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Report on the technical review of the seventh national communication of Finland

Parties included in Annex I to the Convention were requested by decision 9/CP.16 to submit their seventh national communication to the secretariat by 1 January 2018. According to decision 15/CMP.1, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol are required to include in their national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. This report presents the results of the technical review of the seventh national communication and relevant supplementary information under the Kyoto Protocol of Finland, conducted by an expert review team in accordance with the “Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention” and the “Guidelines for review under Article 8 of the Kyoto Protocol”.

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Abbreviations and acronyms

AAU	assigned amount unit
AEA	annual emission allocation
BR	biennial report
CER	certified emission reduction
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CTF	common tabular format
ERT	expert review team
ESD	effort-sharing decision
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GDP	gross domestic product
GHG	greenhouse gas
HFC	hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
NA	not applicable
NAP 2022	National Plan for Adaptation to Climate Change 2022
NC	national communication
NF ₃	nitrogen trifluoride
NIR	national inventory report
non-Annex I Party	Party not included in Annex I to the Convention
non-ETS sectors	sectors not covered by the European Union Emissions Trading System
N ₂ O	nitrous oxide
NO	not occurring
PaMs	policies and measures
PFC	perfluorocarbon
Reporting guidelines for supplementary information	“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol Part II: Reporting of supplementary information under Article 7, paragraph 2”
SF ₆	sulfur hexafluoride
toe	tonne of oil equivalent
UNFCCC reporting guidelines on NCs	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications”
WAM	‘with additional measures’
WEM	‘with measures’
WOM	‘without measures’

I. Introduction and summary

A. Introduction

1. This is a report on the in-country technical review of the NC7 of Finland. The review was coordinated by the secretariat in accordance with the “Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”, particularly “Part V: UNFCCC guidelines for the technical review of national communications from Parties included in Annex I to the Convention” (annex to decision 13/CP.20), and the “Guidelines for review under Article 8 of the Kyoto Protocol” (annex to decision 22/CMP.1 and annex I to decision 4/CMP.11).¹

2. In accordance with the same decisions, a draft version of this report was transmitted to the Government of Finland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

3. The review was conducted from 19 to 24 March 2018 in Helsinki by the following team of nominated experts from the UNFCCC roster of experts: Mr. Sorin Deaconu (Romania), Mr. Raúl Jorge Garrido Vázquez (Cuba), Ms. Tugba Icmeli (Turkey), Ms. Traute Koether (Austria) and Ms. Songli Zhu (China). Ms. Icmeli and Ms. Zhu were the lead reviewers. The review was coordinated by Mr. Roman Payo (UNFCCC secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the NC7 of Finland in accordance with the UNFCCC reporting guidelines on NCs (decision 4/CP.5) and the reporting guidelines for supplementary information, in particular the supplementary information required under Article 7, paragraph 2, and on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol (annex to decision 15/CMP.1 and annex III to decision 3/CMP.11).

1. Timeliness

5. The NC7 was submitted on 13 December 2017, before the deadline of 1 January 2018 mandated by decision 9/CP.16.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

6. Issues and gaps identified by the ERT related to the reported information are presented in table 1. The information reported by Finland in its NC7, including the supplementary information under the Kyoto Protocol, mostly adheres to the UNFCCC reporting guidelines on NCs.

¹ At the time of the publication of this report, the Party had submitted its instrument of acceptance of the Doha Amendment; however, the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

Table 1

Assessment of completeness and transparency of mandatory information reported by Finland in its seventh national communication, including supplementary information under the Kyoto Protocol

