



Framework Convention on Climate Change

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Report of the in-country in-depth review of the fifth national communication of Finland

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 Finland conducted by an expert review team in accordance with relevant provisions of the Convention and Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. For Finland the Convention entered into force on 1 August 1994 and the Kyoto Protocol on 16 February 2005. Within the burden-sharing agreement of the European Union (EU) for meeting commitments under the Kyoto Protocol, Finland committed itself to keeping its greenhouse gas (GHG) emissions at the base year¹ level during the first commitment period from 2008 to 2012.

2. This report covers the in-country in-depth review (IDR) of the fifth national communication (NC5) of Finland, coordinated by the UNFCCC secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (as contained in the annex to decision 22/CMP.1). The review took place from 3 to 8 May 2010 in Helsinki, Finland, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Marko Aunedi (Croatia), Ms. Diana Harutyunyan (Armenia), Mr. Abdelkrim Ben Mohamed (Niger) and Ms. Karla Schoeters (Belgium). Mr. Aunedi and Mr. Ben Mohamed were the lead reviewers. The review was coordinated by Ms. Ruta Bubniene and Ms. Barbara Muik (UNFCCC secretariat).

3. During the IDR, the expert review team (ERT) examined each part of the NC5. The ERT also evaluated the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol provided by Finland as a part of the NC5. 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 reported in the national inventory report of the Party's 2010 annual submission.

4. In accordance with decision 22/CMP.1, a draft version of this report was communicated to the Government of Finland, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Summary

5. The ERT noted that Finland's NC5 mostly complies 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. The ERT acknowledged a high degree of coherency in Finland's NC5.

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

1. Completeness

7. The ERT noted that the NC5 covers most of the information required by the UNFCCC reporting guidelines and that Finland has provided all supplementary 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, chapter II.

required under Article 7, paragraph 2, of the Kyoto Protocol. However, Finland has not provided an estimate of the total effect of policies and measures (PaMs) or information on the GHGs affected by, and the implementing entities of, major individual measures in the energy sector. Emission projections related to fuel sold to ships and aircraft engaged in international transport were also not provided.

2. Transparency

8. The ERT acknowledged that Finland's NC5, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, is comprehensive, concise, well structured and mostly transparent. 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 Finland to further increase the transparency of its reporting, such as in relation to PaMs (see para. 29 below), consistency between the NC5 chapters on PaMs and projections (see para. 27 below), projection methodologies (see paras. 59–62 below) and the applied climate scenarios (see para. 76 below).

3. Timeliness

9. The NC5 was submitted on 23 December 2009, before the deadline of 1 January 2010 mandated by decision 10/CP.13.

II. Technical assessment of the reviewed elements

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

10. In its NC5, Finland has provided a concise description of its national circumstances, and has elaborated on the EU- and national-level legislations and on key climate change policies and strategies. Further technical assessment of the country's institutional and legislative arrangements for coordination and implementation of PaMs is provided in chapter II.B.1 of this report.

1. National circumstances

11. In its NC5, Finland has provided a concise description of its national circumstances and how these national circumstances affect GHG emissions and removals in the country. This description covers government structure, geography, climate, urban structure, economic development, specifics of the energy, transport, industry, waste, agriculture and forestry sectors, as well as developments of building stock. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

12. The main drivers of emission trends in Finland include the steady growth of its industrial sector, and structural changes in the economy leading to an increased share of electric and electronic industry and a decreased share of forest-oriented industry. The gross domestic product (GDP) grew steadily by 4 per cent annually during the period 2004–2007, owing to an increase in the export-oriented electric and electronic, pulp and paper, and metal industries. The contraction in the global economy in the second half of 2008 triggered the recession in the Finnish economy and the significant decrease in Finland's GDP after 2008.

13. The population of Finland has been growing at a rather moderate rate of 0.35 per cent annually since 1990. The urban population accounted for 65 per cent of the total population in 2007, and this share has continued to grow, albeit at a slower rate than in the second half of the 1990s.

14. One of the key characteristics of the Finnish economy is its high energy intensity – in 2008, its total primary energy supply (TPES) per unit of GDP was among the highest of the member countries of the Organisation for Economic Co-operation and Development (OECD). The country's relatively high dependence on fossil fuels and peat has resulted in considerable carbon intensity, in the amount of 0.4 kg carbon dioxide equivalent (CO₂ eq) per 2000 USD using purchasing power parity. However, in parallel with the structural changes in Finland's economy, the carbon and energy intensity of the economy started to decrease in the late 1990s and, since then, GDP and GHG emission trends have been decoupled. Finland's CO₂-GDP ratio decreased by more than 30 per cent during the period 1990–2008. This reflects partly the structural changes in industry strongly driven by the increased share of GDP of communications and electrical equipment manufacturing, and partly the effect of the energy-efficiency measures implemented in the manufacturing and housing sectors.

Table 1

Indicators relevant to greenhouse gas emissions and removals for Finland

	1990	1995	2000	2005	2008	Change 1990– 2000 (%)	Change 2000– 2008 (%)	Change 1990– 2008 (%)
Population (million)	5.0	5.1	5.2	5.3	5.3	3.8	1.9	5.8
GDP (2000 USD billion using PPP)	109.3	105.2	132.8	150.4	165.7	21.5	24.8	51.6
TPES (Mtoe)	28.4	28.9	32.1	33.5	34.8	13.1	8.3	22.5
GDP per capita (2000 USD thousand using PPP)	21.9	20.6	25.6	28.6	31.4	17.1	22.4	43.3
TPES per capita (toe)	5.7	5.7	6.2	6.5	6.6	9.0	6.2	15.8
GHG emissions without LULUCF (Tg CO ₂ eq)	70.4	70.8	69.1	68.4	70.1	–1.8	1.5	–0.3
GHG emissions with LULUCF (Tg CO ₂ eq)	54.4	56.7	46.5	35.6	34.7	–14.4	–25.3	–36.1
CO ₂ emissions per capita (Mg)	11.3	11.3	10.9	10.7	11.0	–3.5	0.6	–2.9
CO ₂ emissions per GDP unit (kg per 2000 USD using PPP)	0.52	0.55	0.43	0.37	0.35	–17.6	–17.8	–32.3
GHG emissions per capita (Mg CO ₂ eq)	14.1	13.9	13.3	13.0	13.3	–5.4	–0.4	–5.8
GHG emissions per GDP unit (kg CO ₂ eq per 2000 USD using PPP)	0.6	0.7	0.5	0.5	0.4	–19.2	–18.7	–34.3

Data sources: (1) GHG emissions data: Finland's 2010 greenhouse gas inventory submission; (2) Population, GDP and TPES data: International Energy Agency, database of energy statistics, 2009.

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.

15. Nevertheless, Finland's CO₂ emissions per TPES unit are lower than in many other EU countries, owing to the country's high use of hydro, nuclear and biomass energy. Renewable energy sources accounted for 28.5 per cent of final energy consumption in 2007. Finland's GHG emissions fluctuate from year to year, as they depend to a great extent on annual changes in winter temperatures and the respective demand for heating, as well as on patterns of precipitation in the Nordic region, which affect the import and export of electricity between the Nordic countries.

16. In its NC5, Finland has provided a summary of information on GHG emission trends for the period 1990–2007. This information is consistent with the 2009 annual submission. Summary tables, including trend tables for emissions in CO₂ eq, given in the common reporting format, are provided in an annex to the NC5. During the review, the ERT assessed Finland's recently submitted 2010 annual submission and reflected that latest information in this report.

17. Total GHG emissions³ decreased by 0.3 per cent between 1990 and 2008, which was mainly attributed to the decrease in methane (CH₄) and nitrous oxide (N₂O) emissions, whereas total GHG emissions including net removals from land use, land-use change and forestry (LULUCF) decreased by 36.1 per cent. The LULUCF sector has been a sink and has had a considerable share in the total net GHG emissions: 22.7 per cent (16.0 Tg CO₂ eq) in 1990 and 50.5 per cent (35.4 Tg CO₂ eq) in 2008.

18. Emissions of CH₄ and N₂O decreased by 32.6 per cent and 8.8 per cent, respectively, in the period 1990–2008. The emission trends for the individual GHGs differed across different time-horizons: for example, CO₂ emissions increased by 27.2 per cent during the period 1990–2003, but decreased by 19.2 per cent during the period 2003–2008; CH₄ emissions declined by 32 per cent during the period 1994–2008; and N₂O emissions decreased between 1990 and 1992, but have since stabilized. Emissions of fluorinated gases (F-gases) accounted for about 0.1 per cent of total GHG emissions in 1990 and 1.5 per cent in 2008, which corresponds to an 11-fold increase. Table 2 provides an overview of GHG emissions by sector from the base year to 2008 (see also discussion of sectoral trends in chapter II.B).

19. GHG emissions from the energy sector increased by 0.9 per cent during the period 1990–2008. The main drivers for this emission trend in the energy sector were economic growth, structural changes in industry and changes in imports and exports within the Nordic electricity market, as well as the implementation of the European Union emissions trading scheme (EU ETS) in the period 2005–2008. Between 1990 and 2008, GHG emissions from the industrial processes sector increased by 38.7 per cent, while those from the waste and agriculture sectors considerably declined. GHG emissions from the waste sector were reduced by 44.6 per cent as a result of efficient implementation of waste regulations aimed at preventing waste and promoting its reuse and recycling. A relatively steady decrease in GHG emissions from the agriculture sector (by 11.8 per cent from 1990 to 2008) was due to reduced cultivation of organic soils, a decreasing number of livestock and a decrease in fertilizer use. The significant increase in net GHG removals from the LULUCF sector (by

³ In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding land use, land-use change and forestry, unless otherwise specified.

121.4 per cent from 1990 to 2008) was thanks to continuous sustainable forest management practices.

Table 2
Greenhouse gas emissions by sector in Finland, 1990–2008

Sector	GHG emissions (Tg CO ₂ eq)						Change (%)		Shares ^a by sector (%)	
	1990	1995	2000	2005	2007	2008	1990–2008	2007–2008	1990	2008
	1. Energy	54.5	56.1	54.4	54.0	63.2	55.0	0.9	–13.0	77.5
A1. Energy industries	19.2	24.1	22.1	21.9	30.8	24.3	26.5	–21.2	27.3	34.6
A2. Manufacturing industries and construction	13.4	12.1	11.9	11.3	11.5	10.8	–14.3	–5.7	19.0	15.4
A3. Transport	12.8	12.0	12.8	13.7	14.3	13.6	6.6	–4.4	18.2	19.4
A4.–A5. Other	8.9	7.5	7.3	6.8	6.5	6.1	–32.0	–5.7	12.7	8.7
B. Fugitive emissions	0.2	0.3	0.2	0.2	0.2	0.2	–18.8	3.3	0.3	0.3
2. Industrial processes	5.1	4.6	5.5	6.2	6.7	7.0	38.7	5.0	7.2	10.0
3. Solvent and other product use	0.2	0.1	0.1	0.1	0.1	0.1	–51.9	–11.5	0.3	0.1
4. Agriculture	6.6	6.0	5.8	5.7	5.7	5.8	–11.8	2.0	9.4	8.3
5. LULUCF	–16.0	–14.1	–22.6	–32.8	–30.7	–35.4	121.4	15.5	–22.7	–50.5
6. Waste	4.0	3.9	3.3	2.4	2.4	2.2	–44.6	–7.5	5.6	3.1
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GHG total with LULUCF	54.4	56.7	46.5	35.6	47.4	34.7	–36.1	–26.7	NA	NA
GHG total without LULUCF	70.4	70.8	69.1	68.4	78.1	70.1	–0.3	–10.2	100.0	100.0

Data source: GHG emissions data: Finland's 2010 greenhouse gas inventory submission.

