prediction of the climate system at the national level.

G. Education, training and public awareness

95. In the NC5, Iceland has provided information on its actions relating to education, training and public awareness on both domestic and international levels. Through the UNU and in cooperation with other institutions, Iceland has provided international training programmes aimed at assisting developing countries in capacity development, including the following: (a) the Land Restoration Training Programme covering the restoration of degraded land and sustainable land management, with cooperation between the UNU, the Government of Iceland, the Soil Conservation Service of Iceland, and the Agricultural University of Iceland; (b) the Geothermal Training Programme, which aims at assisting developing countries in capacity-building on geothermal exploration and development. The programme has been in place in Iceland since 1979, with cooperation between the UNU and the Government of Iceland and being hosted by the National Energy Authority of Iceland; (c) the Gender Equality Studies and Training Programme is aimed at promoting gender equality and women's empowerment through education and training. The programme is a joint project between the University of Iceland and the Ministry for Foreign Affairs and is part of the Government's development cooperation efforts. The programme is implemented by the University of Iceland through EDDA – Centre of Excellence.

96. During the review, Iceland provided further information on its education policy in the area of climate change. According to Iceland, environmental education is gaining importance in the new national curriculum guide, which was adopted in 2011 for education at preschool level, compulsory level and upper secondary level. Sustainability is one of the six key priorities identified in the curriculum. Climate change issues are communicated to the general public in various ways ranging from increasing public awareness of the relationship between mankind and nature/environment (activity carried out by museums) to providing practical information to families (through the Global Action Plan run by an environmental NGO). Climate change is an element of policy debates under various processes, such as the green growth.

97. The Icelandic Government involves both business and environmental NGOs in the preparation of climate change PaMs. The NGOs are also participating in different working groups at various stages of the preparation of these PaMs. However, formal consultation of the general public on draft policy and legal documents has not been reported in the NC5.

H. Evaluation of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

98. Iceland has provided most of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC5. The supplementary information is placed in different sections of the NC5. Table 8 provides an overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol as well as references to the NC5 chapters in which this information is provided.

99. Iceland has not reported the following elements of the supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol: identification of steps taken to promote and/or implement any decisions by ICAO and IMO in order to limit or to reduce GHG emissions not included in the Montreal Protocol from aviation and marine bunker fuels; information on what efforts Iceland is making to implement PaMs in such a way as to minimize adverse effects, including the effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention; and a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol also contribute to the conservation of biodiversity and the sustainable use of natural resources.

100. During the review, Iceland provided information on these elements. The ERT recommends that Iceland include these reporting elements in its next national communication.

Table 8

Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

| <i>Supplementary information</i> | <i>Reference</i> |
|--|--|
| National system | NC5, Chapter 3.2 |
| National registry | NC5, Chapter 3.3 |
| Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 | NC5, Chapter 4.4 |
| Policies and measures in accordance with Article 2 | NC5, Chapter 4 |
| Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures | NC5, Chapter 3.2, 3.3, 4.1, 4.2, 4.3 |
| Information under Article 10 | NC5, Chapter 3.2, 4.3, 4.4, 6, 7.3, 8, 9 |
| Financial resources | NC5, Chapter 7 |

I. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

101. Iceland reported the information requested in section H. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the annex to decision 15/CMP.1 as a

part of its 2012 annual submission. During the in-country review, Iceland provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT considers the reported information to be transparent and complete. The ERT commends Iceland for the additional information provided and encourages Iceland to continue exploring and reporting on the adverse impacts of the response measures.

102. In NIR 2012, Iceland provided information on how the design of its policy instruments in GHG emission reductions takes into consideration national circumstances. It also reported the potential positive impact on other countries fighting against climate change of its experimental research project CarbFix (see para. 43 above). Iceland reported in NIR 2012 that subsidies associated with the use of environmentally unsound and unsafe technologies have not been identified.

103. More information on this topic was provided by Iceland during the review. The Government of Iceland has supported developing countries in building capacity in the area of the sustainable use of natural resources through its administration of the United Nations University Geothermal Training Programme. The Geothermal Training Programme has operated over 30 years, building up expertise in the utilization of geothermal energy, by training more than 400 experts from over 40 countries. The programme provides their graduating fellows with the opportunity to enter postgraduate programmes in Icelandic universities. Iceland plans to continue its support for geothermal projects in developing countries with geothermal resources, which can be utilized to decrease their dependency on fossil fuels for economic development.

III. Conclusions and recommendations

104. The ERT concludes that, in general, the NC5 provides a good overview of the national climate policy of Iceland. The information includes most of the mandatory information required by the UNFCCC reporting guidelines and most of the elements of the supplementary information required under Article 7 of the Kyoto Protocol. The ERT also concludes that the information provided in the NC5 is broadly transparent. Although some mandatory reporting elements were not reported in the NC5, during the review, Iceland provided sufficient information on these missing elements. The ERT noted the delay in the submission of the NC5.

105. Iceland's emissions for 2010 were estimated to be 29.7 per cent above its 1990 level excluding LULUCF and 12.5 per cent above including LULUCF. With abundant RES, emissions from energy industries are low in Iceland. Emission increases were driven mainly by the expansion of heavy industry in Iceland, mainly aluminium production in several facilities or projects. These aluminium production facilities or projects have a major impact on total GHG emission levels in Iceland that is highly visible because of the small size of the Icelandic economy and its total emissions. In accordance with decision 14/CP.7, Iceland is reporting its total emission with and without the CO₂ emissions from projects that meet the criteria specified in decision 14/CP.7.

106. In the NC5, Iceland presented GHG projections for the period from 2008 to 2050. The GHG emission projections include two 'with measures' scenarios based on different assumptions with regard to economic growth, population growth, and the scale of production of aluminium and ferrosilicon industries that have the largest impact on total GHG emissions in Iceland. The projected increase in GHG emissions in an annual average of the period 2008–2012 under these scenarios, in relation to the base year, are 38.9 and

54.0 per cent respectively. Despite this increase, Iceland expects to meet its Kyoto Protocol target (which is to limit the growth in its GHG emissions to 10 per cent in relation to the base year level) when provisions of decision 14/CP.7 is applied. According to the information in the NC5, Iceland is not planning to make use of the Kyoto Protocol mechanisms to meet its target during the first commitment period.

107. The ERT noted that the unique emission and energy profile of Iceland presents a challenge to its emission mitigation plans, as its energy production is almost entirely based on renewables and most of its energy-related emissions stem from mobile sources. Iceland projects to meet its Kyoto Protocol target with the application of provisions of decision 14/CP.7 and a range of measures as described in the NC5 and the 2007 Climate Strategy. The plan includes increased afforestation and revegetation activities, and the provision of economic incentives (excise tax, oil charge tax and carbon tax) targeting fossil fuel consumption in the transport sector, which are expected to increase carbon sequestration and reduce emissions, respectively. As of 2013, the aluminium and ferrosilicon industry will fall under the EU ETS. Benchmarking, gradual lowering of the cap and trade of allowances under the EU ETS are designed to encourage a shift towards cleaner technologies and lower emissions of GHGs in these industries. During the review, the ERT was informed that the development will be closely monitored and reviewed biennially with a view to adopting additional PaMs as necessary.

108. The ERT noted that despite the economic crisis, Iceland remains committed to the provision of new and additional financial resources, as well as the provision of fast-start finance under the Copenhagen Accord. Resources have been allocated to both adaptation and mitigation activities in developing countries, with a focus on the sectors perceived to be most vulnerable or with significant mitigation potential, such as agriculture, disaster management, education, energy, fisheries, water and sanitation. The ERT further noted that, for Iceland, technology transfer and capacity-building focus more on mitigation.

109. Extensive work has been undertaken by Iceland on climate change impact assessment. Ongoing research has also been conducted to inform feasible and practical adaptation options. The ERT noted that this ongoing research will facilitate closer collaboration among different actors and further promote sectoral integration in adapting to climate change.

110. Environmental education in Iceland is gaining importance in the new national curriculum guide for education adopted in 2011, with sustainability being one of the six key priorities identified in the curriculum. Climate modelling and monitoring activities have a domestic focus. However, Iceland is also actively involved in international research activities through cooperating with overseas universities and it engages in extensive GCOS activities.

111. The ERT concluded that Iceland's national system continues to perform its required functions as set out in decision 19/CMP.1; that the national registry continues to perform the functions set out in decision 13/CMP.1 and decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. The ERT noted that updates of database and applications, implemented security measures and changes to the national registry software are documented on a regular basis by nominated responsible persons.

112. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol provided by the Party in its 2012 annual submission is complete and transparent. The ERT encourages Iceland to further enhance the reporting on Article 3, paragraph 14, including by indicating the prioritization of the action taken in implementing its commitments under Article 3.

113. In the course of the IDR, the ERT formulated several recommendations relating to the completeness and transparency of the Party's reporting under the Convention and its Kyoto Protocol. The key recommendations are that Iceland:

(a) Improve the completeness of its reporting by including in the next national communication the following information:

- (i) Description and summary tables of PaMs by sector, subdivided by gas;
- (ii) How Iceland believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals;
- (iii) Emission projections presented on a sectoral and gas-by-gas basis;
- (iv) Emission projections related to fuel sold to ships and aircraft engaged in international transport;
- (v) The expected impact of climate change and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), with regard to adaptation;
- (vi) How Iceland has determined the financial resources to be 'new and additional';
- (vii) Steps taken to promote and/or implement any decisions by the ICAO and IMO in order to limit or reduce emissions of GHG;
- (viii) How the Party strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects on other Parties;
- (ix) A description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, also contributes to the conservation of biodiversity and the sustainable use of natural resources;

(b) Improve the transparency of reporting by including in the next national communication the following information:

- (i) The total effect of PaMs separately for measures already implemented and those for new measures;
- (ii) Further details on the assistance provided to developing country Parties that are particularly vulnerable to climate change in meeting the costs of adaptation;
- (iii) More details on Iceland's activities related to technology transfer, in particular the country's success and failure stories;
- (iv) Further details of the public information available on the website of the national registry;

(c) Improve the transparency of reporting by including in its next annual submission further information on how it gives priority to the actions taken to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol regarding the minimization of the adverse impacts of response measures to climate change.

114. The ERT encourages Iceland to undertake a number of improvements regarding transparency and the completeness of its reporting; the most important of which are that the Party:

(a) Explore further the potential for using RES in mobile sources and to include information on this in its next national communication;[Restart the numbering of this subpara.

- (b) Provide more details on the methodologies used for its GHG projections;

- (c) Report on the sensitivity of projections to changes in external parameters and implementation issues;
- (d) Provide more detailed information on vulnerability assessment and adaption options.

IV. Questions of implementation

115. During the review, the ERT assessed the NC5, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol and reviewed information on the minimization of the adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, with regard to timeliness, completeness and transparency. No question of implementation was raised by the ERT during the review.

Annex

Documents and information used during the review

A. Reference documents

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications”. FCCC/CP/1999/7. Available at <<http://unfccc.int/resource/docs/cop5/07.pdf>>.

“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/CP/1999/7. Available at <<http://unfccc.int/resource/docs/cop5/07.pdf>>.

“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>>.

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FCCC/SBI/2011/INF.1/Add.1. Compilation and synthesis of fifth national communications. Note by the secretariat. Addendum. Policies, measures, and past and projected future greenhouse gas emission trends of Parties included in Annex I to the Convention. Available at <<http://unfccc.int/resource/docs/2011/sbi/eng/inf01a01.pdf>>.

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Fourth national communication of Iceland. Available at <<http://unfccc.int/resource/docs/natc/islnc4.pdf>>.