<i>Section of NC</i>	<i>Completeness</i>	<i>Transparency</i>	<i>Reference to description of recommendations</i>	<i>Supplementary information under the Kyoto Protocol</i>	<i>Completeness</i>	<i>Transparency</i>	<i>Reference to description of recommendations</i>
Executive summary	Complete	Transparent	–	National system	Complete	Transparent	–
National circumstances	Complete	Transparent	–	National registry	Complete	Transparent	–
GHG inventory	Complete	Transparent	–	Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	–
PaMs	Complete	Transparent	–	PaMs in accordance with Article 2	Complete	Transparent	–
Projections and the total effect of PaMs	Complete	Mostly transparent	Issue 1 in table 10	Domestic and regional programmes and/or arrangements and procedures	Complete	Transparent	–
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent	–	Information under Article 10 ^a	Complete	Transparent	–
Financial resources and transfer of technology	Complete	Transparent	–	Financial resources	Complete	Transparent	–
Research and systematic observation	Complete	Transparent	–	Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	–
Education, training and public awareness	Complete	Transparent	–				

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chapter III below.

^a The assessment refers to information provided by the Party on the provisions contained in Article 4, paragraphs 3, 5 and 7, of the Convention reported under Article 10 of the Kyoto Protocol, which is relevant only to Parties included in Annex II to the Convention. Assessment of the information provided by the Party on the other provisions of Article 10 of the Kyoto Protocol is provided under the relevant substantive headings under the Convention, for example research and systematic observation.

3. Summary of reviewed supplementary information under the Kyoto Protocol

7. The supplementary information under Article 7, paragraph 2, of the Kyoto Protocol is incorporated in different sections of the NC7, and the supplementary information under Article 7, paragraph 1, of the Kyoto Protocol is reported in the NIR of the 2017 annual submission. Table 2 provides references to where the information is reported. The technical assessment of the information reported under Article 7, paragraphs 1 and 2, of the Kyoto Protocol is contained in the relevant sections of this report.

Table 2

Overview of supplementary information under the Kyoto Protocol reported by Finland

<i>Supplementary information</i>	<i>Reference to the section of NC7</i>
National registry	Chapter 3.4
National system	Chapter 3.3
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Chapter 5.7
PaMs in accordance with Article 2	Chapters 4, 7 and 8
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Chapters 3.3, 3.4 and 4.1–4.4
Information under Article 10	Chapters 3.3 and 8.2.4
Financial resources	Chapter 7
Minimization of adverse impacts in accordance with Article 3, paragraph 14	Reported in the NIR (chapter 15) of the Party's 2017 annual submission

II. Technical review of the information reported in the seventh national communication, including the supplementary information under the Kyoto Protocol

A. Information on national circumstances and greenhouse gas emissions and removals

1. National circumstances relevant to greenhouse gas emissions and removals

(a) Technical assessment of the reported information

8. The national circumstances of Finland explain the relationship between its historical and future emission trends and the climate change policy agenda. The changing nature of those circumstances defines the factors that affect the climate policy development and implementation of the Convention. The NC7 contains key data on government structure, population profile, geographical profile, climate profile, the economy, energy, transport, industry, building stock, agriculture, forestry, waste and peatlands.

9. Finland's low population density (18 inhabitants per km²) and large geographical area (338,400 km²) imply long travel distances. The cold climate (5.5 °C mean annual temperature in south-western Finland, decreasing towards the north-east) leads to a high demand for energy for indoor heating almost all year round. In addition, the import and export of electricity to and from Finland impacts annual GHG emissions but depends on hydropower production and hence on precipitation in the Nordic countries. The energy-intensive industry structure (e.g. paper and board production, basic metals production) and long travel distances have led to relatively high energy intensity (e.g. 5.93 toe per capita for 2015) and per capita GHG emissions (e.g. 10.13 t CO₂ eq for 2015). The large carbon stock in living biomass of forests, which are managed using sustainable forest management principles, plays a key role in offsetting the total GHG emissions of Finland.

10. The ERT noted that during the period 1990–2015 Finland's population and GDP increased by 9.9 and 48.2 per cent, respectively, while GHG emissions per GDP unit and

GHG emissions per capita decreased by 47.4 and 29.0 per cent, respectively. Therefore, Finland has made significant progress in decoupling GHG emissions and economic growth. During the review, Finland emphasized that the main reasons for the decoupling of GHG emissions and economic growth are the implementation of environmental regulations and other PaMs, technological improvements that increase the energy efficiency of processes, and the shift from industry to the services sector. Table 3 illustrates the national circumstances of Finland by providing some indicators relevant to emissions and removals.