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.

^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

20. In accordance with decision 15/CMP.1, Finland has 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). This description includes all of the elements required in decision 15/CMP.1, including: the name of and contact information for the national entity; the roles and responsibilities of various agencies and entities; a description of the process for collecting

activity data; a description of the quality assurance and quality control (QA/QC) plan; and a description of the procedures for the official consideration and approval of the inventory.

21. During the review, the Party presented an overview of the national system, elaborating on its capacity, legislative and institutional arrangements and their enforcement, and administrative procedures, including QA/QC procedures. The ERT took note of the conclusion contained in the report of the individual review of the 2009 annual submission of Finland (2009 annual review report (ARR))⁴ and concluded that the national system continued to perform its required functions as set out in decision 19/CMP.1.

3. National registry

22. In its NC5, Finland has provided information on its 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 the national registry complies with the requirements of the technical standards for data exchange between registry systems.

23. During the review, Finland 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 of data; the measures put in place to prevent the security of the registry being compromised; the test procedures related to the performance of the current version of the national registry; and the recording of the changes and discrepancies in the national registry. In response to questions raised by the ERT during the review, Finland provided documents demonstrating how it records the changes related to the national registry and how it maintains these records. The ERT noted that updates of databases and applications, implemented security measures, and changes to the national registry software are documented.

24. The ERT took note of the conclusion contained in the standard independent assessment report (SIAR) that Finland continues to maintain sufficient capacity to ensure the accurate accounting of Kyoto Protocol units and that it continues to conform to the technical standards for data exchange between registry systems. The ERT also took note of the recommendations contained in the 2009 ARR that Finland should take appropriate actions to reduce the number of out-of-sequence messages sent by its registry, and enhance the user interface of its registry by providing the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1. The ERT reiterates these recommendations and further recommends that Finland report in its next annual submission on any changes made to that public information.

25. The ERT concluded that Finland'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.

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

26. As required by the UNFCCC reporting guidelines, Finland has provided in its NC5 comprehensive and well-organized information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol. Although Finland has focused on PaMs at the national level, it has also mentioned those at the regional and municipal levels and elaborated on European legislation. Each

⁴ FCCC/ARR/2009/FIN, paragraph 13.

sector has its own textual description of the principal PaMs, supplemented by summary tables on PaMs by sector. Finland has also provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals, consistent with the objective of the Convention. The NC5 contains a similar set of PaMs to that in the NC4.

27. However, the ERT noted that Finland did not provide the following reporting elements required by the UNFCCC reporting guidelines: information on the GHGs affected by, and the implementing entity or entities of, major individual measures in the energy sector. The ERT also noted some inconsistencies in the description of the PaMs and the projections for the transport sector, where measures with different implementation statuses (i.e. implemented, under implementation or planned) have been included in both the 'with measures' and 'with additional measures' scenarios. More distinction between and clarity on the statuses of the measures would increase transparency. The ERT encourages Finland to improve transparency by ensuring consistent reporting in the NC5 chapters on PaMs and projections.

28. Some of the recommendations contained in the previous IDR report⁵ were taken into consideration by Finland to improve its reporting in the NC5: for example, more emphasis has been put on presenting measures in the sectors not covered by the EU ETS (non-ETS sector), in particular the residential and transport sectors.

29. Although more information on the methods used for the monitoring, evaluation and estimation of the effects of PaMs was provided during the review, there is limited information on monitoring and evaluation methods in the NC5. The ERT acknowledges the difficulty of evaluating the effect of individual measures, owing to overlaps and interactions. During the review, Finland showed that there is ongoing research in this area⁶ and that efforts are being made to quantify the effect of individual PaMs. The ERT encourages Finland to enhance the transparency of its reporting by providing information on the monitoring, evaluation and estimation of the effects of PaMs, taking into account possible synergies and overlaps, as well as the costs of individual PaMs.

30. During the review, Finland provided information on updated PaMs, such as a recent governmental agreement (made on 26 April 2010) on a renewable-energy package for the achievement of a 38 per cent renewable energy target for Finland. This package includes a custom feed-in tariff for electricity produced from wood combustion, a feed-in tariff for wind power and biogas (already in the legislative process), an increased target for the use of heat pumps and an increase in the target for the share of biofuel in gasoline and diesel from 10 to 20 per cent. In relation to addressing the long-term challenges in the transport sector, the possibility of introducing electric cars through fleet renewal and use of biofuels is also being explored. The national building code on energy efficiency has heightened the requirements for new buildings. By updating the Directive on the energy performance of buildings and the Land Use and Building Act, energy efficiency and the renovation of buildings have been stimulated. On 6 May 2010, the Government of Finland issued a proposal on a nuclear package which includes construction of two additional nuclear power plants, expected to begin operations after 2020. Also, more information was provided by Finland during the review on the ancillary benefits of its PaMs, for example in relation to air quality and biodiversity. Table 3 provides a summary of the reported information on the PaMs of Finland.

31. Finland has identified the shift to energy-efficient passenger cars through a tax on CO₂ emissions, feed-in tariffs for electricity produced from wood pellets, and voluntary energy-efficiency agreements with businesses and municipalities as the country's success

⁵ FCCC/IDR.4/FIN.

⁶ Operational and Financial Plan of the Ministry of the Environment for the period 2010–2013.

stories. For example, Finland estimates that, owing to the introduction of a CO₂-based car tax for passenger cars (since 2008) and vans (since 2009), the average emissions of new cars decreased from 177 g/km in 2007 to 152 g/km at the beginning of 2010.

Table 3

Summary of information on policies and measures

<i>Major policies and measures</i>	<i>Examples/comments</i>
<i>Framework policies and cross-sectoral measures</i>	
Long-term Climate and Energy Strategy (2008)	Outline of PaMs up to 2020 and suggestions for PaMs up to 2050; sets target of 15 per cent reduction in greenhouse gas (GHG) emissions from the transport sector by 2020 compared with emission levels in 2005
Government Foresight Report on Long-term Climate and Energy Policy: Towards a Low-carbon Finland (2009)	Includes non-binding target to reduce Finland's GHG emissions by at least 80 per cent by 2050 compared with the 1990 level
European Union (EU) climate policy	European Climate Change Programme
EU emissions trading scheme (EU ETS)	Emissions Trading Act (2004), which sets a target for installations covered by the EU ETS to reduce their emissions by 21 per cent below 2005 levels by 2020
Energy taxation	Excise duties for energy consumption (coordinated as EU-wide tax based on CO ₂ content of fuel)
Support of research and development	Several research and development programmes under the Finnish Funding Agency for Technology and Innovation, such as ClimBus
Other	Use of Kyoto Protocol mechanisms (procurement by the Government)
<i>Policies and measures by sector</i>	
<i>Energy</i>	
New nuclear power plant	Construction of a new nuclear power plant by 2012 (expected to reduce GHG emissions by 2015 by 8 Mt CO ₂ /year)
Energy sector liberalization	Electricity Act (1999); Electricity Industry and Organization Act (2000); Gas Act (2000)
Renewable energy sources	Finland set a target of 38 per cent of final energy consumption to come from renewable energy sources by 2020; Action Plan for Renewable Energy Sources (4.5 Mt CO ₂ /year by 2010); feed-in tariff for wind power (saving of 6 TWh by 2020)
Energy efficiency	Energy Conservation Programme (3.4 Mt CO ₂ eq/year in 2010); promotion of energy conservation and use of renewable energy sources (4 Mt CO ₂ eq/year during the period 2010–2020); Act on energy certification of buildings; Act on energy efficiency inspections of cooling equipment

<i>Major policies and measures</i>	<i>Examples/comments</i>
<i>Transport</i>	
Vehicle and fuel taxes	Differentiation of car and vehicle taxation according to vehicle-specific emissions (planned and partly implemented); fleet renewal; tax incentive for biofuels; Act on promoting biofuels in transport (increase of the share of biofuels in gasoline and diesel to 10 per cent by 2020); governmental decision (2010) to increase the share of biofuels to 20 per cent by 2020
Agreements/partnerships	Voluntary agreement with industry on fuel efficiency; EU voluntary agreements with car manufacturers (2.1–2.4 Mt CO ₂ eq/year by 2020); energy-saving agreements (0.3 Mt CO ₂ eq/year by 2020)
Other	Ecodriving; promotion of public transport (0.3 Mt CO ₂ eq/year by 2020)
<i>Industrial processes</i>	
Integrated pollution prevention and control (IPPC)	EU IPPC directive ^a
Fluorinated gases (F-gases)	EU regulation and directives on F-gases ^b (0.4 Mt CO ₂ eq/year by 2020)
<i>Agriculture</i>	EU Common Agricultural Policy; promotion of biogas treatment of manure (0.03 Mt CO ₂ eq/year by 2020); measures affecting N ₂ O emissions from agricultural soils (0.5 Mt CO ₂ eq/year by 2020)
<i>Forestry</i>	National Forest Programme; Finnish Forest Certification System
<i>Waste management</i>	National waste plan revised in accordance with the EU waste directive; ^c government decision on landfills; waste minimization measures; waste tax; biowaste strategy

^a EU directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control.

^b Regulation 842/2006 on certain fluorinated greenhouse gases, and EU directive 2006/40/EC of the European Parliament and of the Council of 17 May 2006 relating to emissions from air-conditioning systems in motor vehicles and amending Council Directive 70/156/EEC.

^c EU directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste (this is the codified version of EU directive 75/442/EEC as amended).