2009 GHG inventory submission of the Iceland. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4771.php>.

2012 GHG inventory submission of Iceland. Available at
<http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php>.

B. Additional information provided by Iceland

Responses to questions during the review were received from Mr. Hugi Ólafsson (Ministry for the Environment), Mr. Kristján Geirsson (Environment Agency of Iceland) and Mr. Stefán Einarsson (Ministry for the Environment), including additional material on updated policies and measures, greenhouse gas projections, the national registry and recent climate policy developments in Iceland.



Report of the in-depth review of the fifth national communication of Iceland

Parties included in Annex I to the Convention are requested, in accordance with decision 10/CP.13, to submit a fifth national communication to the secretariat by 1 January 2010. In accordance with decision 8/CMP.3, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol shall include in their fifth national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. In accordance with decision 15/CMP.1, these Parties shall start reporting the information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention for the first year of the commitment period. This includes supplementary information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. This report presents the results of the in-depth review of the fifth national communication of Iceland conducted by an expert review team in accordance with the relevant provisions of the Convention and Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. For Iceland, the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Under the Kyoto Protocol, Iceland committed itself to limiting the growth in its greenhouse gas (GHG) emissions to 10 per cent in relation to the base year¹ level during the first commitment period from 2008 to 2012. In implementing this target, Iceland availed itself of the provisions of decision 14/CP.7 on the impacts of single projects on emissions in the commitment period (see para. 32 below).

2. This report covers the in-country in-depth review (IDR) of the fifth national communication (NC5) of Iceland, coordinated by the UNFCCC secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 23 to 28 April 2012 in Reykjavik, Iceland, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Ms. Alma Jean (Saint Lucia), Mr. Vishwa Bandhu Pant (India), Mr. Erik Rasmussen (Denmark) and Ms. Andreja Urbancic (Slovenia). Ms. Jean and Mr. Rasmussen were the lead reviewers. The review was coordinated by Ms. Xuehong Wang and Mr. Bernd Hackmann (UNFCCC secretariat).

3. During the IDR, the expert review team (ERT) examined each section of the NC5. The ERT also evaluated the supplementary information provided by Iceland as a part of the NC5 in accordance with Article 7, paragraph 2, of the Kyoto Protocol. In addition, the ERT reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which was provided by Iceland in its 2012 annual submission under Article 7, paragraph 1, of the Kyoto Protocol.

4. In accordance with 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, in this final version of the report.

B. Summary

5. The ERT noted that Iceland's NC5 complies, to some extent, with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines). As required by decision 15/CMP.1, supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol² is provided in the NC5. Iceland considered some recommendations provided in the report of the centralized in-depth review of the fourth national communication of Iceland.³ The ERT commended Iceland for its improved reporting.

6. The supplementary information on the minimization of the adverse impacts referred to in paragraph 3 above is complete and transparent and was provided on time. During the review, Iceland provided further relevant information.

¹ "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

² Decision 15/CMP.1, annex, paragraphs 27–43.

³ FCCC/IDR.4/ISL.

1. Completeness

7. The NC5 covers all sections required by the UNFCCC reporting guidelines and most of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. However, the NC5 does not include the following information required by the UNFCCC reporting guidelines: summary tables on policies and measures (PaMs) by sectors, subdivided by gases (see para. 27 below); how Iceland believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals (see para. 27 below); emission projections presented on a gas-by-gas basis (see para. 59 below); emission projections related to fuel sold to ships and aircraft engaged in international transport (see para. 59 below); the expected impacts of climate change and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention, with regard to adaptation (see para. 78 below); information on 'new and additional' financial resources (see paras. 83 and 84 below).

8. Also, the NC5 does not include information on the steps taken to promote and/or implement any decisions by the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) in order to limit or reduce emissions of GHG not controlled by the Montreal Protocol from aviation and marine bunker fuels (see para. 99 below); information on how the Party strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects on other Parties (see para. 101 below); description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, which also contribute to the conservation of biodiversity and the sustainable use of natural resources (see para. 99 below). During the review week, the missing information was provided by Iceland. The ERT recommends that Iceland enhance the completeness of its reporting by providing this information in its next national communication.

2. Transparency

9. The ERT acknowledged that Iceland's NC5, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol is broadly transparent. The NC5 provides clear information on all aspects of implementation of the Convention and its Kyoto Protocol. The NC5 is structured following the outline contained in the annex to the UNFCCC reporting guidelines and the supplementary information submitted under Article 7, paragraph 2, of the Kyoto Protocol is easily identifiable. In the course of the review, the ERT formulated a number of recommendations that could help Iceland to further increase the transparency of its reporting with regard to policies and measures (see paras. 47 and 49 below), projections and total effects of policies and measures (see paras. 59 and 76 below), vulnerability, climate change impacts and adaptation (see para. 82 below), a description of the national system (see paras. 19 and 20 below), a description of the national registry (see para. 24 below), and information on minimization of adverse impacts (see para. 101 below).

3. Timeliness

10. The NC5 was initially submitted on 12 February 2010, after the deadline of 1 January 2010 mandated by decision 10/CP.13. A revised version was submitted on 12 March 2010 and the review was based on that revised version.

11. Iceland informed the secretariat about its difficulties with the timeliness of its national communication submission on 22 December 2009 in accordance with decision 22/CMP.1, paragraph 139. The ERT noted the delay in the submission of the NC5.

II. Technical assessment of the reviewed elements

A. National circumstances relevant to greenhouse gas emissions and removals, including legislative arrangements and administrative procedures

12. In its NC5, Iceland has provided a concise description of its national circumstances, and elaborated on the framework legislations and key policy documents on climate change. The NC5 also referred to the description of the national inventory report of the 2009 annual submission. Further technical assessment of the institutional and legislative arrangements for coordination and implementation of PaMs are provided in section II.B.1 of this report.

1. National circumstances

13. In its NC5, Iceland has provided a description of its national circumstances, and information on how these national circumstances affect GHG emissions and removals in Iceland and how changes in national circumstances affect GHG emissions and removals over time. Information was provided on the government structure, population, geography, climate, economy and relevant economic sectors. The ERT noted that the main drivers of emission trends in Iceland include population density and demographic development, geographical situation, primary energy profile and use, transport systems, and economic development, in particular development of industrial processes. The primary energy profile also gives Iceland a unique emission profile, with a very low contribution from energy industries (0.1 per cent in 2010) to total GHG emissions. This low share is due to the abundant availability of renewable energy sources (RES), mainly hydropower and geothermal power, which are widely used for the production of heat and electricity in Iceland. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

14. Iceland is a parliamentary democracy with a president elected by direct voting for a term of four years, with no limit as to the number of terms that may be served. The overall responsibility for climate change policymaking lies within the Ministry for the Environment and a number of national institutions are involved in the implementation of this policy. Implementation of the Kyoto Protocol is underpinned by Act No. 65/2007 on the emission of greenhouse gases, which was passed by the Icelandic legislature, the Althing, in March 2007. A significant part of the policies and measures are deferred to the local level. Further legislative arrangements and administrative procedures, including those related to the national system and the national registry are presented in sections II.A.2, II.A.3 and chapter II.B.

15. Iceland has provided a summary of information on GHG emission trends for the period 1990–2007. This information is mostly consistent with the 2009 national GHG inventory submission. Summary tables, including trend tables for emissions in carbon dioxide equivalent (CO₂ eq) (given in the common reporting format), are also provided in an annex to the NC5. During the review, the ERT assessed the recently submitted 2012 annual submission and reflected the findings in this report.

Table 1
Indicators relevant to greenhouse gas emissions and removals for Iceland

| | 1990 | 1995 | 2000 | 2005 | 2010 | Change ^a 1990–2000 (%) | Change 2000–2010 (%) | Change ^a 1990–2010 (%) |
|---|------|------|------|------|------|---|----------------------------|---|
| Population (million) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 7.7 | 14.3 | 23.1 |
| GDP (2000 USD billion using PPP) | 6.5 | 6.6 | 8.4 | 10.4 | 10.4 | 28.6 | 24.0 | 59.6 |
| TPES (Mtoe) | 2.1 | 2.3 | 3.1 | 3.5 | 5.4 | 45.1 | 74.9 | 153.7 |
| GDP per capita (2000 USD thousand using PPP) | 25.1 | 24.5 | 30.0 | 34.5 | 32.6 | 19.4 | 8.5 | 29.7 |
| TPES per capita (toe) | 8.2 | 8.4 | 11.0 | 11.8 | 16.9 | 34.7 | 53.1 | 106.2 |
| GHG emissions without LULUCF (Tg CO ₂ eq) | 3.5 | 3.3 | 3.8 | 3.8 | 4.5 | 9.8 | 18.1 | 29.7 |
| GHG emissions with LULUCF (Tg CO ₂ eq) | 4.7 | 4.4 | 4.8 | 4.7 | 5.3 | 3.4 | 8.8 | 12.5 |
| CO ₂ emissions per capita (Mg) | 8.3 | 8.6 | 9.8 | 9.5 | 10.6 | 18.7 | 8.3 | 28.5 |
| CO ₂ emissions per GDP unit (kg per 2005 USD using PPP) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | -0.7 | -16.1 | -16.7 |
| GHG emissions per capita (Mg CO ₂ eq) | 13.5 | 12.1 | 13.7 | 12.7 | 14.2 | 2.0 | 3.4 | 5.4 |
| GHG emissions per GDP unit (kg CO ₂ eq per 2005 USD using PPP) | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | -14.6 | -4.8 | -18.7 |

Sources: (1) GHG emissions data: Iceland's 2012 greenhouse gas inventory submission, version 14 April 2012; (2) Population, GDP and TPES data: International Energy Agency, 2012.

Note: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

Abbreviations: GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

16. Total GHG emissions⁴ excluding emissions and removals from land use, land-use change and forestry (LULUCF) increased by 29.7 per cent between the base year and 2010, whereas total GHG emissions including net emissions or removals from LULUCF increased by 12.5 per cent. This increase was mainly attributed to CO₂ emissions, which increased by 58.1 per cent over this period. Emissions of methane (CH₄) also increased by 12.5 per cent, while emissions of nitrous oxide (N₂O) decreased by 11.7 per cent. Emissions of fluorinated gases accounted for about 12.0 per cent of total GHG emissions in 1990 and 4.8 per cent in 2010. A major increase was experienced between 2005 and 2008 (trends for 2005–2008: total GHGs – 29.8 per cent, CO₂ – 25.8 per cent, CH₄ – 2.4 per cent, N₂O – 12.2 per cent) followed by a decrease thereafter due to the global financial and economic crisis. Trends in total GHG emissions were mostly underpinned by GHG emission trends in industrial processes, mainly emissions from the aluminium industry, the energy sector, transport and fisheries, driven by the population increase and strong economic growth. Analysis of the drivers of GHG emission trends in each sector is

⁴ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

provided in section II.B. Table 2 provides an overview of GHG emissions by sector from the base year to 2010.