Table 3

Indicators relevant to greenhouse gas emissions and removals for Finland for the period 1990–2015

Indicator						Change (%)	
	1990	2000	2010	2014	2015	1990–2015	2014–2015
GDP per capita (thousands 2011 USD using purchasing power parity)	28.91	34.89	39.85	39.02	38.99	34.9	–0.1
GHG emissions without LULUCF per capita (t CO ₂ eq)	14.26	13.50	14.09	10.82	10.13	–29.0	–6.3
GHG emissions without LULUCF per GDP unit (kg CO ₂ eq per 2011 USD using purchasing power parity)	0.49	0.39	0.35	0.28	0.26	–47.4	–6.3

Sources: (1) GHG emission data: Finland's 2017 GHG inventory submission; (2) population and GDP: World Bank.

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.

(b) Assessment of adherence to the reporting guidelines

11. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. There were no issues raised during the review relating to the topics discussed in this chapter of the review report.

2. Information on greenhouse gas emissions and removals

(a) Technical assessment of the reported information

12. Total GHG emissions² including indirect CO₂ emissions and excluding emissions and removals from LULUCF decreased by 22.1 per cent between 1990 and 2015, whereas total GHG emissions including indirect CO₂ emissions and net emissions or removals from LULUCF decreased by 49.6 per cent over the same period. During the review, Finland indicated that preliminary data for 2016 show that total GHG emissions are 6.0 per cent higher than in 2015. Table 4 illustrates the emission trends and shares in national GHG emissions by sector and by gas for Finland.

Table 4

Greenhouse gas emissions by sector and by gas for Finland for the period 1990–2015

Sector	GHG emissions (kt CO ₂ eq)					Change (%)		Share (%)	
	1990	2000	2010	2014	2015	1990–2015	2014–2015	1990	2015
1. Energy	53 557.84	53 754.85	60 165.64	44 434.03	40 816.34	–23.8	–8.1	75.3	73.5
A1. Energy industries	18 969.25	22 137.73	30 943.60	19 611.06	16 225.40	–14.5	–17.3	26.7	29.2

² In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified. Values in this paragraph are calculated based on the 2017 annual submission.

	GHG emissions (kt CO ₂ eq)					Change (%)		Share (%)	
	1990	2000	2010	2014	2015	1990–2015	2014–2015	1990	2015
A2. Manufacturing industries and construction	13 662.91	12 209.83	10 187.68	8 559.01	8 449.35	–38.2	–1.3	19.2	15.2
A3. Transport	12 101.30	12 127.53	12 717.75	11 052.97	11 110.95	–8.2	0.5	17.0	20.0
A4. and A5. Other	8 701.34	7 158.33	6 174.91	5 094.44	4 885.20	–43.9	–4.1	12.2	8.8
B. Fugitive emissions from fuels	123.03	121.42	141.70	116.56	145.44	18.2	24.8	0.2	0.3
C. CO ₂ transport and storage	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	–	–	–	–
2. IPPU	5 370.16	5 827.36	6 260.15	5 921.01	6 076.18	13.1	2.6	7.6	10.9
3. Agriculture	7 525.30	6 466.33	6 576.22	6 510.80	6 480.97	–13.9	–0.5	10.6	11.7
4. LULUCF	–12 672.35	–21 709.98	–27 297.44	–28 336.47	–25 990.77	105.1	–8.3	NA	NA
5. Waste	4 671.95	3 850.03	2 583.25	2 206.60	2 133.72	–54.3	–3.3	6.6	3.8
6. Other	NO	NO	NO	NO	NO	NA	NA	NA	NA
Indirect CO ₂	165.38	103.97	68.66	53.35	52.00	–68.6	–2.5	NA	NA
<i>Gas</i>									
CO ₂	56 948.99	57 025.65	64 007.49	47 756.98	44 381.68	–22.1	–7.1	80.1	80.0
CH ₄	7 746.42	6 614.29	5 373.04	4 919.05	4 874.90	–37.1	–0.9	10.9	8.8
N ₂ O	6 377.14	5 659.89	4 696.47	4 652.52	4 659.05	–26.9	0.1	9.0	8.4
HFCs	0.02	559.46	1 485.40	1 699.34	1 547.41	6 440 749.3	–8.9	0.00003	2.8
PFCs	0.21	13.23	1.06	10.30	6.62	3 095.2	–35.8	0.0003	0.01
SF ₆	52.48	26.06	21.79	34.25	37.55	–28.5	9.6	0.1	0.1
NF ₃	NO	NO	NO	NO	NO	NA	NA	NA	NA
Total GHG emissions without LULUCF	71 125.26	69 898.57	75 585.25	59 072.44	55 507.21	–22.0	–6.0	100.0	100.0
Total GHG emissions with LULUCF	58 452.91	48 188.59	48 287.81	30 735.96	29 516.44	–49.5	–4.0	NA	NA
Total GHG emissions without LULUCF, including indirect CO₂	71 290.64	70 002.55	75 653.91	59 125.79	55 559.21	–22.1	–6.0	NA	NA
Total GHG emissions with LULUCF, including indirect CO₂	58 618.29	48 292.56	48 356.47	30 789.31	29 568.44	–49.6	–4.0	NA	NA