1. Policy framework and cross-sectoral measures

32. Several ministries and other public institutions participate in the development of climate change related policy in Finland, including the Ministry of Employment and the Economy (formerly the Ministry of Trade and Industry), the Ministry of the Environment, the Ministry for Foreign Affairs, the Ministry of Transport and Communications and the Ministry of Agriculture and Forestry. The Ministry of the Environment bears administrative responsibility for Finland's involvement in the UNFCCC negotiations and acts as the national focal point to the Convention. The ministerial working group on climate and

energy policy, established in 2003 and headed by the Ministry of Employment and the Economy, is leading the development of climate change policy at the national level and guiding Finnish involvement in the international climate change negotiations. This working group coordinated the preparation of a recent strategic climate change related document, namely Finland's Long-term Climate and Energy Strategy (2008). The preparation of another key climate change related document, the Government Foresight Report on Long-term Climate and Energy Policy: Towards a Low-carbon Finland (2009)⁷ (hereinafter referred to as the Foresight Report), was carried out by the Prime Minister's Office in cooperation with key ministries and supervised by a ministerial working group led by the Minister of the Environment.

33. Several institutions at the national, regional and local levels are involved in the implementation of Finland's climate change policy. Statistics Finland compiles the country's GHG inventory, while the Energy Market Authority is the competent authority of the EU ETS and the national entity responsible for the emissions trading registry under the Kyoto Protocol. The Ministry of Employment and the Economy is responsible for transposition and implementation of the EU ETS legislation. Centres for Economic Development, Transport and the Environment (replacing regional environment centres) prepare and implement environmental strategies (including climate change mitigation), which guide land-use planning and environmental protection in their respective regions. Municipal authorities play a significant role in the implementation of climate change related PaMs, as they are responsible for the implementation of PaMs, including those targeted at achieving energy efficiency in the residential sector and those in the waste sector.

34. As Finland is a member of the EU, its climate and energy policies are mainly driven by EU legislation. Key EU policies include the burden-sharing agreement,⁸ the EU ETS, the climate and energy package, the monitoring mechanism,⁹ use of Kyoto mechanisms, the EU energy services directive (directive 2006/32/EC), the EU directive on the energy performance of buildings (directive 2002/91/EC), energy market liberalization and the EU Common Agricultural Policy. At the national level, the key driving policy is the Long-term Climate and Energy and Strategy (2008), which outlines PaMs scheduled for up to 2020 and suggestions for PaMs for up to 2050.

35. The EU ETS is the main instrument for reducing emissions, which covers roughly 50 per cent of Finland's GHG emissions (a cap set at 37.6 Mt CO₂ eq/year for the period 2008–2012) and is set to reduce the emissions of participating installations by 21 per cent in the period 2008–2012 compared with the estimated level of emissions without the use of the EU ETS. Other PaMs included in the EU climate and energy package aim to promote energy saving and use of renewable energy sources (a 38 per cent share of renewable energy in final energy consumption and a 10 per cent share of biofuels in gasoline and diesel in the transport sector). It was projected that the non-ETS sector would emit 35.2 Mt

⁷ Prime Minister's Office Finland. 2009. *Government Foresight Report on Long-term Climate and Energy Policy: Towards a Low-carbon Finland*. Available at <http://www.vnk.fi/julkaisukansio/2009/j28-ilmasto-selonteko-j29-klimat-framtidsredogoeelse-j30-climate_/pdf/en.pdf>.

⁸ EU decision 2006/944/EC of 14 December 2006 determining the respective emission levels allocated to the Community and each of its Member States under the Kyoto Protocol pursuant to Council Decision 2002/358/EC.

⁹ EU decision 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol.

CO₂ eq/year in the period 2008–2012, and Finland has adopted a target to further reduce emissions from this sector¹⁰ by 16 per cent by 2020 compared with the 2005 level.

36. The key long-term national policy document is the Foresight Report, which has set a target to reduce Finland's GHG emissions by at least 80 per cent by 2050 compared with the 1990 level. It includes a set of scenarios towards a low-carbon economy, with the aim of spurring on and informing future debates. The Foresight Report provides guidance for short- and medium-term policy, communicates to the public the need for PaMs for combating climate change, and directs future research. All of the scenarios foresee reaching the level of almost zero emissions from the transport sector and energy production by 2050, while the major emitters are forecast to be the agriculture and industrial processes sectors. The ERT acknowledges that this long-term policy sets a solid basis for the further planning of PaMs targeted at addressing climate change, and encourages Finland to continue specifying priority pathways for the development of climate change policy as in the Foresight Report.

2. Policies and measures in the energy sector

37. Between 1990 and 2008, GHG emissions from energy industries increased by 26.5 per cent (5,094 Gg), mainly driven by an increase in national electricity consumption. The level of emissions from electricity production strongly depends on the availability of hydropower in the Nordic electricity market, which is in turn based on the rainfall and temperature levels. Scarcity of hydropower is compensated by power generated by combined heat and power, and condensing power plants. The dependency on weather conditions in the Nordic countries implies significant inter-annual variation in the level of GHG emissions from the energy sector.

38. The trend in GHG emissions from fuel combustion showed notable decreases in industry (–19.2 per cent or 2,560 Gg) and in energy use in other sectors (–32.0 per cent or 2,860 Gg). Although energy consumption in the manufacturing industry increased, the growth in the use of biomass (particularly in the forest industry) and improvements in energy efficiency led to a decrease in the total emissions from fuel combustion. In the residential and services sectors, the decrease in emissions caused by the shift from oil heating to district and electric heating (increase of district heating by 36 per cent and increase of electric heating by 43 per cent during the period 1990–2007) outweighed the increase in emissions resulting from the growing number (by 24 per cent during the period 1990–2007) and increasing average size (by 7 per cent during the period 1990–2007) of dwellings in the country. Between 1990 and 2008, GHG emissions from transport increased by 6.6 per cent (839 Gg); the number of kilometres driven by passenger cars grew by 26 per cent, while the number of passenger-kilometres travelled by public transport remained stable.

39. **Energy supply.** Finland has a relatively high dependence on fossil fuels and peat, which, along with hydro and nuclear power and biomass, are major primary energy sources. In order to secure its energy supply and reach its GHG emission reduction target for 2020, Finland is planning to increase the shares of nuclear power, wind power and biomass in its TPES and increase the use of heat pumps. The main PaMs targeted at reducing GHG emissions are the use of the EU ETS, increasing the use of renewable energy sources through feed-in tariffs and subsidies, and improving energy efficiency as a result of voluntary agreements, taxes and regulations.

¹⁰ In accordance with EU decision 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

40. **Renewable energy.** In 2005, renewable energy sources accounted for 28.5 per cent of final energy consumption, which should be increased to 38 per cent by 2020 compared with the 2005 level in accordance with the requirements of the EU climate and energy package. Finland plans to achieve this target by increasing the use of renewable energy sources, such as wood-based fuels, liquid biofuels, wind power and heat pumps, and also by reducing energy consumption. The regulation on a feed-in tariff for wind power is planned to come into force by the end of 2010. The target price of EUR 83.5/MWh has been proposed and the actual price will be defined depending on the market price. Extra incentives are planned for new entrants to the market before 2015. The ERT noted that, with a payback period of 15 years, heat pumps are considered to be financially viable and no additional government subsidies are deemed necessary. The success of the introduction of heat pumps relies primarily on the raising of awareness through campaigns and the provision of advice on their installation.

41. Owing to the increasing competition in the international market for forest-related industry products, production of pulp and paper, one of Finland's key industries, has decreased in the country. As a result, the availability of biomass (wood residues and wood pellets) might become limited, thus creating an obstacle to reaching the targeted share of renewable energy in final energy consumption by 2020. During the review, the ERT was informed by Finland that, as a response to trends in forestry-related industry, a custom-made feed-in tariff for electricity produced from wood pellets, based on the price of emission allowances on the carbon market, was proposed by the Government on 26 April 2010 and forwarded to the Parliament for approval.

42. **Energy efficiency.** The EU climate and energy package set an overall target of a 20 per cent reduction in primary energy use compared with projected levels by 2020, to be achieved by improving energy efficiency. For Finland, with an already highly energy-efficient but energy-intensive economy, this has been translated into a national energy efficiency target of 11 per cent. PaMs aimed at achieving this target are mainly driven by the EU directive on energy services. Different measures have been put in place, such as economic subsidies for developing and implementing energy-efficiency technologies, taxes and regulations.

43. Finland considers voluntary energy-efficiency agreements with companies and municipalities, sector-specific programmes and the energy audit programme that have been in place since 1990 to be its most successful measures. Total energy savings achieved by industrial, energy-producing and building companies, as well as municipalities, through voluntary energy-efficiency agreements are estimated at around 9 TWh/year up to the end of 2010. These agreements promote energy audits and analyses and, within them, companies and municipalities are advised on how to optimize energy consumption. A state-owned company named MOTIVA has been commissioned by the Government to provide support and monitor the implementation of energy-efficiency measures.

44. In 2008, the Energy Efficiency Committee, established for a one-year term, proposed 125 new or significantly expanded existing measures for saving energy and improving energy efficiency, focusing mainly on the housing, construction and transport sectors. These measures are expected to reduce energy consumption by 18.3 TWh by 2020 and examples include the introduction of new and efficient vehicle technology (saving 8.5 TWh), energy regulations for new buildings (4.9 TWh), energy-efficiency agreements combined with research and innovation (2.8 TWh) and energy-efficiency requirements for equipment (2.1 TWh).

45. **Residential and commercial sectors.** Approximately 50 per cent of the CO₂ emissions from electricity and heat supply in these sectors are covered by the EU ETS (through district heating and combined heat and power plants). Additionally, these emissions are being reduced by increasing the use of renewable energy sources. The

remaining CO₂ emissions result from the use of light fuel oil and natural gas, and these are being reduced by promoting energy-efficiency measures (such as triple glazing) and the use of renewable energy (such as switching to heat pumps). The non-CO₂ emissions from energy use in buildings are mainly the CH₄ emissions from wood combustion.

46. The highest potential for saving energy exists in upgrading the heating systems of existing buildings and changing households' behaviour. Preventing urban sprawl by implementing tax and land-use policies and by providing guidance on land-use planning and building is expected to further contribute to reducing GHG emissions from the residential and commercial sectors. The policies driving these actions are: the EU ETS and the EU directive on the energy performance of buildings (implemented in Finland under the Act on energy certification of buildings); the Act on energy efficiency inspections of cooling equipment; the amendment to the Land Use and Building Act; and the dissemination of information, education and research.

47. **Transport sector.** Emissions from the transport sector increased by 15.3 per cent between 1990 (12.8 Mt CO₂ eq) and 2007 (14.7 Mt CO₂ eq), but decreased by 6.6 per cent between 2007 and 2008 (13.6 Mt CO₂ eq). The key policies for reducing GHG emissions from the transport sector include measures on the transport demand side, the introduction of more biofuels, and voluntary agreements among the EU car manufacturers on fuel efficiency.