Table 2
Greenhouse gas emissions by sector in Iceland, 1990–2010

| Sector | GHG emissions (Tg CO ₂ eq) | | | | | | Change (%) | | Shares ^a by sector (%) | |
|---|---------------------------------------|------------|------------|------------|------------|------------|-------------|-------------|-----------------------------------|--------------|
| | 1990 | 1995 | 2000 | 2005 | 2009 | 2010 | 1990b–2010 | 2009–2010 | 1990 | 2010 |
| 1. Energy | 1.8 | 1.9 | 2.0 | 2.1 | 2.0 | 1.9 | 4.9 | -7.5 | 50.8 | 41.1 |
| A1. Energy industries | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -66.3 | -27.1 | 0.4 | 0.1 |
| A2. Manufacturing industries and construction | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.2 | -29.9 | -19.5 | 10.8 | 4.7 |
| A3. Transport | 0.6 | 0.6 | 0.7 | 0.8 | 0.9 | 0.9 | 45.0 | -4.8 | 17.7 | 19.8 |
| A4.–A5. Other | 0.7 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | -14.3 | 0.0 | 20.0 | 13.2 |
| B. Fugitive emissions | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 212.7 | 11.5 | 1.8 | 4.2 |
| 2. Industrial processes | 0.9 | 0.5 | 0.9 | 0.9 | 1.8 | 1.8 | 109.7 | 0.7 | 24.6 | 39.8 |
| 3. Solvent and other product use | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -32.2 | -2.6 | 0.3 | 0.1 |
| 4. Agriculture | 0.7 | 0.6 | 0.7 | 0.6 | 0.7 | 0.6 | -8.1 | -1.3 | 20.1 | 14.2 |
| 5. LULUCF | 1.2 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 | -38.2 | -3.3 | 33.9 | 16.2 |
| 6. Waste | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 44.6 | -4.4 | 4.2 | 4.7 |
| 7. Other | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| GHG total with LULUCF | 4.7 | 4.4 | 4.8 | 4.7 | 5.5 | 5.3 | 12.5 | -3.4 | NA | NA |
| GHG total without LULUCF | 3.5 | 3.3 | 3.8 | 3.8 | 4.7 | 4.5 | 29.7 | -3.4 | 100.0 | 100.0 |

Note: The changes in emissions and the shares by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA= not applicable.

^a The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions that was offset by GHG removals through LULUCF.

2. National system

17. In accordance with decision 15/CMP.1, Iceland provided in its NC5 a description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1 (decision 19/CMP.1). The description includes most of the elements as required in decision 15/CMP.1, except for a description of the process for recalculation of previously submitted inventory data.

18. The Environment Agency of Iceland (EA), under the supervision of the Ministry for the Environment, has overall responsibility for the national inventory. This agency compiles and manages all sectors of the inventory, except for the information on the LULUCF sector, which is compiled by the Agricultural University of Iceland. The EA is also responsible for preparing the national inventory reports (NIRs).

19. During the review, Iceland provided additional information on the national system, elaborating on the process of selecting emission factors, and providing a description of the

process for the recalculation of previously submitted inventory data. The ERT encourages Iceland to report this information in the NIR of its next annual submission.

20. The ERT took note of the recommendations of the report of the individual review of the annual submission of Iceland submitted in 2011.⁵ During the review, the ERT learned that the Party had made some efforts to provide additional information for each sector on the role of the different institutions in providing activity data and emission factors, and in producing emission estimates. The ERT also learned that the Party made some efforts to improve the institutional arrangements by conducting a series of regular meetings of a coordinating team, the official role of which is to review the emission inventory and to coordinate between involved institutions, especially with regards to the LULUCF and agriculture sectors. The ERT reiterated the recommendation of the previous ERT of the GHG inventory review that the Party should report this information in the relevant chapter of the NIR of its next annual submission.

21. The ERT concluded that the national system continued to perform its required functions as set out in decision 19/CMP.1.

3. National registry

22. At the time of the review, the Icelandic national registry was a stand-alone registry; it was not operated together in a consolidated form with the registries of other Parties. As of 30 June 2012, Iceland's national registry became a separate registry entity within the consolidated registries of the European Union (EU) registry. In its NC5, Iceland has provided information on the national registry, including a description of how its national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and how it complies with the requirements of the technical standard for data exchange between registry systems.

23. During the review, Iceland provided additional information on the measures put in place to safeguard, maintain and recover registry data; the security measures employed in the registry to prevent unauthorized manipulations; the measures put in place to protect the registry against security compromises; the test procedures related to the performance of the current version of the national registry; and the recording of the changes and discrepancies of the national registry. In response to questions raised by the ERT, Iceland provided documents demonstrating how it records the changes related to the national registry and how it maintains these records. The ERT noted that updates to databases and applications, implemented security measures, and changes to the national registry software are documented on a regular basis by nominated responsible staff.

24. The ERT took note of the conclusion of the standard independent assessment report (SIAR) that 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 also took note of the recommendation of the SIAR that Iceland should make available, on the website of its national registry, public information pursuant to decision 13/CMP.1, annex, paragraphs 44–48. During the review, the ERT learned that Iceland has already taken measures to address this recommendation. The ERT recommends that Iceland further improve the public information available on the website, and improve the reporting of this matter in its next annual submission.

25. 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 decisions 16/CP.10 and 12/CMP.1.

⁵ FCCC/ARR/2011/ISL.

B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

26. As required by the UNFCCC reporting guidelines, Iceland has provided in its NC5 some information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol. Each sector has its own textual, but general, description of the principal PaMs, supplemented by a combined summary table on some of these PaMs in the following chapter on projections. The NC5 contains a description of PaMs by sector similar to that in the NC4.

27. However, the ERT noted that Iceland did not provide the following reporting elements required by the UNFCCC reporting guidelines: information on PaMs subdivided by GHG and by sector; a textual description of the principal PaMs by sector with the name, objective, GHG(s) affected, type or types of policy or measure, status of implementation and the implementing entity or entities of each PaM; summary tables on PaMs by sector; and information on how Iceland believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals, consistent with the objective of the Convention. The ERT also noted that the NC5 did not include a description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources, and information on the effort that Iceland is making to implement PaMs in such a way as to minimize adverse effects, including the effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. During the review, Iceland has provided information on all these missing elements. The ERT recommends that Iceland follow the UNFCCC reporting guidelines more closely and provide these reporting elements in its next national communication.

28. In February 2007, the Icelandic Government adopted an updated Climate Change Strategy, the third of its kind, aiming at ensuring compliance with Iceland's Kyoto Protocol target. The strategy sets forth a long-term vision for the reduction of total emissions of GHGs by 50–75 per cent in 2050 compared with the 1990 level. Emphasis is placed on cost-effective PaMs, including economic instruments, with co-benefits such as the introduction of new low- and zero-carbon technology. Also the strategy includes measures on carbon sequestration in vegetation and soil, and the financing of climate-friendly measures in other countries.

29. The strategy also sets forth the Government's five principal climate change objectives, which include the following: (a) fulfilling international obligations; (b) decreasing GHG emissions by reducing the use of fossil fuels in favour of renewable energy and climate-friendly fuels; (c) increasing carbon sequestration; (d) fostering research and innovation in fields related to climate change; and (e) preparing for adaptation to climate change. The strategy contains provisions for measures that will be adopted in order to achieve these objectives and two expert working groups were appointed to support the further development of climate policy. One group had the role of compiling and summarizing the best available scientific knowledge on the likely impact of climate change and presenting proposals on adaptation efforts. The other working group was given the task of assessing the effectiveness and economic efficiency of measures to mitigate climate change.

30. On the basis of the strategy, a draft Action Plan for Climate Change Mitigation (2010 Action Plan) was released in 2009. During the formulation of the 2010 Action Plan, PaMs to mitigate climate change were assessed in terms of their effectiveness and economic efficiency. The following conclusions were drawn: (a) there is a significant

mitigation potential in Iceland at low and moderate cost. Actions with negative mitigation cost could reduce net emissions by 4 per cent by 2020, while actions with a cost in the range EUR 0–20 could reduce net emissions by 19 per cent; (b) afforestation and revegetation offer the most significant mitigation potential; (c) there is a significant mitigation potential in transport and fisheries; and (d) the mitigation potential in energy production is insignificant, due to the fact that Iceland is almost 100 per cent reliant on renewables. On the basis of this work, the Government adopted the 2010 Action Plan with ten key actions (see table 3). The total effect of these key actions is estimated to be a reduction in net GHG emission in the range of 1,330–1,570 Gg per year by 2020.

31. As the 2010 Action Plan was not finalized at the time of the submission and publication of the NC5, the information contained in the NC5 on individual PaMs and their effects are limited. During the review, Iceland provided updated information on the development of its PaMs, especially those under the plan.

32. Iceland’s commitment under the Kyoto Protocol is to limit the growth in its GHG emissions to 10 per cent in relation to the base-year level during the first commitment period from 2008 to 2012. Iceland expects to achieve this target through emission reductions from the portfolio of existing PaMs and taking into account provisions of decision 14/CP.7. According to this decision, emissions from industrial process projects up to 1.6 Mt CO₂ eq annually that meet the criteria specified in this decision shall be reported separately and shall not be included in national totals under the condition that the emissions of a Party exceed its assigned amount. As this condition could be fully assessed only at the end of the commitment period, when the aggregated GHG emissions over the period would be known, during the commitment period Iceland reports both, total GHG emissions and emissions that meet the criteria of this decision (see paras. 48 and 49 below). In response to a question raised by the ERT during the review, Iceland confirmed that it is aware that this decision imposes restrictions on transfers and acquisition of the Kyoto units under Articles 6 and 17 of the Kyoto Protocol for a Party that chooses to avail itself of it.

33. One of the most important PaMs in the medium term (until 2020) is the implementation of the European Union emissions trading scheme (EU ETS). Iceland is part of the EU ETS as it is a member of the European Economic Area (EEA) under the ‘EEA agreement’. Until 2012, no installation in Iceland fell under the EU ETS. As of 1 January 2012, CO₂ emissions from aviation are regulated under the EU ETS and GHG emissions from heavy industries such as aluminium, ferrosilicon, mineral wool and fish-meal production will be regulated as of 1 January 2013. Benchmarking, gradual lowering of the cap and trading of allowances under the EU ETS are designed to encourage a shift towards cleaner technologies and lower emissions of GHGs in these industries. Table 3 provides a summary of the information on the PaMs contained in the NC5 as well as those provided during the review.

Table 3
Summary of information on policies and measures in Iceland

| <i>Major policies and measures</i> | <i>Examples/comments</i> |
|--|--|
| <i>Policy framework /cross-sectoral measures</i> | |
| Climate Change Strategy 2007 | Strategy aims to ensure compliance with the Kyoto Protocol target, reduce the use of fossil fuels, increase carbon sequestration, foster research and prepare for adaptation |
| Iceland’s 2010 Action Plan for Climate Change Mitigation | The plan includes 10 key actions that are outlined in this table |

| <i>Major policies and measures</i> | <i>Examples/comments</i> |
|--|--|
| Carbon tax on fossil fuel use* | Aims to reduce fossil fuel use (NA/25-50/50-100) |
| Participation in EU ETS* | Aims to reduce CO ₂ emissions in a cost-effective way (NA/50-75/100-150), with 40 per cent of Iceland's GHG emissions to be covered under the scheme |
| Research and development in climate-friendly technology* | Promotes innovations in renewable energy, CCS, processing of CO ₂ in geothermal steam, shipping emissions, fuel-efficient fishing methods, hydrogen engines, etc. (NA/10-20/50-100) |
| Information and public awareness | Aims to encourage alternative ways of transport, such as walking and cycling |
| <i>Policies and measures by sector</i> | |
| <i>Energy</i> | |
| CarbFix CCS project | Aims to capture carbon from geothermal emissions and store them permanently under ground |
| Provision of land-based electricity to ships in harbours | Aims to discourage the burning of fuel by ship engines (18/18/18) |
| Biofuels for the fishing fleet* | Aims to convert from fossil fuels to biofuels (NA/10-50/50-170) |
| Electrification of fish-meal production* | Aims to convert from fossil fuels (heavy oil) to electricity produced by renewable (NA/10-25/25-50) |
| <i>Transport</i> | |
| Oil charge tax | Aims to make small diesel cars more competitive |
| Exemption and reduction of excise tax on non- and low-polluting vehicles | Aims to encourage the purchase of low-polluting vehicles |
| Change in taxes and fees for cars and fuels* | Combines the two above-mentioned policies and measures (NA/10-50/20-100) |
| Official procurement of low-carbon and fuel efficient vehicles* | Aims to reduce emissions and create demand for low-carbon vehicles |
| Increased share of public transport, walking and cycling in transport* | Aims to reduce emissions from transport (NA/10-20/20-40) |
| <i>Industrial processes</i> | |
| Limit PFC emissions from aluminium smelters | Aims to encourage aluminium plants to cut PFC emissions |
| <i>Land use, land-use-change and forestry</i> | |
| Afforestation and revegetation* | Aims to increase carbon sequestration in soil and vegetation (NA/600/775) |
| Restoration of drained wetlands* | Aims to reduce CO ₂ emissions from drained wetlands (NA/10-20/50-100) |

| <i>Major policies and measures</i> | <i>Examples/comments</i> |
|---|--|
| <i>Waste</i> | |
| Capture of CH ₄ in landfills | Aims to reduce CH ₄ emissions |

Note: The GHG reduction estimates given in parentheses are reductions in Gg CO₂ eq for the years 2010, 2015 and 2020;

* indicates that the measure is included among the 10 key measures in the 2010 Action Plan.