48. Finland's Long-term Climate and Energy Strategy set a target of a 15 per cent reduction in GHG emissions from the transport sector by 2020 compared with the emission levels in 2005. A programme aimed at reducing emissions from business, industry, administration and people's everyday lives by means of transport- and communication-related policies¹¹ encompasses measures such as: the introduction of new car technology and the acceleration of the renewal of the existing car stock by means of a CO₂ emission based tax (includes the introduction of electric cars); energy-efficiency measures such as economic driving; energy-efficiency measures in public procurement; and the promotion of the use of environmentally friendly modes of transport. These measures will be reviewed in 2012 and, if they have not delivered the expected results, additional financial steering methods are planned to be implemented.

49. The Act on promoting biofuels in transport translates the EU recommendation to increase the share of biofuels in gasoline and diesel to 10 per cent by 2020. In a recent Finnish governmental decision, the target for the share of biofuels in gasoline and diesel was increased to 20 per cent by 2020. Voluntary agreements between the EU and car manufacturers constitute another major policy aimed at reaching the Kyoto target. The ERT noted that Finland intends to closely monitor traffic volumes and the trends in the different modes of transport in order to scrutinize the effectiveness of its PaMs.

50. **Industrial sector.** CO₂ emissions from energy combustion are included under the EU ETS. The ERT noted that ongoing efforts made by industrial companies to reduce emissions from fuel combustion have been regarded as measures to increase energy efficiency at these companies and have thus not been reported in detail. The ERT therefore encourages Finland to include more detailed information on energy-efficiency measures implemented by industrial companies in its next national communication.

3. Policies and measures in other sectors

51. Between 1990 and 2008, GHG emissions from non-energy sectors (industrial processes (including solvent and other product use), agriculture and waste) decreased by

¹¹ Drawn up by a committee appointed by the Ministry of Transport and Communications in March 2009.

4.3 per cent (from 15,840 Gg CO₂ eq to 15,152 Gg CO₂ eq), mainly driven by a reduced amount of landfilled biodegradable waste, as well as by structural changes in agriculture, which have resulted in an increase in farm size and a decrease in the number of domestic livestock. On the other hand, the trend in GHG emissions from industrial processes showed notable increases (+38.7 per cent or 1,960 Gg CO₂ eq), which were compensated by decreases in emissions from the other non-energy sectors (-24.6 per cent or 2,648 Gg CO₂ eq). This increasing trend in the GHG emissions from industrial processes reflects higher production volumes in the chemical and iron and steel industries. The LULUCF sector is a net sink, with significant inter-annual variations in the level of removals owing mainly to forest harvesting (16.0 Mt CO₂ eq removals in 1990 and 35.4 Mt CO₂ eq removals in 2008).

52. **Industrial processes.** During the review, Finland provided an update on its F-gas inventory. The ERT noted that F-gas emissions continued to increase from 2007 to 2008, although a decrease in these emissions had been previously projected. During the review, Finland expressed its intention to update the projections according to the latest trends in F-gas emissions. The ERT encourages Finland to do so and to report relevant information in its next national communication. The most important measures targeted at reducing emissions of F-gases are the implementation of the EU regulation on F-gases and the EU directive on emissions from air-conditioning systems in motor vehicles. In 2011, the EU regulation on F-gases will be reviewed to discuss the inclusion of a partial prohibition of F-gases. As an additional measure, Finland plans to promote, by disseminating information and through awareness-raising campaigns, substitutes for F-gases, which are expected to reduce emissions of F-gases by 0.38 Mt CO₂ eq by 2020.

53. **Agriculture.** In 2008, GHG emissions from the agriculture sector accounted for 8.3 per cent of total GHG emissions. The CH₄ and N₂O emissions from agriculture were reduced by 11.8 per cent between 1990 and 2008, thanks mainly to changes in the structure and methods of production. As part of its overall emission reduction target for the non-ETS sector (-16 per cent by 2020), Finland set an emission reduction target of 13 per cent compared with 2005 levels for the agriculture sector. Measures analysed to reach this target include the non-expansion of the current total area of cultivation, changing the patterns of cultivation of organic soils, the intensification of the production of energy crops and the promotion of the use of manure and agricultural by-products in biogas production. To increase transparency, the ERT encourages Finland to describe the measures planned for reaching the target set for 2020 in more detail in its next national communication.

54. **Forestry.** Forest land covers 65 per cent of the country's total area (22 million ha). Net removals from forest land varied between 18.1 and 44.2 Mt CO₂ eq during the period 1990–2008, owing to the varying intensity of forest harvesting. This represents 24–55 per cent of Finland's total emissions excluding LULUCF for the respective years. Finland's forest policy aims to achieve sustainable forest management through forest-related legislation, such as the Forest Act, the Act on financing of sustainable forestry, national and regional forest programmes, and the Forest Biodiversity Action Programme for Southern Finland (the METSO Programme). During the review, the ERT was informed that the use of wood for heat production will be promoted in Finland by the adoption of a custom-made feed-in tariff for electricity production from fuel wood.

55. **Waste management.** GHG emissions from waste management decreased significantly (by 45 per cent) between 1990 and 2008 (from 3,975 Gg CO₂ eq to 2,202 Gg CO₂ eq), owing mainly to the national implementation of the EU landfill directive, and national legislation and strategies to reduce waste generation, in particular to minimize the amount of landfilled biodegradable waste. Emission reductions were also achieved by increasing landfill gas recovery, which was also applied to closed landfills by the revision of the Government Decree on landfills in 2006. Emissions from waste management are projected to decrease further (by 52 per cent by 2020) as a result of the implemented

measures. Additional measures, including those covered by the revision of the national waste plan owing to the implementation of the new EU Waste Framework Directive, are projected to reduce emissions by a further 130 Gg CO₂ eq by 2020.

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

56. In its NC5, Finland has reported information which has not been included elsewhere 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. With regard to international trade, Finland indicated that it is planning and implementing emission reduction measures in accordance with notification requirements under international trade conventions.

57. In its NC5, Finland has recognized that one of the approaches to dealing with the minimization of the impacts of climate change related PaMs on developing countries is through its development policy. It therefore aims to support programmes and projects that focus on saving energy, increasing energy efficiency and promoting renewable energy production in developing countries, and that, through such actions, provide employment and income for the local population. The NC5 highlights the support that Finland provides to developing countries in capacity-building and developing their economic infrastructures, thus helping to diversify their economies and energy production. The ERT noted that regional programmes that promote the role of the private sector in providing energy services are being promoted in Latin America, sub-Saharan Africa and parts of Asia.

58. The NC5 also reports on the environmental impact assessment of Finland's Long-term Climate and Energy Strategy, which was made publicly available for comments before its adoption by the Parliament. The ERT encourages Finland to further enhance its reporting on the minimization of adverse effects in accordance with Article 2, paragraph 3, of the Kyoto Protocol. Further information on Finland's efforts to minimize adverse environmental, social and economic impacts of the implementation of climate change related PaMs, as reported in its NC5 and 2010 annual submission, is presented in chapter II.I of this report.

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

1. Projections overview, methodology and key assumptions

59. The GHG emission projections provided by Finland in the NC5 include a 'with measures' and a 'with additional measures' scenario until 2020, presented relative to actual inventory data for 2007. The sectors covered by the projections include energy (also including transport), industrial processes, solvent and other product use, agriculture, waste and LULUCF, following the same sector-based structure used in the chapter on PaMs. The emission projections cover the following GHGs: CO₂, CH₄, N₂O and F-gases (treating perfluorocarbons, hydrofluorocarbons (HFCs) and sulphur hexafluoride collectively), as well as the aggregated emissions for each sector and the national total, using global warming potential values. Although it was recommended in the previous IDR report, Finland has not included projections of emissions from fuel used in international transport in the projections chapter of its NC5. The ERT therefore reiterates the recommendation from the previous review report that Finland address this issue in its future reporting.

60. The GHG emission projections presented in Finland's NC5 are based on its Long-term Climate and Energy Strategy. The key assumptions used with regard to economic

activity, population growth, fuel prices and technological development are essentially the same as those described in the NC4. The key difference is related to the delayed completion of a fifth nuclear unit, which was assumed to begin operations in 2012 instead of in 2009–2010 and therefore expected to have little impact on reaching the Kyoto target in the first commitment period. Assumptions used in relation to parameters have been listed mostly in a qualitative manner in the NC5 and refer to the period 2006–2010. Finland provided the ERT with additional quantitative information on such assumptions during the review. The ERT encourages Finland to include more details on these assumptions in its next national communication, and to specify the assumptions used throughout the period covered by the projections.

61. The ‘with measures’ scenario is based on PaMs implemented or adopted until the end of 2007, while the ‘with additional measures’ scenario incorporates measures planned for the beginning of 2008 until 2020. The effects of the ‘with additional measures’ scenario become evident only after 2012, when this scenario begins to diverge from the ‘with measures’ scenario, as the additional measures are mostly driven by post-Kyoto EU targets for 2020. Both scenarios take 2007 as the base year for the projections. The results of the scenarios have been presented in tabular format in the NC5, and the ‘with measures’ scenario has been depicted graphically along with the ‘with measures’ scenario from the NC4. To enhance transparency, the ERT encourages Finland to present both the ‘with measures’ and ‘with additional measures’ scenarios in graphical format in the projections chapter of its next national communication.

62. Similar to in the NC4, a wide range of specialized models has been employed by Finland to prepare the emission projection scenarios for its NC5. The energy and transport sectors have been analysed using the TIMES and POLA models, supplemented by an environmental impact model; for the LULUCF sector, the SF-GTM, MELA and YASSO models have been used; while the projections for the agriculture sector have been elaborated using the DREMFIA model. A macroeconomic impact assessment of the scenarios has also been carried out using the VATTAGE model. The cooperation and interaction between the entities involved in developing the projections is efficient and well established. During the review, the Party provided information on methodologies in addition to that provided in its NC5. The ERT noted that Finland’s future national communications would benefit from more comprehensive descriptions of methodologies, in particular of the interactions between different models.

63. The sensitivity of the projections to variations in input parameters is discussed in the NC5. A quantitative assessment of the projections has been provided for an alternative policy on the import of electricity, and the economic impact of different price levels of emission allowances is also discussed. During the review, the ERT gained additional insight into the uncertainties regarding the future output of certain industrial sectors, in particular pulp and paper production, where decreased industrial activity may result in considerably lower emission levels. The ERT therefore encourages Finland to further explore such drivers within the sensitivity analyses of projection scenarios in its future reporting.

2. Results of projections

64. According to the ‘with measures’ scenario, Finland is on track to achieve its Kyoto target of limiting its GHG emissions to its base year level (71 Mt CO₂ eq) during the first commitment period. Finland plans to achieve its Kyoto target by means of efforts at the domestic and EU levels, supplemented by the use of the flexibility mechanisms under the Kyoto Protocol, and removal units under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. Finland is making additional efforts to continuously revise and enhance its domestic policies, as shown in the ‘with additional measures’ scenario, in order to curb its

GHG emissions even beyond its commitments under the Kyoto Protocol. These efforts are aimed at achieving more ambitious emission reduction targets than those assumed under the Kyoto Protocol, driven by the Party's commitments as part of the EU effort, which are underpinned by the policy to increase the use of renewable energy sources and improve energy efficiency.