Abbreviations: CCS = carbon dioxide capture and storage, EU ETS = European Union emissions trading scheme, GHG = greenhouse gas, NA= not applicable, PFC = perfluorocarbon.

1. Policy framework and cross-sectoral measures

34. The EA and the Ministry for the Environment have the main responsibility for monitoring climate change policies and measures, and are responsible for the submission of the national inventory reports and emission data, and national communications to the secretariat. Responsibility for the implementation of PaMs rests with different ministries and government agencies depending on the measures. The Ministry of Finance is, for example, responsible for the preparation of legislation proposals for environmental taxation.

35. Iceland has two levels of administration that include the central government and 75 regional municipalities. The regional municipalities work alongside the central government in implementing many of the climate-related policies. The regional municipalities have a key role in some fields, such as waste management. In recent years, municipalities in Iceland have undertaken considerable work in forming their own sustainable development policy under the label of ‘Local Agenda 21’. The City of Reykjavík, the largest municipality in Iceland, adopted the Climate Change and Air Quality Policy that has the goal of reducing net GHG emissions by 35 per cent by 2020, and 73 per cent by 2050 compared with 2007 levels.

36. Act No. 65/2007 on GHG emissions provides the legal basis for GHG monitoring and reporting in accordance with the UNFCCC requirements. The stated purpose of the act is to create conditions to allow Icelandic authorities to comply with international obligations to limit Iceland’s GHG emissions and report thereon. The act covers the national system for the estimation of GHG emissions by sources and removals by sinks, the establishment of a national registry, emission permits and the obligation of companies to report relevant information to the authorities. The act also provides the legal basis for operators to participate in the clean development mechanism and in joint implementation projects.

37. The European Union directive 2003/87/EC that established a scheme for GHG allowance trading within the European Union was adopted by a decision of the EEA Joint Committee No. 146/2007 that is applicable to EEA members, including Iceland. However, there are currently no installations in Iceland that fall under the EU ETS. Following the inclusion of emissions from certain industries under the EU ETS from 2013 onwards, over 40 per cent of emissions will be regulated under the EU ETS. Much of these emissions fall currently under the provisions of decision 14/CP.7 for the first commitment period of the Kyoto Protocol, namely the four single projects (see paras. 48 and 49 below). During the review, Iceland clarified that decision 14/CP.7 will only be applied for the first commitment period under the Kyoto Protocol.

38. Iceland informed the ERT that measures have not yet been taken to implement the EU effort sharing decision, which regulates emissions for the non-ETS sectors since this decision is not considered by Iceland as EEA relevant. This decision would be

implemented, in the event that Iceland becomes an EU member, using the same institutional arrangement as for other climate legislation, for example the 2010 Action Plan.

2. Policies and measures in the energy sector

39. Iceland has a unique energy profile compared with other Annex I Parties. RES (hydropower and geothermal energy) are the primary energy sources used for heating and electricity production, and accounted for approximately 83 per cent of total primary energy supply in 2009. Therefore, GHG emissions from the energy sector are mainly from mobile sources, which use fossil fuels. Between 1990 and 2010, GHG emissions from the energy sector increased by 4.9 per cent (from 1,778 Gg CO₂ eq to 1,866 Gg CO₂ eq), driven mainly by an increase in emissions from energy use in transport and fisheries. However, it should be noted that underlying the general trend, there was a decrease in GHG emissions of 7.5 per cent between 2009 and 2010 driven by the global financial crisis.

40. In 2010, energy industries accounted for 0.1 per cent of total GHG emissions. Between 1990 and 2010, GHG emissions from this sector decreased by 66 per cent (from 13.7 Gg CO₂ eq to 4.6 Gg CO₂ eq). In contrast, GHG emissions from energy use in transport increased by 45 per cent (from 621 Gg CO₂ eq to 900 Gg CO₂ eq) over the same period. Between 1990 and 2010, emissions from energy use in other sectors decreased by 14.3 per cent (from 700 Gg CO₂ eq to 600 Gg CO₂ eq). Among this, fisheries is the largest source, contributing 13.2 per cent of total emissions and 32.1 per cent of energy-related emissions in 2010. During this period, emissions from fisheries have fluctuated around the 1990 value, largely reflecting the inherent nature of this industry.

41. The ERT noted that the unique emission and energy profile of Iceland presents a challenge to its emission mitigation goals and plans, as most of its energy-related emissions stem from mobile sources, for which mitigation effects are generally more difficult to achieve than they are for stationary energy sources. However, the ERT noted that the abundant availability of RES could provide an opportunity for Iceland to lower its GHG emissions from mobile sources including road vehicles (electric vehicles equipped with electrochemical batteries or fuel cells) and ships. Iceland's efforts in this area are not clear from its NC5. However, during the review, the ERT was informed of the steps taken through the 2010 Action Plan and the new Energy Strategy to promote the use of RES.

42. PaMs in the energy sector can be divided into two categories: those targeting the reduction of the use of fossil fuels and those targeting the reduction of CO₂ emissions from the production of geothermal power. While the latter is implemented through the CarbFix carbon dioxide capture and storage (CCS) project, reduction of the use of fossil fuels is achieved through the levying of a carbon tax on fossil fuel use, provision of land-based electricity from renewable sources in ships docked at harbours, promotion of biofuels for the fishing fleet, electrification of fish-meal production, the levying of oil charge tax, exemption and reduction of excise tax on non- and low-polluting vehicles, change in taxes and fees for cars and fuels, official procurement of low-carbon and fuel-efficient vehicles and increased share of public transport, walking and cycling in transport.

43. **Energy supply.** Geothermal energy production is not completely climate-neutral, as it causes dissolved CO₂ in geothermal fluid to be released more rapidly than would occur naturally. Such emissions are measured and accounted for in Iceland as fugitive emissions, and are about 4 per cent of total GHG emissions. These emissions are still miniscule compared with emissions that would occur if heating and electricity production, which is now produced from geothermal sources, was produced by fossil fuels. An experimental project (CarbFix) is under way at the Hellisheidi geothermal plant, injecting CO₂ captured in geothermal steam back into the basaltic rock underground. The aim of the CarbFix project is to study the feasibility of sequestering carbon dioxide into basaltic bedrock and storing it there permanently as a mineral. Depending on the results of this project, the

technique for sequestering carbon dioxide into basaltic bedrock might be replicable by other Parties since basaltic bedrock susceptible of CO₂ injections are widely found on the planet and CCS and mineralization in basaltic rock is not confined to geothermal emissions or areas.

44. During the review, the ERT was informed about Iceland's Energy Strategy 2011. The elements in this comprehensive Energy Strategy comprise: (a) replacing imported energy with RES; (b) adopting a precautionary and protective approach to hydroelectric and geothermal energy production; (c) supporting diversification of industry with emphasis on the development of ecologically beneficial high-technology industry. In the preparation of this strategy, around 80 different options/possibilities for hydropower and geothermal power plants have been analysed with regard to sustainability issues, preservation of natural environments and historic sites, tourism and alternative land use, regional development and economy. The final approval of the strategy is expected to take place in May 2012 in the form of a parliamentary resolution.

45. **Transport and fisheries.** Iceland's 2002 strategy for sustainable development states the goal of phasing out fossil fuels from the energy supply mix almost completely within a few decades. To achieve this goal, Iceland focuses mainly on the reduction in fossil fuel use in transportation and fisheries. In the transport sector, Iceland has implemented PaMs that favour low-emission cars. These include an exemption of excise tax on vehicles that are powered by electricity or hydrogen, reducing excise tax for hybrid automobiles, and the cancellation or refund of value-added tax on hydrogen-powered vehicles and on specialized spare parts that are imported. In addition, an oil-charge system was implemented in 2005 with the aim of increasing the number of smaller diesel vehicles in use.

46. During the review, Iceland informed the ERT that one of the key measures in the 2010 Action Plan is to put more emphasis on the modes of transport such as walking, cycling and public transport. Transport policy in Iceland is based on a multi-year National Transport Plan. After the submission of the NC5, a proposal for the National Transport Plan for 2011–2022 was submitted to Parliament in December 2011, accompanied by a proposal for a short-term project plan for 2011–2014. At the time of the review, the two proposals were being discussed by Parliament. The proposed National Transport Plan for 2011–2022 includes a 2010 Action Plan on Sustainable Transport with an emphasis on other modes of transport. A tenfold expansion of the cycling route network defined within the Greater Reykjavik Area from 10 km in 2010 to 100 km in 2020 is one of its elements. Another element is the agreement between the Government and the municipalities within the Greater Reykjavik Area, where 77 per cent of the population of Iceland lives, according to which the Government will invest IKR 1 billion in the public transport system within the next 10 years.

47. In the fisheries sector, PaMs include significant renewal of the fishing fleet to be more fuel-efficient, equipping ships with Icelandic-designed energy-saving devices based on information technology, and phasing out hydrofluorocarbons (HFCs) used in cooling systems in fishing ships. During the review, Iceland informed the ERT that the use of biodiesel in the fishing fleet has been analysed as an option. However, this has not been taken further mainly due to an increasing concern regarding the sustainability of the production of biofuels. The ERT commends Iceland for its efforts and encourages it to explore further the potential for using RES in mobile sources and to include information on this in its next national communication.

3. Policies and measures in other sectors

48. **Industrial processes.** GHG emissions from industrial processes accounted for 39.8 per cent of GHG emissions in 2010, compared with 24.6 per cent in 1990. Between 1990 and 2010, GHG emissions from the industrial processes sector marked the most

significant growth as they increased by 109.7 per cent (from 863 Gg CO₂ eq to 1,810 Gg CO₂ eq), driven mainly by an increase in CO₂ emissions from the aluminium industry through expansion of existing facilities and the building of two new factories. There are very few measures to address emissions from aluminium production. Instead, Iceland availed itself to the provisions of decision 14/CP.7 that under certain conditions allows the exclusion of these emissions in the national totals for accounting purposes. During the review, Iceland elaborated on its application of decision 14/CP.7 and why it considers that the four projects in the aluminium industry in operation since 1990 fulfil the criteria set forth in this decision.

49. According to the NIR 2012 and information provided to the ERT during the review, Iceland is applying a broader interpretation of the definition of an expansion as a single project that falls under the provisions of decision 14/CP.7. In particular, the expansion for the Alcan aluminium plant involved the establishment of a new-build potline while at the same time increasing the capacity of the two existing potlines. In this context, the ERT acknowledged that the definition of an expansion of an industrial process facility at a single site in decision 14/CP.7 could be interpreted differently, namely, that only the new-build potline would count as an expansion. Since calculations show that the different interpretations of an expansion could lead to different results based on the same data from Iceland's NIR, the ERT recommended that Iceland carefully consider both interpretations and take a precautionary approach in the lead-up to the end of the first commitment period of the Kyoto Protocol.

50. The other measures in the industrial processes sector include the limit set on perfluorocarbon (PFC) emissions from aluminium smelters and the switch from coal to biomass – in particular wood – as a carbon source in ferroalloy production, which is only partly implemented. While the effect of the switch from coal to biomass has not been estimated, the limit on PFC emissions led to a reduction in emissions by 300,000 tons from 1990 to 2004, despite the fact that aluminium production increased during that period.

51. **Agriculture.** Agriculture accounted for 14.2 per cent of total GHG emissions in 2010, compared with 20.1 per cent in 1990. Between 1990 and 2010, GHG emissions from the agriculture sector decreased by 8.1 per cent (from 703 Gg CO₂ eq to 646 Gg CO₂ eq), driven mainly by a decrease in CH₄ emissions from livestock and manure as well as a decrease in N₂O emissions from fertilizer application. Studies have been undertaken to explore the possibilities of improved manure management as the most promising method to reduce agricultural emissions that mainly result from fertilizer application.

52. **LULUCF.** The LULUCF sector was a net source of 734 Gg CO₂ eq in Iceland in 2010 and net GHG emissions decreased by 455 Gg CO₂ eq or 38.2 per cent since 1990. The trend was mainly driven by revegetation and reforestation, which are the elected activities under the Kyoto Protocol with high priority in Iceland. There is significant potential to enhance carbon sequestration beyond the present level due to the high proportion of land available for revegetation and reforestation.

53. The Icelandic Government implemented a four-year programme of revegetation and tree planting during 1997–2000 to increase the sequestration of CO₂ in the biomass. Efforts to increase the annual carbon sequestration rate resulting from these programmes have continued since then. A strategic plan for soil conservation and revegetation for the period of 2003 to 2014, adopted by the Icelandic Parliament in 2002, lists carbon sequestration as one of the four main objectives of this plan. Increased afforestation and revegetation as well as the restoration of drained wetlands are also among the 10 key actions in the Government's 2010 Action Plan.

54. **Waste management.** Between 1990 and 2010, GHG emissions from the waste sector increased by 44.6 per cent (from 148 to 214 Gg CO₂ eq), mainly driven by the continuation

of organic waste being disposed of in landfills. The total amount of waste has been increasing in recent years, although some reduction has occurred since the economic downturn in 2008. Despite the increase in waste, GHG emissions from the sector have declined due to increased recycling and technological advances in waste handling.

55. The two most important measures in waste management are the reduction of the organic waste fraction being disposed of in landfills and the collection of CH₄ from the largest landfill in the country, which started in 1997. Captured methane is currently not used for electricity production. An electricity production unit was in operation from 2002–2009, but it did not function properly. The number of vehicles using methane as fuel has increased substantially for the last couple of years. In 2010, around 50 vehicles ran either solely or partially on methane. The rest of the captured methane is flared. It is estimated that the methane from landfill could power at least 2,000 cars annually. The difference between this estimate and actual methane production stems from difficulties in collecting methane. Together the reduction in the amount of organic waste being disposed of in landfills since 2005 and the increase in methane collection led to a reduction of methane emissions by 4.4 per cent from 2009 to 2010. This reduction is expected to continue in the future.

4. Minimization of adverse effects in accordance with Article 2, paragraph 3, of the Kyoto Protocol

56. In its NC5, Iceland did not provide information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts, on other Parties, especially developing country Parties. During the review, Iceland made a reference to information under Article 3, paragraph 14, of the Kyoto Protocol reported in its 2012 annual submission. This is presented in chapter II.I of this report. The ERT recommends that Iceland provide information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects in its next national communication.

C. Projections and the total effect of policies and measures, and supplementarity relating to the Kyoto Protocol mechanisms

57. The projections reported in the NC5 were prepared in 2008 and presented relative to the 2007 inventory data that were the latest data available at that time. A number of new PaMs have been adopted after the submission of the NC5. These were included in Iceland's 2010 Action Plan and reflected in updated projections that were provided to the ERT during the review. The total effect of new policies and measures has been assessed in the framework of the 2010 Action Plan and reflected in this review report. Due to Iceland's unique energy and emission profile, emphasis of GHG projections is placed on the following sectors: industry and chemical use, transport, fisheries, agriculture, waste and electricity, and heat productions.

1. Projections overview, methodology and key assumptions

58. The GHG emission projections provided by Iceland in the NC5 include two "with measures" scenarios until 2050, presented relative to actual inventory data for 2007. Projections were presented on a sectoral basis for some sectors (see para. 57 above), although in graphical format rather than numerical values. The sectors used in projections are not exactly the same as those used in the PaMs section.

59. The ERT noted that in the NC5 Iceland did not provide the following reporting elements required by the UNFCCC reporting guidelines: projections presented on a gas by gas basis for the following GHGs: CO₂, CH₄, N₂O, PFCs, HFCs and sulphur hexafluoride; aggregated projections for the energy and LULUCF sector as well as for a national total, using global warming potential values; and emission projections related to fuel sold to ships and aircrafts engaged in international transport. In addition, projections in numerical format were not provided in the NC5. During the review, this missing information was provided by Iceland. The ERT recommends that Iceland provide this information in its next national communication.

60. The two 'with measures' scenarios presented in the NC5 include PaMs that had been adopted before 2007. These two scenarios were developed based on different assumptions with regard to economic growth, population growth, and the size of production of aluminium and ferrosilicon industries that have the largest impact on total national emissions in Iceland. Scenario 1 assumes no added capacity to the energy-intensive industries after 2008, whereas scenario 2 assumes that production volumes by 2015 will reach the maximum levels allowed according to environmental permits already issued.

61. Methodologies used for GHG projections were not transparently described in the NC5. During the review, Iceland provided additional information on methodologies, including those used for different sectors. Methods used are influenced by the size of the country, since some activities in the industry and energy sector need to be modelled on a plant by plant (project) basis due to the high share of individual plants/projects in the total national emissions. Detailed databases with activity data are available for analytical purposes (car fleet, afforestation data, etc.). The ERT noted that significant improvements have been made in the quantitative assessment of the impacts of PaMs and the total effects of PaMs during the preparation of the 2010 Action Plan compared with the information reported in the NC5. The economic and technical feasibility of the set of PaMs in most of the sectors and the potential effect of these PaMs on emission reduction have been analysed during the preparation of 2010 Action Plan.

62. Based on information provided during the review, the ERT noted that the methodologies used for preparing projections by sector are based on the following approaches: (a) industrial processes: projections are prepared mostly on the basis of an overview of planned and potential future projects in metal production; (b) transport: projections are based on modelling vehicle stock change subject to the penetration of more efficient or improved technologies and use of alternative fuels, as well as to changes in car ownership and annual mileage that are highly dependent on economic growth; (c) fisheries: projections are based on assumptions related to activities (future fish catch), expected penetration of biofuels as a fuel for fishing vessels and the penetration of electricity in fish-meal production; (d) agriculture: projections are based on assumptions related to activity data; (e) afforestation: projections are based on empirical data on carbon uptake from previous afforestation (forest growth in recent years) and planned afforestation activities; (f) wetland restoration: projections are prepared on the basis of planned activities; and (g) waste: projections are based on assumptions related to the disposal of organic matter and landfill gas use.

63. Key assumptions on important variables influencing future GHG emission trends for sectors with the highest share in Iceland's GHG emissions (industrial processes, transport, fisheries, LULUCF) as well as for the other sectors were provided in the NC5 and elaborated on during the review. The most important assumptions include those on the economic and population growth, the size of production of aluminium and ferrosilicon industries, the volume of the fish catch and afforestation activities. Another assumption is that the penetration of new and alternative energy sources in the transport sector is expected to be predominantly market driven. As projections of fuel use following the recent

economic development were prepared in 2012 only, related GHG emission projections were not available during the review.

64. Sensitivity analysis has been carried out for GHG emissions in two scenarios with different assumptions on economic growth, population growth and industrial production. Overall, fuel use in transport and related emissions are the most sensitive to economic development. During the review, additional information was provided on the sensitivity of projections based on qualitative parameters: (a) the scale of the impact of afforestation will depend on the availability of financial resources under the Government incentive programmes; (b) the penetration rate of electricity in fisheries (fish-meal production and other activities) will depend on electricity grid expansion and related costs; (c) the penetration rate of biofuels will depend on the availability of biofuels that meet the sustainability criteria; and (d) technological development will have a very important impact on GHG emissions in Iceland in the longer term from 2020 to 2050, particularly for the transport sector, aluminium production and geothermal energy production.

2. Results of projections

65. Iceland's Kyoto Protocol target, that is to limit the growth in its GHG emissions to 10 per cent in relation to the base-year level, translates into an average assigned amount of 3.71 Tg CO₂ eq per year during the Kyoto Protocol first commitment period (2008–2012). The projections provided in the NC5 for 'with measures' scenario 1 (see para. 60 above) show that Iceland's total GHG emissions are expected to amount to 4.68 Tg CO₂ eq on average during the first commitment period without the application of decision 14/CP.7. This results in an estimated gap of 0.97 Tg CO₂ eq annually for the first commitment period.

66. In the NC5, Iceland estimated that under scenario 1, the average annual emissions from industrial processes from sources that meet the criteria set forth in decision 14/CP.7 amount to 1.25 Tg CO₂ eq during the period of 2008–2012. As this estimate is higher than the estimated gap to the emission target, with the use of provisions of decision 14/CP.7, Iceland is expected to meet its Kyoto Protocol target for the first commitment period for 'with measures' scenario 1.

67. Due to higher levels of the industrial process emissions projected under 'with measures' scenario 2, total GHG emissions are expected to amount to an average 5.19 Tg CO₂ eq during the first commitment period without the application of decision 14/CP.7. This results in a gap of 1.48 Tg CO₂ eq annually during the first commitment period. Under scenario 2, Iceland estimated that the average annual emissions from sources that meet the criteria of decision 14/CP.7 amount to 1.53 Tg CO₂ eq during the period of 2008–2012. Hence, with the use of the provisions of decision 14/CP.7, Iceland is expected to meet its Kyoto Protocol target also for 'with measures' scenario 2.

68. According to the NC5, total GHG emissions are expected to amount to 4.65 Tg and 5.99 Tg CO₂ eq in 2020 under 'with measures' scenarios 1 and 2, respectively. Under the two scenarios, emissions from industry and chemical use will contribute the most to total GHG emissions, making up 47.6 per cent and 57.8 per cent, respectively of the total emissions. This will be followed by the transport sector, which will contribute 18.2 per cent and 15.7 per cent, respectively, to total emissions by 2020 under the two scenarios. Emissions from the fisheries sector will account for 12.8 per cent and 10.0 per cent of total emissions, while emissions from the agriculture sector will contribute 10.8 per cent and 8.4 per cent to total emissions by 2020 under the two scenarios. By 2020, emissions from the waste sector will be around 5.9 per cent and 4.6 per cent of total emissions under scenarios 1 and 2. Finally, emissions from electricity and heat production will contribute 4.7 per cent and 3.6 per cent of total emissions by 2020 under the two scenarios.