65. As the 'with measures' and 'with additional measures' scenarios only start to differ from each other after 2012, the emission projections for 2010 are the same for both scenarios. After taking into account the effects of domestic actions and the use of Kyoto mechanisms and removal units under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, GHG emissions in 2010 are projected to be 0.3 per cent (0.2 Mt) below the country's Kyoto target. Removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are expected to contribute an average annual reduction of 0.6 Mt CO₂ eq, while the emission reduction units (ERUs) generated through the flexibility mechanisms under the Kyoto Protocol are expected to contribute 1.4 Mt CO₂ eq annually during the first commitment period. The largest emission reduction by 2010, compared with 2007 levels, is expected to result from participation in the EU ETS, as emissions from the sectors covered by the EU ETS (the ETS sector) account for roughly 50 per cent of Finland's GHG emissions. The non-ETS sector is expected to play a smaller role (contributing an around 3 per cent reduction in emissions) in reaching the Kyoto target by 2010. The ERT noted that clarity could be improved in Finland's national communication by including a discussion on meeting the Kyoto target (or any subsequent targets).

66. Considering that the emission projection scenarios in Finland's NC5 were compiled based on information available in 2007, they did not account for the major economic slowdown that occurred in the period 2007–2008. During the review, Finland informed the ERT that it is in the process of updating its emission projections. Preliminary data, along with the discussions held with the Finnish experts, suggest that the actual level of GHG emissions is expected to be substantially lower than projected in the NC5 (see para. 69 below). This suggests that meeting its Kyoto target might be less challenging for Finland than estimated at the time of drafting the NC5.

67. The projections set out in the 'with additional measures' scenario indicate a continuous decrease in emissions in the period until 2020. Measures are planned in this scenario to enable Finland to reach the EU goals for 2020. Updated information received during the review suggests that the level of emissions in 2020 is expected to be 18.5 per cent lower than projected in the 'with additional measures' scenario presented in the NC5, as a result of measures taken in both the ETS and non-ETS sectors. Furthermore, the Foresight Report demonstrates Finland's long-term commitment to reducing emissions by identifying four different evolution pathways, each one achieving an at least 80 per cent emission reduction by 2050.

68. The ERT noted that emissions of F-gases, as reported in Finland's 2010 annual submission, continued to increase from 2007 to 2008 (by 10 per cent), although a decreasing trend in these emissions, of a similar magnitude, has been projected to start in 2008 in the NC5. The ERT also noted that, according to the 'with additional measures' scenario, N₂O emissions will increase although these emissions will be included in the EU ETS. Furthermore, the projection for N₂O emissions in the 'with additional measures' scenario is slightly higher than in the 'with measures' scenario. The ERT encourages Finland to update its projections for F-gases taking into account the recent trends in these emissions, and to review its projections for N₂O emissions in its next national communication.

69. During the review, Finland provided updated projections, which indicated even greater emission reductions in 2010 compared with those projected in the NC5 (with emissions of 68.4 Tg CO₂ eq/year compared with 70.8 Tg CO₂ eq/year). These updated

projections were prepared in early 2010 and take into account the effects of the economic slowdown. Table 4 and the figure below provide a summary of GHG emission projections for Finland, as laid out in its NC5. The figure shows actual emissions excluding the effects of trading EU ETS allowances, Kyoto mechanisms and carbon removals. The projected level of GHG emissions in 2020 under the ‘with additional measures’ scenario (68.5 Tg CO₂ eq/year) is 22.7 per cent lower than the level of emissions under the ‘with measures’ scenario (88.6 Tg CO₂ eq/year).

Table 4
Summary of greenhouse gas emission projections for Finland

	<i>Greenhouse gas emissions (Tg CO₂ eq per year)</i>	<i>Changes in relation to base year level (%)</i>
Inventory data 1990 ^a	70.4	-0.9
Inventory data 2008	70.1	-1.3
Kyoto Protocol base year ^b	71.0	NA
Kyoto Protocol target ^b	71.0	0
‘With measures’ projections for 2010 ^c	70.8	-0.3
‘With additional measures’ projections for 2010 ^c	70.8	-0.3
‘With measures’ – updated projections ^d	68.4	-3.7

Note: All projections are for greenhouse gas emissions without land use, land-use change and forestry and include the effects of the implementation of the European Union emissions trading scheme, of units acquired under the flexibility mechanisms under the Kyoto Protocol, and of removal units under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

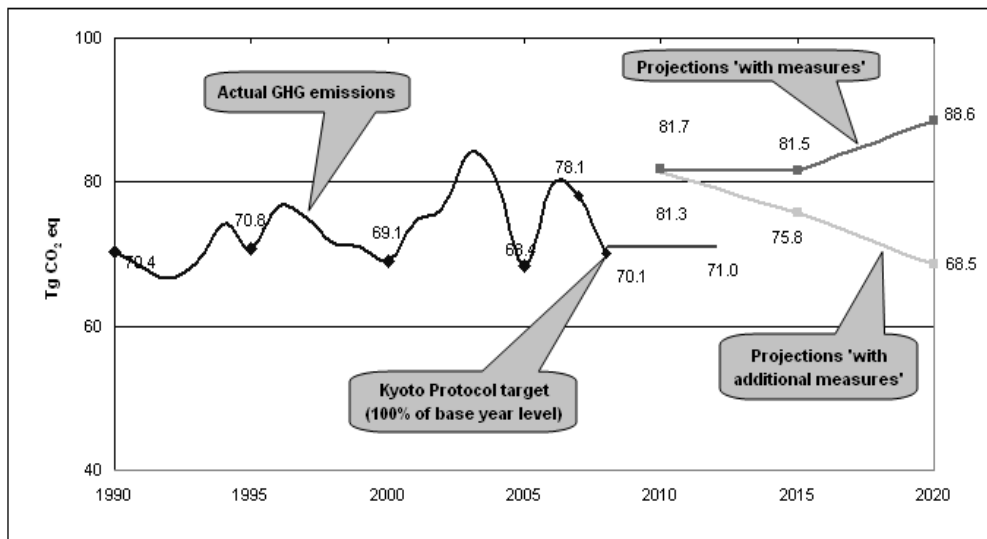
^a *Data source:* Finland’s 2010 greenhouse gas inventory submission.

^b Based on the initial review report contained in document FCCC/IRR/2007/FIN.

^c *Data source:* Finland’s fifth national communication.

^d Updated projections provided by the Party during the in-depth review.

Greenhouse gas emission trends and projections in Finland



Data sources: (1) Data for the years 1990–2008: Finland’s 2010 greenhouse gas inventory submission; the emissions are without land-use, land-use change and forestry (LULUCF); (2) Data for the years 2010–2020: Finland’s fifth national communication; the emissions are without LULUCF and do not include the effects of mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, or removal units under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Abbreviation: GHG = greenhouse gas.

3. Total effect of policies and measures

70. In the NC5, Finland presents the relevant information on factors and activities that are expected to be the key drivers for future developments in emissions in each sector until 2020, but does not report the estimated and expected total effect of implemented and adopted PaMs in the ‘with measures’ scenario, compared with a situation without such PaMs. During the review, Finland explained that this omission was due to the fact that a ‘without measures’ scenario is not available, and that it has made efforts to quantify the effect of implemented and adopted PaMs. The ERT therefore reiterates the recommendation made in the previous review report that Finland include an estimate of the total effect of its PaMs in its next national communication.

71. The ERT noted, however, that the total effect of planned PaMs included in the ‘with additional measures’ scenario is implicitly included in the NC5 as the difference in the level of future emissions under the ‘with measures’ and ‘with additional measures’ scenarios. This difference is only reflected in the projections for the period after 2012, when the additional measures are expected to have an effect.

72. Synergies and overlaps between PaMs have been indirectly taken into account in the modelling framework employed for preparing the scenarios. The difference between the aggregated effect and the sum of the effects of individual PaMs could not be assessed, since either no estimate of the aggregated effect has been provided (such as for the ‘with measures’ scenario) or the effects of individual measures have not been quantified in sufficient detail.

Table 5

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

<i>Sector</i>	<i>Effect of implemented and adopted measures (Tg CO₂ eq)</i>	<i>Relative value (% of base year emissions)</i>	<i>Effect of planned measures (Tg CO₂ eq)</i>	<i>Relative value (% of base year emissions)</i>
Energy (including transport)	NA	NA	19.1	26.9
Industrial processes	NA	NA	0.3	0.4
Agriculture	NA	NA	0.5	0.7
Waste management	NA	NA	0.2	0.3
Total (excluding LULUCF)	NA	NA	20.2	28.5

Data source: Finland’s fifth national communication.

Note: The total effect of implemented and adopted policies and measures (PaMs) has not been reported; the total effect of planned PaMs is defined as the difference between the ‘with measures’ and ‘with additional measures’ scenarios, and is presented here for 2020 as the planned PaMs are not assumed to have any effect in 2010.

Abbreviation: NA = not available.

73. According to the information reported in the NC5, PaMs implemented in the energy sector will deliver the largest emission reductions, with changes in the electricity generation fuel mix, the improvement of energy efficiency in buildings and the more efficient use of fuel in the transport sector having the greatest impact. The effect of PaMs implemented in other sectors will be of a smaller magnitude. The ERT encourages Finland to continue its efforts to quantify the effect of individual PaMs. The most effective PaMs and the drivers for GHG emission reductions are described in chapter II.B of this report. Table 5 provides an overview of the total effect of planned PaMs under the ‘with additional measures’ scenario as reported by Finland.

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

74. Finland has provided information in its NC5 on its intended use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol as a supplement to domestic actions. The NC5 states that the emission reductions achieved through the use of flexibility mechanisms will be minor compared with the emission reductions achieved through the EU ETS and other domestic measures. Kyoto units generated through these mechanisms are expected to account for 1.4 Mt CO₂ eq annually; removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are expected to contribute an average annual reduction of 0.6 Mt CO₂ eq, whereas domestic actions, along with the country’s participation in the EU ETS, are expected to reduce GHG emissions by 8.8 Mt CO₂ eq annually in the first commitment period. In the period 2008–2012, Finland may allow operators in the EU ETS to use certified emission reductions and ERUs for compliance purposes up to a maximum relative threshold of 10 per cent of their annual allowances (18.75 Mt CO₂ allowances during the first commitment period).

75. The current portfolio of the Finnish Carbon Procurement Programme (Finnder) contains 14 contracted projects, with estimated emission reductions of 3.3 million t CO₂ eq. The Finnish Government set criteria for Finnder, including the exclusion of projects reducing HFCs and the requirement to clearly identify sustainability-related benefits. Finland spent EUR 20 million on the implementation of the joint implementation/clean development mechanism pilot programme (1999–2006) and allocated EUR 50 million aimed at purchasing 7 million carbon credits in the 2008–2012 period. The ERT noted that Finland intends to allocate a further EUR 30 million for the purchase of carbon credits in the 2013–2020 period.

D. Vulnerability assessment, climate change impacts and adaptation measures

76. In its NC5, Finland has provided the required information on the expected impacts of climate change in the country and on adaptation strategies and options. The NC5 identifies detailed adaptation measures planned in all sectors, but most progress has been made in the adaptation of the water sector. However, the ERT noted that Finland did not provide detailed information on the climate scenarios, although such information provided by developed country Parties may prove valuable to developing country Parties carrying out climate impact assessments. The ERT acknowledged that substantial additional information on this matter was provided during the in-country visit. Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC5.

77. Forests are one of the main ecosystems in Finland (together with water ecosystems and wetlands) and still constitute an important part of the country’s economy. During the review, the ERT noted Finland’s strong concerns in relation to observed and forecast changes in the structure and dynamics of the forest ecosystems, including the occurrence of forest diseases and pests owing to long-term trends in temperature and precipitation.

78. The NC5 highlights both Finland's vulnerabilities and the associated adaptation measures. Finland, together with other Nordic countries, has been considered to be among the least vulnerable to climate change. This is due partly to biophysical circumstances, but also to the existing monitoring and planning systems put in place to facilitate adaptation.

Table 6

Summary of information on vulnerability and adaptation to climate change

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Biodiversity and natural ecosystems	<p><i>Vulnerability:</i> Extinction of some species; threat to pollination of plants; profound impact on phytoplankton and zooplankton, benthic fauna, fish stocks, and the number of species and habitats in fell areas; however, also probability of increase in total amount of flora and fauna</p> <p><i>Adaptation:</i> Reducing human-induced stress on nature by controlling land use; conservation of valuable traditional farmland biotopes; control and prevention of the spread of invasive alien species</p>
Water resources	<p><i>Vulnerability:</i> Change in seasonal distribution of run-off; increase in the frequency and intensity of winter floods; possible reduction in groundwater discharges; higher concentrations of dissolved organic carbon</p> <p><i>Adaptation:</i> Preparing for emergencies, and land-use planning; flood forecast and prevention; restrictions on water use and changes to regulation permits; saving and recycling water, and use of lower quality water</p>
The Baltic Sea and its coastal areas	<p><i>Vulnerability:</i> Change in run-off into the Baltic Sea; Bothnian Sea will become, generally, ice free by the end of the century; many parts of the Baltic Sea will face sea-level rise by 2100, with extreme sea levels projected to increase significantly above the mean sea level; enhanced erosion and transport of sediments</p> <p><i>Adaptation:</i> Not reported</p>
Pristine peatlands	<p><i>Vulnerability:</i> The continued increase in atmospheric CO₂ and N₂O might affect the quantity and quality of surface vegetation in peatlands; mire vegetation zones will move further north; increase in methane production and CO₂ sequestration rates in the long term</p> <p><i>Adaptation:</i> Not reported</p>
Agriculture	<p><i>Vulnerability:</i> Crop productivity to increase and the main field crops to be cultivated further north; increased production risks; increased risks of soil erosion, leaching of nutrients, and plant disease epidemics; enhanced leaching of nutrients to water if grazing increases</p> <p><i>Adaptation:</i> Adoption of production methods adaptable to climate change; development of monitoring systems (for animal and plant diseases); introduction of new cultivation methods and development of new crop varieties; extension of farm animal grazing period; and increased control of pests and diseases</p>

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Fisheries and game	<p><i>Vulnerability:</i> Baltic Sea fish populations to change; increased eutrophication; warming likely to be more of a disadvantage than an advantage for the most important cultivated fish, the rainbow trout, and for moose; increase in the abundance of medium-sized predators</p> <p><i>Adaptation:</i> Improvement of monitoring; prevention of water pollution; increased buffer zones around small waters; investment in aeration and oxygenation equipment at fish-farming facilities; increased purification of discharge water; preparation of management plans for game stocks; prevention of forest and agricultural damage; regulation of hunting in accordance with game stocks</p>
Forestry	<p><i>Vulnerability:</i> Both positive (annual growth of forests estimated to increase by a third by 2100) and negative (risk of forest fires) impacts; increase in the number of spruce bark beetle generations; increased risk of fungal diseases; some damage to berries</p> <p><i>Adaptation:</i> Incorporation of climate change issues into forest management plans; improvement of trees; development of harvesting; control of pests and diseases; adaptation of forest legislation in line with changing climatic conditions</p>
Energy	<p><i>Vulnerability:</i> Energy distribution and transmission less reliable owing to increased frequency of extreme events; climate change likely to have a positive effect on hydropower resources, potential for wind energy, and the amount of available bioenergy, and a negative effect on solar energy</p> <p><i>Adaptation:</i> Inclusion of adaptation to climate change in the long-term planning and strategies of the energy sector; more detailed examination of concrete adaptation measures with regard to need, quality, design and possible realization times</p>
Land-use planning and construction	<p><i>Vulnerability:</i> Considerable increase in the number of freeze-thaw cycles on the exterior surfaces of buildings; reduction in the carrying capacity of soil, causing more settlement; increased difficulty of building ice roads</p> <p><i>Adaptation:</i> Inclusion of the evaluation of the impact of climate change in the long-term planning of regional and urban structures and in the construction sector; surveillance of flood-sensitive areas and structures; development of anticipatory and warning systems for extreme events; improvement of the conduction of rain and surface waters; potential revision of design standards, instructions and regulations based on research</p>
Manufacturing	<p><i>Vulnerability:</i> Change in chemical and structural properties of wood for the forest industry; changes in food processing industry; increased vulnerability of the transport of industrial raw materials and products</p> <p><i>Adaptation:</i> Inclusion of adaptation to climate change in the long-term surveys of different industrial sectors; systematic survey of industries located in flood-sensitive areas and consideration of the required adaptation methods, as necessary</p>

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Transport and communications	<p><i>Vulnerability:</i> Climate change may be both beneficial and detrimental to sea transport; airport maintenance costs may increase in mid-winter; vulnerability of the networks relying on cables and of the automatic safety systems of different modes of transport</p> <p><i>Adaptation:</i> Inclusion of climate change issues in the transport sector's long-term planning; anticipatory and warning systems for extreme events; new planning norms and guidelines for road and railway construction</p>
Tourism and recreation	<p><i>Vulnerability:</i> Cross-country skiing, alpine skiing, riding snowmobiles and ice-fishing are vulnerable to climate change, but ski resorts in the north may benefit in the future; attractions in summer time may experience both benefits and losses</p> <p><i>Adaptation:</i> Integration of adaptation to climate change within tourism-related strategies; development of other attractions besides those related to snow for winter tourism, to reduce the dependence on snow; change in patterns of recreational use of nature</p>
Insurance	<p><i>Vulnerability:</i> Higher uncertainties in estimation of risk of extreme climate events to be reflected in insurance premiums and coverage</p> <p><i>Adaptation:</i> Integration of climate change adaptation into tourism-related strategies; development of technology to reduce risks; development of precautions to avoid damage</p>
Health	<p><i>Vulnerability:</i> Increase in heat-related mortality and morbidity in the summer; decrease in the risk of additional mortality caused by cardiovascular and pulmonary diseases as a result of an extremely cold spell; northward spread of ticks and tick-borne diseases such as Lyme disease (borreliosis) and tick-borne encephalitis; potential increase in risk of slipping injuries and traffic accidents; adverse impact on health of airborne particulates owing to increase in forest fires</p> <p><i>Adaptation:</i> Securing the capacity of healthcare services to meet the challenges of the changing climatic conditions; dissemination of information on the dangers of the changing climate and the associated increased risks</p>
Cultural environment	<p><i>Vulnerability:</i> Threat to the preservation of the cultural and natural heritage; archaeological heritage endangered; increased damage to wooden buildings</p> <p><i>Adaptation:</i> Not reported</p>
Finnish Lapland	<p><i>Vulnerability:</i> Changes in temperature and precipitation likely to have pronounced effects on the distribution and productivity of boreal forests and arctic vegetation; threats to the important Christmas tourism season and reindeer husbandry; on the other hand, Finland's hydropower production may benefit from the impacts of climate change in Lapland</p> <p><i>Adaptation:</i> Coordination of the interests of reindeer husbandry and forestry; comprehensive planning of different forms of land use through the development of planning systems</p>

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
National security	<p><i>Vulnerability:</i> Climate change related problems in some other parts of the world may be reflected in Finland through the global economy and via migration and environmental refugees</p> <p><i>Adaptation:</i> Integration of climate change related concerns and adaptation to climate change into the future development of national security</p>

79. In the NC5, adaptation measures are categorized as anticipatory or reactive; however, no estimates of the costs of these adaptation measures have been provided. There are indications that certain sectors might experience potential economic benefits as a result of climate change, provided that targeted and early adaptation measures are put in place, while negative impacts can also be expected, for example owing to extreme climate events. The ERT noted that two major projects concerning vulnerability assessment were started in 2009, entitled “Map-based assessment of vulnerability to climate change employing regional indicators” and “Vulnerability Assessment of ecosystem services for Climate Change Impacts and Adaptation”.

80. By providing continuous support to the national meteorological services of developing country Parties, Finland is enhancing their capacity to undertake climate impact assessments as part of the elaboration of their national communications, and is also providing them with tools to support the elaboration of their national adaptation programmes of action. The ERT encourages Finland to continue reporting on its provision of support to developing countries’ meteorological and hydrological institutions.

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

81. In its NC5, Finland has provided details of measures taken to give effect to its commitments under Article 4, paragraphs 3, 4 and 5, of the Convention and under Article 11 of the Kyoto Protocol. In particular, it has provided information on financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels, including the Global Environment Facility (GEF) and other climate change related funds such as the Least Developed Countries Fund and the Special Climate Change Fund. The ERT noted that Finland provided a complete table 5 from the UNFCCC reporting guidelines, following the recommendation made in the previous IDR report.

82. Finland 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.

83. Funding for climate change related activities is provided through official development assistance and by the Finnish Funding Agency for Technology and Innovation. In its NC5, Finland has reported on the provision of “new and additional” funding. During the review, Finland further explained the criteria used to determine resources as “new and additional”, which encompass the criteria set in the Bonn Declaration, namely using the baseline of 2001 for the provision of financial resources, with the minimum requirement of USD 6.4 million annually starting from 2005.