69. According to Iceland, no significant changes in the shares of GHG emissions by gas are expected in 2020 compared to those in 2010. Specifically, under ‘with measures’ scenario 1, the shares of CH₄ and N₂O emissions are expected to decrease by 2.1 and 1.3 per cent, respectively, in 2020 compared with the 2010 level due to a decrease in agricultural activities and the effect of PaMs in the waste and agricultural sectors. A further decrease in the share of PFCs (by 0.8 per cent points in 2020 compared with the 2010 level) is expected, while the level of PFC emissions will remain stable at the 2010 level. However, future levels of PFC emissions will also depend on the possible expansion of aluminium production in the country. The share of CO₂ emissions is expected to increase by 3 per cent points in 2020 compared with the 2010 level.

70. The most recent projections were prepared in 2012 taking into account the effects of 2010 Action Plan (see para. 30). The expected emissions after the implementation of the plan are projected to be between 4.12 and 5.32 Tg CO₂ eq by 2020, which represents an increase in emissions of around 22.3–57.9 per cent compared with the base-year levels. By sector, emissions from the industry sector are projected to be between 1.70 and 2.90 Tg CO₂ eq; from the transport sector, around 0.75 Tg CO₂ eq; from fisheries, around 0.45 Tg CO₂ eq; from the agricultural sector, around 0.45 Tg CO₂ eq; from the waste sector, 0.20 Tg CO₂ eq; from power production, around 0.22 Tg CO₂ eq; and from sector others, around 0.35 Tg CO₂ eq. Removals from LULUCF activities are expected to reach 0.80 Tg CO₂ eq annually. The results of the projections are shown in table 4 and the figure below.

Table 4
Summary of greenhouse gas emission projections for Iceland

| | <i>Greenhouse gas emissions (Tg CO₂ eq per year)</i> | <i>Changes in relation to base year level (%)</i> | <i>Changes in relation to 1990 level (%)</i> |
|--|---|---|--|
| Inventory data 1990 ^a | 3.50 | 3.9 | NA |
| Inventory data 2010 ^a | 4.54 | 34.7 | 29.7 |
| Kyoto Protocol base year ^b | 3.37 | NA | -3.7 |
| Kyoto Protocol target ^b | 3.71 | 10.0 | 6.0 |
| NC5 ‘with measures’ projections for 2010 (scenario 1/scenario 2) ^c | 4.68/5.19 | 38.9/54.0 | 33.6/48.3 |
| NC5 ‘with measures’ projections for 2020 (scenario 1/scenario 2) ^c | 4.65/5.99 | 38.0/77.7 | 32.9/71.1 |
| Updated ‘with additional measures’ projections for 2020 ^d | 4.12~5.32 | 22.3~57.9 | 17.7~52.0 |

^a *Source:* Iceland’s 2012 greenhouse gas (GHG) inventory submission; the emissions are without land use, land-use change and forestry (LULUCF).

^b *Source:* Based on the initial review report contained in document FCCC/IRR/2007/ISL.

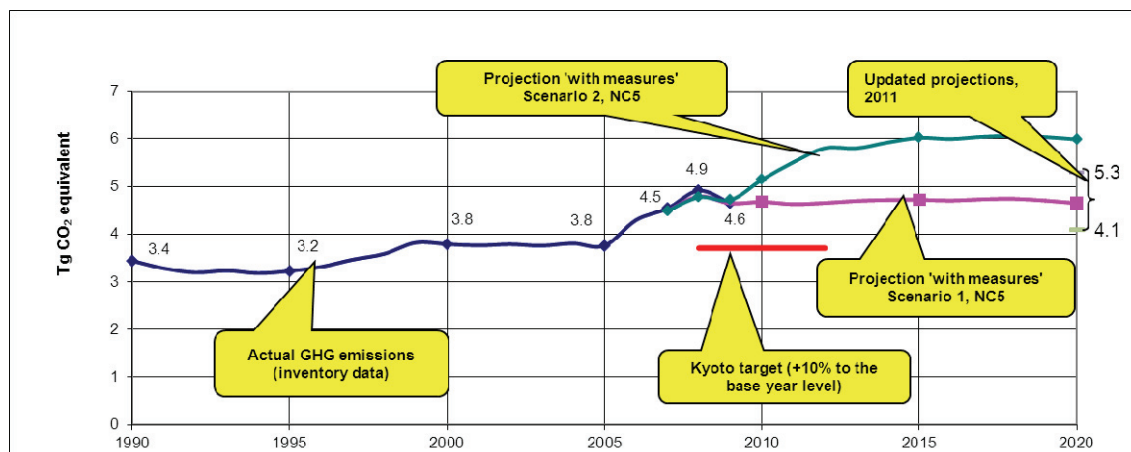
^c *Source:* Iceland’s fifth national communication.

^d *Source:* Updated projections provided by the Party during the in-depth review; the projections are for GHG emissions without LULUCF and taking into account the effect of the Action Plan for Climate Change Mitigation 2011.

71. In the 2010 Action Plan, Iceland set the national target for GHG emission reduction for sectors not included in the EU ETS, which is a 16 per cent reduction by 2020 compared with the 2005 levels. The achievement of this medium term target will mostly depend on the effective implementation of the 2010 Action Plan. LULUCF will be an important sector for GHG emission reductions in Iceland in the mid to long term. At the time of the review, the financial resources were not yet allocated for the implementation of measures specified

in the 2010 Action Plan to enable planned afforestation activities. The electricity sector expansion is a necessary condition for fuel switch to low-carbon electricity in fish-meal production and is not yet implemented. Moreover, the expected emission reduction is not yet fully underpinned by necessary measures (e.g. agriculture). It is also not yet clear whether fuel switch in the transport sector led by the market and stimulated by tax policy will be sufficient to achieve the targets set in the plan.

Greenhouse gas emission projections



Sources: (1) Data for the years 1990–2010: Iceland’s 2012 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry (LULUCF). (2) Data for the years 2009–2020: Iceland’s fifth national communication; the emissions are without LULUCF.

Note: The estimated gap does not exceed the threshold of 1.6 Tg CO₂ eq of emissions that are allowed to be offset by decision 14/CP.7 under the condition that the criteria set forth in decision 14/CP.7 are met.

72. In the longer term, Iceland has a target of reducing emissions by 50–75 per cent by 2050 compared with the 1990 level (see para. 28 above). The NC5 projections indicate that by 2050 total GHG emissions in Iceland will reach 4.03 Tg and 5.62 Tg CO₂ eq, respectively, under ‘with measures’ scenarios 1 and 2, which are higher than the 1990 level. Hence, fulfilment of the long-term target will depend significantly on future technological development in aluminium production and in the transport sector. However, due to the size of its economy, Iceland is not in a position to influence global technological development in these fields significantly. It remains unclear to the ERT how this long-term target will be met through present and future PaMs and how the technological uncertainty will be addressed.

3. Total effect of policies and measures

73. In the NC5, Iceland presented very limited information on the expected total effect of implemented and adopted PaMs. The total effect of PaMs was estimated as an aggregation of policy effects from afforestation and revegetation activities as well as the provision of land-based electricity to ships in harbours for 2010 and 2020. The effects of other measures were not presented in the NC5, but were provided during the review.

74. In addition, in the NC5, Iceland did not provide the following reporting elements required by the UNFCCC reporting guidelines: an estimate of the total effect of its PaMs, in accordance with the ‘with measures’ definition, compared with a situation without such PaMs, presented in terms of GHG emissions avoided or sequestered, by gas (on a CO₂ eq basis) in 1995 and 2000, and relevant information on factors and activities for each sector

for the years 1990 to 2020. Significant improvement has been made in the quantitative analysis of measures during the preparation of the 2010 Action Plan.

75. Table 5 provides an overview of the projected effects in 2020 of the planned PaMs specified in the 2010 Action Plan. An assessment of the projected effects of PaMs in 2010 was not provided in this table, as such information was not reported in the NC5. As table 5 shows, PaMs implemented in the LULUCF sector will deliver the largest emission reductions, followed by the effect of PaMs implemented in transport and fisheries sectors. The most effective PaMs and drivers behind GHG emission reductions are described in sections II.B.1 and II.B.2.

Table 5
Projected effects of planned, implemented and adopted policies and measures in 2020

| <i>Sector</i> | <i>Effect of planned measures (Tg CO₂ eq)</i> | <i>Relative value (% of 1990 emissions excluding LULUCF)</i> |
|---|--|--|
| Energy (without CO ₂ from transport) | 0.24 | 6.9 |
| Transport – CO ₂ | 0.22 | 6.4 |
| Industrial processes | NA | NA |
| Agriculture | 0.12 | 3.3 |
| Land-use change and forestry | 0.78 | 22.1 |
| Waste management | 0.02 | 1.6 |
| Total | 1.38 | 39.4 |

Source: Action Plan for Climate Change Mitigation, 2010.

Note: The total effect of *planned* policies and measures is defined as the difference between the ‘with measures’ scenario as implemented and planned in 2011 relative to emissions in 2008.

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

76. The ERT encourages the Party to follow the UNFCCC reporting guidelines more closely in the submission of its next national communication, particularly in reporting on methodology and the sensitivity of projections to changes in external parameters and implementation issues. The ERT also encourages the Party to report the total effect of PaMs separately from measures already implemented and those of new and additional measures.

4. **Supplementarity relating to mechanisms pursuant to Articles 6, 12 and 17**

77. Iceland in its NC5 provided sufficient information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. It is expected that Iceland will meet its commitments under the Kyoto Protocol for the first commitment period without making use of the Kyoto Protocol mechanisms under Articles 6, 12 and 17, but by applying provisions of decision 14/CP.7.

D. Vulnerability assessment, climate change impacts and adaptation measures

78. In its NC5, Iceland has provided the required information on the expected impacts of climate change in the country. However, the ERT noted that Iceland did not provide information on vulnerability assessment and adaptation options as well as the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. During the review, Iceland provided information on mitigation options in various sectors,

which have components that can be reported as adaptation options. Initial elements of vulnerability assessment were actually included in the impact assessment, although this has not been outlined in the NC5. The ERT was informed during the review that studies are ongoing across most sectors that will subsequently inform the adaptation options. Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC5 and provided during the review.