84. The ERT noted that Finland's contribution to climate change related funding has been growing steadily since 2005. Finland has provided more funding than the minimum amount committed by it (USD 7.4 million in 2005 and USD 28.5 million in 2008) and is planning to further increase the funding provided in 2009 (estimated contribution of USD 40 million). The ERT noted that in 2009 disbursements of Finnish development aid were of the magnitude of 0.54 per cent of gross national income (GNI), and that these are committed to reaching 0.7 per cent of GNI by 2015. The ERT commends Finland for reporting on its continuously increasing contribution. Table 7 summarizes the information on financial resources.

Table 7

Summary of information on financial resources

<i>Channel of financial resources</i>	<i>Contribution</i>
Official development assistance (ODA)	EUR 923.6 million (0.54 per cent of GNI) in 2009
Climate-related aid in bilateral ODA	EUR 14.76 million (2008)
Climate-related support programmes	Energy and Environment Partnership with Central America; VietAudit; Sustainable Forestry for Rural Development project (SUFORD); post-emergency reconstruction programme in the field of meteorology
Bonn Declaration	USD 52.9 million (2005–2008)
Contributions to the GEF	2006: EUR 7.8 million; 2007: EUR 7.8 million; 2008: EUR 7.8 million
Contribution to third GEF replenishment	EUR 30 million (2002–2006)
Pledge for fourth GEF replenishment	EUR 31.2 million (2006–2010)
Activities implemented jointly	After the JI/CDM pilot programme (1999–2006), the Finnish Carbon Procurement Programme (Finnder) was launched. Finnder's portfolio of contracted projects contains 14 projects: nine CDM and five JI projects. Emission reductions amount to 3.3 Mt CO ₂ eq
JI and CDM under the Kyoto Protocol	Investments in the Prototype Carbon Fund, Testing Ground Facility, Multilateral Carbon Credit Fund, Asia-Pacific Carbon Fund, Fine Carbon Fund, ADB's Future Carbon Fund, and Nefco's Future Carbon Fund. Overall: EUR 20 million (1999–2006)
Other (bilateral/multilateral)	Support to the World Bank's Trust Fund for Environmentally and Socially Sustainable Development. A total of 27 projects for developing countries directly relating to climate change (2004–2008)

Abbreviations: ADB = African Development Bank, CDM = clean development mechanism, GEF = Global Environment Facility, GNI = gross national income, JI = joint implementation.

85. The Finnish development policy emphasizes that development in all countries should be environmentally sustainable. Finland supports projects and programmes that promote environmentally sustainable development in its partner countries and regions. In the energy sector, for example, which is important in terms of economic development, solutions are being pursued for promoting the use of renewable natural resources. The ERT

also noted that support to developing countries targets activities related to capacity-building, poverty eradication, achieving the United Nations Millennium Development Goals and supporting developing countries' participation in climate change negotiations (with particular emphasis on women).

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

86. In its NC5, Finland has provided information related to the promotion of the transfer of environmentally sound technologies (ESTs). However, the information provided does not clearly distinguish between the activities undertaken by the private and public sectors, nor does it specify the steps taken by the Government to promote, facilitate and finance transfer of technology, and to support development and enhancement of endogenous capacities and technologies of developing countries. During the review, Finland elaborated on difficulties met in determining the share of public and private financing in technology transfer. The ERT encourages Finland to report relevant information in a transparent manner in its next national communication.

87. The NC5 implies that the private sector has a central role that has not been fully utilized, although several Finnish companies have participated in various partnerships. The ERT noted an improvement in conditions for investments by the private sector, and the existence of Cleantech Finland, an industrial association of providers of sustainable and environmentally friendly technologies.

88. The NC5 reports on four specific programmes for transferring ESTs to developing countries, all of them targeting mitigation of climate change. The countries concerned were Viet Nam, Lao People's Democratic Republic, Mozambique and Central American countries. The ERT was informed that the objectives of these specific programmes included the implementation of energy-saving schemes, environmentally efficient concessions and efficient industrial processes. The successful implementation of these programmes can be considered as a success story within Finland's activities in transferring technology to developing countries.

F. Research and systematic observation

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

90. There are a number of institutes, universities and research organizations in Finland that take part in climate change research and systematic observation. Research is diversified and distributed throughout different government bodies and private companies. The ERT noted the relatively high level of funding available, in comparison with other OECD countries, to support research and development activities at both the national and international levels (total general expenditure on research and development amounts to more than 3 per cent of GDP). The ERT also noted a clear focus on energy- and forestry-related issues, although attention is also given to climate processes and climate system studies, socio-economic analysis and adaptation. Systematic observation receives a great deal of attention and focuses on atmospheric, ocean, terrestrial and forest climate observing systems, as well as on supporting developing countries.

91. Several sector-specific research institutes have initiated extensive research programmes or clusters of research projects on climate change issues. These include: MTT Agrifood Research Finland – impacts on the agriculture sector, adaptation and biofuels; the Finnish Environment Institute – vulnerability and adaptation, environmental impacts and mitigation measures; the Finnish Forest Research Institute – impacts on the forestry sector, adaptation, sinks and mitigation; the Finnish Meteorological Institute – climate processes and climate services, including scenarios; and the Technical Research Centre of Finland – mitigation measures and energy scenarios.

92. Finland has participated in international research programmes such as the World Climate Research Programme and the International Geosphere–Biosphere Programme. Under GCOS, three stations from Finland are included in the global surface network and the global upper-air network of stations. Finland has provided its national report on GCOS.

93. The NC5 also reflects the action taken by Finland to support capacity-building in developing countries. Through the Finnish Meteorological Institute, Finland continues to provide support and assistance to some developing countries in Southern Africa, Asia, Oceania, South America and the Caribbean region. Such support has an in-built capacity-building component.

G. Education, training and public awareness

94. In the NC5, Finland has provided information on its actions relating to education, training and public awareness at both the domestic and international levels, as well as information on the implementation of the New Delhi work programme on Article 6 of the Convention.¹²

95. Climate change issues are incorporated into the curricula of educational institutions at all levels. In addition, all educational institutions are required to have a sustainable development action plan by the end of 2010. Universities, colleges and several training institutions provide continuing and vocational training on climate change, energy efficiency and environmental technologies.

96. The NC5 contains some information on training programmes, which are limited to international training in the sustainable use and management of forests. During the review, the ERT learned that training of a broader scope was also organized, such as for scientists visiting the Finnish Meteorological Institute, energy managers and journalists.

97. The ERT acknowledged the enormous amount of work done by the Government, civil organizations, the media, universities and communities in informing Finnish society on climate change issues. The Climate Change Communication Programme (2002–2007) formed an important framework for stakeholder consultations, public campaigns, and preparation of printed and electronic information materials, surveys, seminars and media campaigns. More than 62 projects were implemented in the five-year period. The NC5 presents useful details on activities performed by the Climate Forum, Motiva and the Climate Change Community Response portal, addressing climate change issues specified under Article 6 of the Convention.

98. The community of non-governmental organizations (NGOs) is well informed on climate change policy, and is involved in developing national policies, as well as in awareness-raising and educational programmes. NGOs were provided with the opportunity to comment on the NC5. Surveys conducted among the Finnish people provide evidence that public-awareness campaigns have achieved their objectives and that most Finns understand the issues related to climate change and the need to curb it.

¹² Decision 11/CP.8.

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

99. Finland has provided all supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC5, and has placed it in different sections of the NC5. Table 8 provides references to the NC5 chapters in which supplementary information is provided. The technical assessment of the information reported under Article 7, paragraph 2, is contained in the relevant sections of this report.

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 3.3
National registry	NC5 chapter 3.4
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	NC5 chapter 4.6.1
Policies and measures in accordance with Article 2	NC5 chapters 4.7 and 8
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	NC5 chapters 3.3, 3.4, 4.2, 4.3, 4.4 and 4.5
Information under Article 10	NC5 chapters 3.3, 4.6, 4.7, 6.2, 7.4, 8.2.4, 8.3.5 and 8.9
Financial resources	NC5 chapter 7

Abbreviation: NC5 = fifth national communication.

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

100. The Party reported the information requested in chapter H. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the annex to decision 15/CMP.1 as part of its 2010 annual submission. However, Finland did not elaborate, in its 2010 annual submission, on how it gives priority to the actions taken to minimize adverse impacts, noting that it has not identified any particular cases of implemented PaMs having negative impacts and that it is challenging to identify negative impacts without input from a developing country that identifies that these impacts might have arisen as a result of a specific measure. The 2010 annual submission provides similar information on this issue to the NC5 (see paras. 57 and 58 above). During the in-country review, the Party provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 14, 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 noted that the commitment to report on the minimization of negative impacts has been given attention through a dedicated inter-ministerial working group. The ERT recommends that Finland, in its next national communication, report on how it gives priority to the actions taken to minimize the adverse economic, social and environmental impacts of its response measures on developing country Parties or provide an explanation as to why such priority could not be given.

101. The 2010 annual submission and the additional information provided during the review presented several of Finland's initiatives to minimize adverse impacts, including strengthening environmental governance (including through preparation of guidelines for a policy on low-carbon development), enhancing sustainable technologies and strengthening meteorological services. The ERT noted that Finland has made a substantial effort to integrate the need to assess possible adverse effects of its PaMs into the planning cycle of its Long-term Climate and Energy Strategy. Individual ministries responsible for specific measures are responsible for assessing the adverse effects of their policies as part of the overall planning and decision-making process.

102. The ERT commends the Party for the additional information provided and encourages it to continue exploring and reporting on the adverse effects of response measures, for example on the impacts of the increased use of biofuels.

III. Conclusions and recommendations

103. The ERT concludes that the NC5 provides a clear overview of the national climate policy of Finland. It covers all of the required sections, contains information that meets most of the mandatory reporting requirements of the UNFCCC reporting guidelines, and was submitted within the time frame set by decision 10/CP.13. It also includes all reporting elements of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. The ERT acknowledges that Finland's NC5 is concise and structured following the outline contained in the UNFCCC reporting guidelines, and that the included supplementary information under Article 7, paragraph 2, of the Kyoto Protocol is easily identifiable.

104. Total GHG emissions in Finland decreased by 0.3 per cent during the period 1990–2008. In 2008, GHG emissions including LULUCF were 36.1 per cent below the 1990 level. The main drivers of the GHG emission trends were economic growth, structural changes in industry, fluctuations in imports and exports on the Nordic electricity market, and the increase in passenger transportation and in housing stock, as well as implemented PaMs, which offset the impact of many of these drivers.