Table 6
Summary of information on vulnerability and adaptation to climate change

| <i>Vulnerable area</i> | <i>Examples/comments/adaptation measures reported</i> |
|-------------------------------------|--|
| Agriculture and food security | <p><i>Vulnerability:</i> Frost heaving resulted in damaged hayfields frequently, and reduced the potential production by 20–30 % between 1960 and 1980. However, increased temperatures since 2000 have improved the yield as spontaneous adaptation has occurred. Consequently, a significant increase in production is anticipated. Warmer temperatures have also meant an increase in other crops such as barley and wheat, and other cereals. Animal husbandry is also not very vulnerable to increased temperatures, but rather beneficial as fodder increased. Concern was expressed about the pressure being placed on new areas, which have not been traditionally used for agriculture</p> <p><i>Adaptation:</i> N.A.</p> |
| Biodiversity and natural ecosystems | <p><i>Vulnerability:</i> Higher temperatures could bring pests and diseases, and result in the introduction of new invasive species that would compete with indigenous species</p> <p><i>Adaptation:</i> The use of fertilizer, with the potential risk of it becoming a source of pollution</p> |
| Fisheries | <p><i>Vulnerability:</i> Not vulnerable, but could benefit from global warming. Warming is likely to improve the survival of larvae and juveniles of most species, and is likely to contribute to the increased abundance of commercial stock. However, some species have been observed to decline. The uncertainty of the effect of acidification was expressed</p> <p><i>Adaptation:</i> Studies that will inform adaptation options are ongoing</p> |
| Forests | <p><i>Vulnerability:</i> The impact assessment suggests that this sector is vulnerable to an increase in pests and diseases from high temperatures. Downy birch was cited as an example, as some of them were defoliated by alien insects. Warmer temperatures are also likely to result in longer growing seasons and increased coverage of natural and managed forest. Warmer temperatures can cause an early start in the growth cycle, increasing the chances of frost damage</p> <p><i>Adaptation:</i> Studies to inform these options are ongoing</p> |
| Human health | <p><i>Vulnerability:</i> Frequency and intensity of climate-related natural disasters or extreme events will pose a severe threat to human health. The capacity of the health system to respond is limited. There is an indication that further studies are warranted.</p> <p><i>Adaptation:</i> Ongoing studies will inform adaptation options</p> |
| Infrastructure and economy | <p><i>Vulnerability:</i> Melting glaciers and increasing surface water may increase the frequency of river and coastal flooding and erosion. The capacity of existing infrastructure of drainage, roads and bridges would need to be modified to accommodate a greater capacity of water</p> <p><i>Adaptation:</i> Climate change factored into future design and location of infrastructure. Studies are ongoing</p> |
| Water resources | <p><i>Vulnerability:</i> Increase in surface water from melting glaciers</p> <p><i>Adaptation:</i> Excess water is channelled to hydropower for use in operations</p> |

79. The reporting in the NC5 on vulnerability, impacts and adaptation has been improved compared with that in the NC4. Specifically, the NC5 includes more rigorous and detailed information on current climate variability and climate projections, using the

scenarios and models of the Intergovernmental Panel on Climate Change (IPCC) and detailed impact assessment. The two main climate elements are temperature and precipitation, the latter is projected to increase by about 2.5 per cent for each degree of warming. Although the Party has not demonstrated the use of a specific framework or methodology to facilitate a thorough vulnerability and impact assessment to determine current climate variability, there is detailed information on vulnerability and the likely impacts with climate change projections. These include glaciers and oceans, fisheries, land ecosystem, forests, soils, and agriculture. Although not outlined in extensive detail, there was a brief mention in the NC5 of the impacts on society.

80. There is extensive research that has taken place or is ongoing in Iceland that will further inform on vulnerability, impacts on different sectors and consequent adaptation options. A structured methodology was not defined in the NC5, and the ERT noted that research has been conducted in different sectors without harmonization or coordination. With the exception of increased frequency and intensity of natural disasters and climate-related risks, Iceland has not anticipated any significant socioeconomic impact. According to Iceland, the impact of increasing temperature is likely to be positive.

81. Iceland has undertaken a number of initiatives to support developing country Parties to prepare for adaptation. These cover areas such as sustainable fisheries, soils and ecosystems, land reclamation, gender and climate change. The environment and climate change courses attended by students from developing countries, and knowledge-sharing help to build their capacity to conduct in-country research on impact assessment.

82. Iceland has undertaken significant work on climate variability assessment and climate projections, which form the basis for conducting the vulnerability assessment. In order to enhance efforts to successfully formulate adaptation options, the ERT encourages Iceland to develop a framework within which vulnerability and adaptation assessment could be developed. This will facilitate a more thorough vulnerability and impacts assessment for all important sectors and the development of practical adaptation options. Although the ERT was informed that there is a lack of funding to pursue adaptation options, further research may yield practical and effective options, which may be relatively inexpensive. The ERT notes that a focus on adaptation research and the formulation of adaptation options will facilitate closer collaboration among the different actors and result in the sectoral integration that Iceland seeks.

E. Financial resources and transfer of technology, including information under Articles 10 and 11, of the Kyoto Protocol

1. Provision of financial resources, including ‘new and additional’ resources and resources under Article 11 of the Kyoto Protocol

83. The information provided in the NC5 covers most of the issues on which information is required under the Convention and its Kyoto Protocol. However, the ERT noted that the Party did not provide an indication of what ‘new and additional’ financial resources it has provided pursuant to Article 4, paragraph 3. The ERT recommends that Iceland enhance completeness of reporting by including this information in its next national communication.

84. In its NC5, Iceland provided details on measures taken to give effect to its commitments under Article 4, paragraphs 3–5, of the Convention as required by the UNFCCC reporting guidelines and under Article 11 of the Kyoto Protocol, as required by the Guidelines for the preparation of information required under Article 7 of the Kyoto Protocol. During the review, Iceland provided information on how it defines ‘new and

additional' financial resources. According to Iceland, the increasing volume of official development assistance (ODA) since 2005 as well as an increase in climate-related ODA in the last couple of years can be considered as 'new and additional' financial resources, despite a decrease in total ODA during 2010–2012 due to the financial crisis experienced earlier. According to the Strategy for Iceland's International Development Cooperation, Iceland aims to increase the percentage of ODA in gross national income to 0.7 per cent by 2019. Another element of the 'new and additional' financial resources involves a separate budget item that has been included in the state budget since 2012, which focuses on environmental and climate change issues. This budget item includes Iceland's fast-start finance commitments. With the new budget item, allocations to climate change projects now have earmarked funding, instead of being a part of the general budget line.

85. Iceland has also provided detailed information on the assistance it has made available to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them meet the costs of adaptation to those adverse effects. Furthermore, Iceland has provided information on other financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels. In particular, Iceland provided financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels, including the Global Environment Facility and the UNFCCC. Table 7 summarizes information on financial resources and technology transfer.

Table 7

Summary of information on financial resources and technology transfer for 2007–2011

| <i>Channel of financial resources</i> | <i>Years of disbursement (Unit: thousand USD)</i> | | | | |
|---------------------------------------|---|-------------|-------------|-------------|-------------|
| | <i>2007</i> | <i>2008</i> | <i>2009</i> | <i>2010</i> | <i>2011</i> |
| Official development assistance (ODA) | 34 397.9 | 48 732.2 | 34 503.0 | 28 596.8 | 25 506.0 |
| Climate-related aid in bilateral ODA | 2 247.1 | 4 948.3 | 5 413.0 | 5 896.5 | 6 333.6 |
| Other (bilateral/multilateral) | 4 473.7 | 7 286.8 | 6 452.3 | 5 212.1 | 5 558.1 |

86. According to the Strategy for Iceland's International Development Cooperation, priority areas for the financial flows include natural resources (renewable energy and fisheries), human capital and peacebuilding. Cross-cutting priority issues include gender equality and environmental sustainability. Climate change related financial flows fall mostly under natural resources, including the United Nations University (UNU) Geothermal and Fisheries Training Programmes, the UNU Land Restoration Training Programme and fast-start finance. Other important climate-related activities include support to geothermal energy projects in Nicaragua and East Africa, and a new compact with the World Bank with the aim of enabling the countries along the African Rift Valley to acquire reliable mapping of geothermal areas and plans for resource testing through drilling. Iceland has furthermore engaged in several water and sanitation projects as well as projects on gender and climate change. In terms of priority regions, high emphasis has been placed on Sub-Saharan Africa, including Malawi, Mozambique and Uganda. In addition, the Strategy for Iceland's International Development Assistance reflects the need to support small island developing States (SIDs) in adapting and mitigating the effects of climate change.

87. During the review, Iceland elaborated on financial resources provided to the climate change related funds set up under the Copenhagen Accord. Iceland has committed itself to

provide USD 1 million for the period 2011 to 2012 under the fast-start finance programme. The allocation of this fund will be balanced between mitigation and adaptation, with a focus on least developed countries and SIDS. The ERT noted that specific projects funded by fast-start finance include those addressing the gender dimension of climate change on fisheries sector livelihoods, geothermal energy and technical assistance to Dominica, gender sensitive climate change mitigation and adaptation in Uganda, as well as those that are supported by the UNFCCC Least Developed Countries Fund and the Women's Delegates Fund.

2. **Activities related to transfer of technology, including information under Article 10, of the Kyoto Protocol**

88. In its NC5, Iceland has provided details of measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound technologies. It also reports on activities related to technology transfer in specific areas such as the development of geothermal energy and its activities for financing access by developing countries to 'hard' or 'soft' environmentally sound technologies. Furthermore, Iceland has reported in textual format on the steps taken by governments to promote, facilitate and finance the transfer of technology, and to support the development and enhancement of endogenous capacities and technologies of developing countries. According to Iceland, all of the reported activities are undertaken by the public sector or international organizations. Therefore, no distinction was made between public- and private-sector activities in the NC5.

89. The ERT noted that although technology transfer and capacity-building focused more on mitigation, they also have some indication of adaptation benefits. According to the NC5, these projects focus on the following: emphasizing the sustainable utilization of natural resources; strengthening the United Nations University Fisheries Training Programme and Geothermal Training Programme through involving more students and setting up training courses in developing countries; establishing the Land Restoration Training Programme that specializes in the restoration of degraded land and sustainable land management in order to assist developing countries in capacity development within this field; establishing the Gender Equality Training Programme that offers courses on gender and climate; focusing the Icelandic International Development Agency's bilateral development cooperation on energy and strengthening collaboration with international institutions in the field of fisheries, renewable energy and gender equality.

90. According to Iceland, for the time being no ODA is channelled through the private sector. However, an analysis is under way within the Ministry of Foreign Affairs on the possibilities of promoting private-sector engagement in development cooperation. Currently the Ministry of Foreign Affairs does not actively monitor non-ODA flows, including financial flows from non-governmental organizations (NGOs) and the private sector to developing countries. Iceland is, however, in the process of implementing the Rio markers⁶ developed by the Organisation of Economic Co-operation and Development and will in the future attempt to measure non-ODA flows, such as those from NGOs and the private sector.

F. **Research and systematic observation**

91. Iceland has provided information on its actions relating to research and systematic observation, and addressed both domestic and international activities, including the World Climate Programme, the International Geosphere–Biosphere Programme, the Global

⁶ <<http://www.oecd.org/dac/aidstatistics/48785310.pdf>>.

Climate Observing System (GCOS) and the IPCC. The NC5 also reflects action taken to support related capacity-building in developing countries. Furthermore, Iceland has provided a summary of information on its GCOS activities.

92. In the NC5, Iceland outlined its climate modelling and monitoring activities, most of which have a domestic focus. The ERT notes that the output of this research is beneficial to all countries including developing countries. Iceland has also been actively involved in international activities through working with overseas universities on a number of projects including paleoenvironmental studies, such as those on fossils, soils and sediment.

93. According to the NC5, emphasis on research and development has increased in Iceland and is facilitated by legislation and promoted by the Science and Technology Policy Council. Around 55 per cent of research and development expenditure is from the private sector and 43 per cent from the public sector, including support provided to higher education institutions. The NC5 indicated that academic research on the socioeconomic dimensions of the climate change issue has yet to be established. The ERT notes that the information contained in the NC5 focuses on research on climate processes, the climate systems and the impacts of climate change.

94. Iceland engages in extensive GCOS related work such as monitoring the climate system, detecting climate change, assessing the impacts of climate change on soils, flora and fauna, oceans, and water resources, supporting adaptation to climate variability and climate change, and conducting research to improve understanding, modelling and prediction of the climate system at the national level.