105. In its NC5, Finland has presented GHG emission projections for the period from 2007 to 2020. Two scenarios have been included: a 'with measures' and a 'with additional measures'. The projected reduction in GHG emissions in 2020 under the 'with additional measures' scenario is 22.7 per cent compared with the level of emissions under the 'with measures' scenario. The Party did not provide an estimate of the total aggregated effect of its PaMs, which was explained by the fact that no 'without measures' scenario had been developed. The ERT acknowledged that the Party is making additional efforts to quantify this effect. The projections indicate that Finland will be able to meet its Kyoto Protocol target (which is to keep its emissions at the 1990 level) under both the 'with measures' and 'with additional measures' scenarios, by means of domestic actions and the use of flexibility mechanisms and removal units under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. With additional measures implemented, Finland should be able to reach its national target for 2020, which is a 16 per cent reduction in emissions compared with the 2005 level for the non-ETS sector. The Foresight Report includes a non-binding target to reduce Finland's GHG emissions by at least 80 per cent by 2050 compared with the 1990 level.

106. The NC5 provides information on how Finland intends to use the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol as a supplement to its domestic actions, in order to meet its Kyoto target. Kyoto units generated through these mechanisms are expected to account for 1.4 Mt CO₂ eq annually, whereas domestic actions, along with the country's

participation in the EU ETS, are expected to reduce GHG emissions by 8.8 Mt CO₂ eq/year in the first commitment period. The NC5 defines that Finland will use removal units equivalent to 0.6 Mt CO₂ eq, accounted for under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

107. The NC5 also provides comprehensive and well-organized information on Finland's PaMs. Finland has implemented or planned a number of PaMs aimed at reducing its GHG emissions and reaching renewable-energy and energy-efficiency targets. The key PaMs identified by the ERT making a sizeable contribution to GHG mitigation were the EU ETS, construction of the fifth nuclear power plant, the new package of legislation in relation to renewable energy (including feed-in tariffs for wind power and targets for the share of biofuel in transport fuels), incentives for the use of heat pumps, incentives for enhancement of energy efficiency in the residential sector, vehicle taxation, and a package of measures in the waste sector. Finland has identified the shift to energy-efficient passenger cars through a tax on CO₂ emissions, feed-in tariffs for electricity produced from wood pellets, and voluntary energy-efficiency agreements with businesses and municipalities as the country's success stories.

108. Finland's provision of financial resources has been increasing since 2005 and contributions to the GEF and other climate change related funds are expected to increase in the future. The ERT noted that the energy and forestry sectors receive the greatest support. Finland provided "new and additional" funding in excess of the minimum requirements set in the Bonn Declaration. Finland has one of the highest levels of funding for national and international research and development among the OECD countries (more than 3 per cent of GDP). It also provides continuous support for the development of national meteorological services in developing countries. The ERT encourages Finland to continue reporting on its provision of support to developing countries' national meteorological and hydrological services.

109. The NC5 reports on four specific programmes for transferring ESTs to developing countries, all of them targeting climate change mitigation. Decisions on the technologies to be transferred are made on the basis of calls for proposals and the technologies are tailored to the recipient country's needs. Finland is encouraged to highlight, in its next national communication, its efforts to promote joint research and development with developing countries on the deployment of technologies for adaptation.

110. In comparison with other countries, Finland, together with other Nordic countries, has been considered to be among the least vulnerable to climate change. This is due partly to biophysical circumstances, but also to the existing monitoring and planning systems put in place to facilitate adaptation. The NC5 identifies detailed adaptation measures planned in all sectors, but most progress has been made in the adaptation of the water sector.

111. Climate change issues have been incorporated into the curricula of educational institutions. All educational institutions are required to have a sustainable development action plan by 2010. Finland also undertook substantial work to inform Finnish society on climate change issues. The NGO community is also involved in developing national policies, and was given an opportunity to comment on the NC5. The ERT encourages Finland to continue reporting, in a comprehensive manner, on its main achievements in the area of training.

112. The ERT concluded that Finland's national system continues to perform its required functions as set out in decision 19/CMP.1; and that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol. The ERT noted that updates of

databases and applications, implemented security measures, and changes to the national registry software are documented on a regular basis by nominated responsible persons or entities. The ERT reiterates the recommendation made in the SIAR that Finland enhance the user interface of its registry by facilitating public access to information on the website of the national registry.

113. The 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 2010 annual submission is mostly complete and mostly transparent. The ERT acknowledges that Finland made considerable efforts to assess and report the adverse impacts of its response measures. The NC5 provides similar information on this issue to the 2010 annual submission, and mentions relevant additional information, such as effects on international trade.

114. In the course of the IDR, the ERT formulated a number of recommendations relating to the completeness and transparency of Finland's reporting under the Convention and its Kyoto Protocol. The key recommendations¹³ are that Finland:

- (a) Provide information on the GHGs affected by, and the implementing entity or entities of, major individual PaMs in the energy sector;
- (b) Report the expected total effect of its implemented and adopted PaMs;
- (c) Report emission projections for fuels used in international air and maritime transport;
- (d) Distinguish, as appropriate, in more detail between the activities undertaken by the private and public sectors in technology transfer to developing countries;
- (e) Report on how it gives priority to the actions taken to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol or provide an explanation as to why such priority could not be given.

115. The ERT encourages Finland to improve the transparency and completeness of its reporting. The most important recommendations are that Finland:

- (a) Provide more information on applied climate scenarios;
- (b) Elaborate on the monitoring, evaluation and quantification of individual PaMs;
- (c) Provide further information on the minimization of adverse impacts in accordance with Article 2, paragraph 3, and Article 3, paragraph 14, of the Kyoto Protocol.

IV. Questions of implementation

116. During the review, the ERT assessed Finland's NC5, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, and reviewed the information on the minimization of 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.

¹³ The recommendations are given in full in the relevant sections of this report.

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 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 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 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>>.

FCCC/SBI/2007/INF.6. Compilation and synthesis of fourth national communications. Available at <<http://unfccc.int/resource/docs/2007/sbi/eng/inf06.pdf>>.

FCCC/SBI/2007/INF.6/Add.1. Compilation and synthesis of fourth national communications. Addendum. Policies, measures, past and projected future greenhouse gas emission trends of Parties included in Annex I to the Convention. Available at <<http://unfccc.int/resource/docs/2007/sbi/eng/inf06a01.pdf>>.

FCCC/SBI/2007/INF.6/Add.2. Compilation and synthesis of fourth national communications. Addendum. Financial resources, technology transfer, vulnerability, adaptation and other issues relating to the implementation of the Convention by Parties included in Annex I to the Convention. Available at <<http://unfccc.int/resource/docs/2007/sbi/eng/inf06a02.pdf>>.

FCCC/ARR/2009/FIN. Report of the individual review of the annual submission of Finland submitted in 2009. Available at <<http://unfccc.int/resource/docs/2010/arr/fin.pdf>>.

FCCC/IRR/2007/FIN. Report of the review of the initial report of Finland. Available at <<http://unfccc.int/resource/docs/2007/irr/fin.pdf>>.

FCCC/IDR.4/FIN. Report of the centralized in-depth review of the fourth national communication of Finland. Available at <<http://unfccc.int/resource/docs/2006/idr/fin04.pdf>>.

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2009 greenhouse gas inventory submission of Finland. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/fin_2009_crf_8apr.zip>.

2010 greenhouse gas inventory submission of Finland. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/fin-2010-crf-26may.zip>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Paavo-Petri Ahonen (Academy of Finland), Ms. Paula Perälä (MTT Agrifood Research Finland), Ms. Johanna Ikävalko (Central Union of Agricultural Producers and Forest Owners), Ms. Tuuli Mäkelä (Confederation of Finnish Industries), Mr. Jouko Hepola, Mr. Jarno Ilme and Ms. Paula Uitto (Energy Market Authority), Ms. Venla Virkamäki (Finnish Association for Nature Conservation), Ms. Katri Suomi (Finn Church Aid), Mr. Tim Carter, Mr. Mikael Hildén, Mr. Niko Karvosenoja, Ms. Päivi Lindh, Ms. Hanna Mela, Mr. Jari Liski, Mr. Jouko Petäjä and Mr. Pekka J. Salminen (Finnish Environment Institute), Mr. Heikki Henttonen, Ms. Sini Niinistö, Ms. Aino Rekola, Mr. Jussi Uusivuori and Ms. Tarja Tuomainen (Finnish Forest Research Institute), Mr. Tuomo Suortti (Finnish Funding Agency for Technology and Innovation), Mr. Heikki Tuomenvirta, Mr. Adriaan Perrels and Ms. Outi Tolonen-Kivimäki (Finnish Meteorological Institute), Ms. Helena Vänskä (Finnish Oil and Gas Federation), Mr. Jukka Katainen (Innofactor), Mr. Juha Honkatukia (Government Institute for Economic Research), Ms. Aulikki Kauppila, Ms. Brigitta Vainio-Mattila and Ms. Tiia Yrjölä (Ministry of Agriculture and Forestry), Ms. Hannele Seitonen (Ministry of Education), Mr. Magnus Cederlöf, Ms. Sirkka Haunia, Ms. Suvi Huikuri, Ms. Laura Höijer, Ms. Kristiina Isokallio, Ms. Karoliina Kinnunen Mohr, Mr. Harri Laurikka, Ms. Outi Leskelä, Mr. Juha-Pekka Maijala, Ms. Kaisa Mäkelä, Mr. Jaakko Ojala, Ms. Else Peuranen, Ms. Eeva-Liisa Poutanen, Mr. Seppo Sarkkinen, Mr. Ari Seppänen, Ms. Sini Korpela, Mr. Jussi Soramäki, Ms. Paula Virta, Ms. Tuija Talsi and Mr. Jukka Uosukainen (Ministry of the Environment), Mr. Erkki Eskola, Ms. Erja Fagerlund, Mr. Pekka Tervo and Mr. Juhani Tirkkonen (Ministry of Employment and the Economy), Ms. Outi Honkatukia (Ministry of Finance), Ms. Anna Laine, Mr. Markku Niinioja, Mr. Matti Nummelin, Ms. Maria Söderlund and Mr. Folke Sundman (Ministry for Foreign Affairs in Finland), Ms. Anni Rimpiläinen (Ministry of Transport and Communications), Ms. Irmeli Mikkonen (Motiva), Ms. Pirkko Heikinheimo and Mr. Oras Tynkkynen (Prime Minister's Office), Mr. Kari Grönfors, Ms. Riitta Pipatti, Ms. Leena Raittinen and Mr. Kai Skoglund (Statistics Finland), Mr. Tommi Ekholm and Mr. Ilkka Savolainen (VTT Technical Research Centre of Finland), Mr. Olavi Luukkanen (University of Helsinki) and Ms. Salka Orivuori (World Wide Fund for Nature), including additional material on updated policies and measures, greenhouse gas projections and recent climate policy developments in Finland. The following documents were also provided by Finland:¹

Finnish Environment Institute, 2009. Paula Kivimaa and Per Mickwitz. Making the Climate Count. Climate Policy Integration and Coherence in Finland.

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