G. Education, training and public awareness

95. In the NC5, Iceland has provided information on its actions relating to education, training and public awareness on both domestic and international levels. Through the UNU and in cooperation with other institutions, Iceland has provided international training programmes aimed at assisting developing countries in capacity development, including the following: (a) the Land Restoration Training Programme covering the restoration of degraded land and sustainable land management, with cooperation between the UNU, the Government of Iceland, the Soil Conservation Service of Iceland, and the Agricultural University of Iceland; (b) the Geothermal Training Programme, which aims at assisting developing countries in capacity-building on geothermal exploration and development. The programme has been in place in Iceland since 1979, with cooperation between the UNU and the Government of Iceland and being hosted by the National Energy Authority of Iceland; (c) the Gender Equality Studies and Training Programme is aimed at promoting gender equality and women's empowerment through education and training. The programme is a joint project between the University of Iceland and the Ministry for Foreign Affairs and is part of the Government's development cooperation efforts. The programme is implemented by the University of Iceland through EDDA – Centre of Excellence.

96. During the review, Iceland provided further information on its education policy in the area of climate change. According to Iceland, environmental education is gaining importance in the new national curriculum guide, which was adopted in 2011 for education at preschool level, compulsory level and upper secondary level. Sustainability is one of the six key priorities identified in the curriculum. Climate change issues are communicated to the general public in various ways ranging from increasing public awareness of the relationship between mankind and nature/environment (activity carried out by museums) to providing practical information to families (through the Global Action Plan run by an environmental NGO). Climate change is an element of policy debates under various processes, such as the green growth.

97. The Icelandic Government involves both business and environmental NGOs in the preparation of climate change PaMs. The NGOs are also participating in different working groups at various stages of the preparation of these PaMs. However, formal consultation of the general public on draft policy and legal documents has not been reported in the NC5.

H. Evaluation of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

98. Iceland has provided most of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC5. The supplementary information is placed in different sections of the NC5. Table 8 provides an overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol as well as references to the NC5 chapters in which this information is provided.

99. Iceland has not reported the following elements of the supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol: identification of steps taken to promote and/or implement any decisions by ICAO and IMO in order to limit or to reduce GHG emissions not included in the Montreal Protocol from aviation and marine bunker fuels; information on what efforts Iceland is making to implement PaMs in such a way as to minimize adverse effects, including the effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention; and a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol also contribute to the conservation of biodiversity and the sustainable use of natural resources.

100. During the review, Iceland provided information on these elements. The ERT recommends that Iceland include these reporting elements in its next national communication.

Table 8

Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

| <i>Supplementary information</i> | <i>Reference</i> |
|--|--|
| National system | NC5, Chapter 3.2 |
| National registry | NC5, Chapter 3.3 |
| Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 | NC5, Chapter 4.4 |
| Policies and measures in accordance with Article 2 | NC5, Chapter 4 |
| Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures | NC5, Chapter 3.2, 3.3, 4.1, 4.2, 4.3 |
| Information under Article 10 | NC5, Chapter 3.2, 4.3, 4.4, 6, 7.3, 8, 9 |
| Financial resources | NC5, Chapter 7 |

I. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

101. Iceland reported the information requested in section H. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the annex to decision 15/CMP.1 as a

part of its 2012 annual submission. During the in-country review, Iceland provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT considers the reported information to be transparent and complete. The ERT commends Iceland for the additional information provided and encourages Iceland to continue exploring and reporting on the adverse impacts of the response measures.

102. In NIR 2012, Iceland provided information on how the design of its policy instruments in GHG emission reductions takes into consideration national circumstances. It also reported the potential positive impact on other countries fighting against climate change of its experimental research project CarbFix (see para. 43 above). Iceland reported in NIR 2012 that subsidies associated with the use of environmentally unsound and unsafe technologies have not been identified.

103. More information on this topic was provided by Iceland during the review. The Government of Iceland has supported developing countries in building capacity in the area of the sustainable use of natural resources through its administration of the United Nations University Geothermal Training Programme. The Geothermal Training Programme has operated over 30 years, building up expertise in the utilization of geothermal energy, by training more than 400 experts from over 40 countries. The programme provides their graduating fellows with the opportunity to enter postgraduate programmes in Icelandic universities. Iceland plans to continue its support for geothermal projects in developing countries with geothermal resources, which can be utilized to decrease their dependency on fossil fuels for economic development.

III. Conclusions and recommendations

104. The ERT concludes that, in general, the NC5 provides a good overview of the national climate policy of Iceland. The information includes most of the mandatory information required by the UNFCCC reporting guidelines and most of the elements of the supplementary information required under Article 7 of the Kyoto Protocol. The ERT also concludes that the information provided in the NC5 is broadly transparent. Although some mandatory reporting elements were not reported in the NC5, during the review, Iceland provided sufficient information on these missing elements. The ERT noted the delay in the submission of the NC5.

105. Iceland's emissions for 2010 were estimated to be 29.7 per cent above its 1990 level excluding LULUCF and 12.5 per cent above including LULUCF. With abundant RES, emissions from energy industries are low in Iceland. Emission increases were driven mainly by the expansion of heavy industry in Iceland, mainly aluminium production in several facilities or projects. These aluminium production facilities or projects have a major impact on total GHG emission levels in Iceland that is highly visible because of the small size of the Icelandic economy and its total emissions. In accordance with decision 14/CP.7, Iceland is reporting its total emission with and without the CO₂ emissions from projects that meet the criteria specified in decision 14/CP.7.

106. In the NC5, Iceland presented GHG projections for the period from 2008 to 2050. The GHG emission projections include two 'with measures' scenarios based on different assumptions with regard to economic growth, population growth, and the scale of production of aluminium and ferrosilicon industries that have the largest impact on total GHG emissions in Iceland. The projected increase in GHG emissions in an annual average of the period 2008–2012 under these scenarios, in relation to the base year, are 38.9 and

54.0 per cent respectively. Despite this increase, Iceland expects to meet its Kyoto Protocol target (which is to limit the growth in its GHG emissions to 10 per cent in relation to the base year level) when provisions of decision 14/CP.7 is applied. According to the information in the NC5, Iceland is not planning to make use of the Kyoto Protocol mechanisms to meet its target during the first commitment period.

107. The ERT noted that the unique emission and energy profile of Iceland presents a challenge to its emission mitigation plans, as its energy production is almost entirely based on renewables and most of its energy-related emissions stem from mobile sources. Iceland projects to meet its Kyoto Protocol target with the application of provisions of decision 14/CP.7 and a range of measures as described in the NC5 and the 2007 Climate Strategy. The plan includes increased afforestation and revegetation activities, and the provision of economic incentives (excise tax, oil charge tax and carbon tax) targeting fossil fuel consumption in the transport sector, which are expected to increase carbon sequestration and reduce emissions, respectively. As of 2013, the aluminium and ferrosilicon industry will fall under the EU ETS. Benchmarking, gradual lowering of the cap and trade of allowances under the EU ETS are designed to encourage a shift towards cleaner technologies and lower emissions of GHGs in these industries. During the review, the ERT was informed that the development will be closely monitored and reviewed biennially with a view to adopting additional PaMs as necessary.

108. The ERT noted that despite the economic crisis, Iceland remains committed to the provision of new and additional financial resources, as well as the provision of fast-start finance under the Copenhagen Accord. Resources have been allocated to both adaptation and mitigation activities in developing countries, with a focus on the sectors perceived to be most vulnerable or with significant mitigation potential, such as agriculture, disaster management, education, energy, fisheries, water and sanitation. The ERT further noted that, for Iceland, technology transfer and capacity-building focus more on mitigation.

109. Extensive work has been undertaken by Iceland on climate change impact assessment. Ongoing research has also been conducted to inform feasible and practical adaptation options. The ERT noted that this ongoing research will facilitate closer collaboration among different actors and further promote sectoral integration in adapting to climate change.

110. Environmental education in Iceland is gaining importance in the new national curriculum guide for education adopted in 2011, with sustainability being one of the six key priorities identified in the curriculum. Climate modelling and monitoring activities have a domestic focus. However, Iceland is also actively involved in international research activities through cooperating with overseas universities and it engages in extensive GCOS activities.

111. The ERT concluded that Iceland's national system continues to perform its required functions as set out in decision 19/CMP.1; that the national registry continues to perform the functions set out in decision 13/CMP.1 and decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. The ERT noted that updates of database and applications, implemented security measures and changes to the national registry software are documented on a regular basis by nominated responsible persons.

112. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol provided by the Party in its 2012 annual submission is complete and transparent. The ERT encourages Iceland to further enhance the reporting on Article 3, paragraph 14, including by indicating the prioritization of the action taken in implementing its commitments under Article 3.

113. In the course of the IDR, the ERT formulated several recommendations relating to the completeness and transparency of the Party's reporting under the Convention and its Kyoto Protocol. The key recommendations are that Iceland:

(a) Improve the completeness of its reporting by including in the next national communication the following information:

- (i) Description and summary tables of PaMs by sector, subdivided by gas;
- (ii) How Iceland believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals;
- (iii) Emission projections presented on a sectoral and gas-by-gas basis;
- (iv) Emission projections related to fuel sold to ships and aircraft engaged in international transport;
- (v) The expected impact of climate change and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), with regard to adaptation;
- (vi) How Iceland has determined the financial resources to be 'new and additional';
- (vii) Steps taken to promote and/or implement any decisions by the ICAO and IMO in order to limit or reduce emissions of GHG;
- (viii) How the Party strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects on other Parties;
- (ix) A description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, also contributes to the conservation of biodiversity and the sustainable use of natural resources;

(b) Improve the transparency of reporting by including in the next national communication the following information:

- (i) The total effect of PaMs separately for measures already implemented and those for new measures;
- (ii) Further details on the assistance provided to developing country Parties that are particularly vulnerable to climate change in meeting the costs of adaptation;
- (iii) More details on Iceland's activities related to technology transfer, in particular the country's success and failure stories;
- (iv) Further details of the public information available on the website of the national registry;

(c) Improve the transparency of reporting by including in its next annual submission further information on how it gives priority to the actions taken to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol regarding the minimization of the adverse impacts of response measures to climate change.

114. The ERT encourages Iceland to undertake a number of improvements regarding transparency and the completeness of its reporting; the most important of which are that the Party:

(a) Explore further the potential for using RES in mobile sources and to include information on this in its next national communication;[Restart the numbering of this subpara.

- (b) Provide more details on the methodologies used for its GHG projections;

- (c) Report on the sensitivity of projections to changes in external parameters and implementation issues;
- (d) Provide more detailed information on vulnerability assessment and adaption options.

IV. Questions of implementation

115. During the review, the ERT assessed the NC5, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol and reviewed information on the minimization of the adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, with regard to timeliness, completeness and transparency. No question of implementation was raised by the ERT during the review.

Annex

Documents and information used during the review

A. Reference documents

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications”. FCCC/CP/1999/7. Available at <<http://unfccc.int/resource/docs/cop5/07.pdf>>.

“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/CP/1999/7. Available at <<http://unfccc.int/resource/docs/cop5/07.pdf>>.

“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>>.

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FCCC/SBI/2011/INF.1/Add.1. Compilation and synthesis of fifth national communications. Note by the secretariat. Addendum. Policies, measures, and past and projected future greenhouse gas emission trends of Parties included in Annex I to the Convention. Available at <<http://unfccc.int/resource/docs/2011/sbi/eng/inf01a01.pdf>>.

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Fourth national communication of Iceland. Available at <<http://unfccc.int/resource/docs/natc/islnc4.pdf>>.

2009 GHG inventory submission of the Iceland. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4771.php>.

2012 GHG inventory submission of Iceland. Available at http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php.

B. Additional information provided by Iceland

Responses to questions during the review were received from Mr. Hugi Ólafsson (Ministry for the Environment), Mr. Kristján Geirsson (Environment Agency of Iceland) and Mr. Stefán Einarsson (Ministry for the Environment), including additional material on updated policies and measures, greenhouse gas projections, the national registry and recent climate policy developments in Iceland.