Source: GHG emission data: Finland's 2017 annual submission.

13. The decrease in total emissions was driven mainly by: the decrease in CO₂ emissions resulting from changes in the energy supply structure (including electricity imports and exports) and the climate; the decrease in CH₄ emissions due to improvements in the waste sector and the reduction in animal husbandry in the agriculture sector; and the decrease in N₂O emissions due to the implementation of N₂O abatement technology in nitric acid production in 2009 and the reduced nitrogen fertilization of agricultural fields.

14. Between 1990 and 2015, GHG emissions from the energy sector decreased by 23.8 per cent (from 53,557.84 to 40,816.34 kt CO₂ eq) owing mainly to emission decreases in fuel combustion. The trend in GHG emissions from fuel combustion showed notable decreases in energy industries (14.5 per cent or 2,743.85 kt CO₂ eq), manufacturing industries and construction (38.2 per cent or 5,213.57 kt CO₂ eq) and category other sectors (50.0 per cent or 3,786.32 kt CO₂ eq). Regarding electricity consumption in 2015, renewable sources in Finland produced 35.8 per cent of the electricity consumed, nuclear power produced in Finland 27.3 per cent, imported electricity (from Estonia, the Nordic countries

and the Russian Federation) 20.1 per cent and electricity generated from fossil fuels and peat combusted in Finland 16.9 per cent.

15. Between 1990 and 2015, GHG emissions from IPPU increased by 13.1 per cent (706.02 kt CO₂ eq) owing mainly to the increase in HFC emissions from the category product uses as substitutes for ozone-depleting substances and CO₂ emissions from the metal industry, which increased by 1,548.58 and 210.18 kt CO₂ eq, respectively, and more than offset the reductions in the chemical and mineral industries (686.99 and 233.37 kt CO₂ eq, respectively). Between 1990 and 2015, GHG emissions from the agriculture sector decreased by 13.9 per cent (1,044.33 kt CO₂ eq), owing mainly to the reduced use of nitrogen fertilizers and improved management of manure. The LULUCF sector was a net sink of 25,990.77 kt CO₂ eq in 2015; net GHG removals have increased by 13,318.42 kt CO₂ eq since 1990. The trend in the LULUCF sector was mainly driven by increasing growing stock and harvest removals. Between 1990 and 2015, GHG emissions from the waste sector decreased by 54.3 per cent (2,538.23 kt CO₂ eq) owing mainly to the promotion of recycling and reuse and the reduction and recovery of landfill gas required by the Waste Act, which entered into force in 1994.

16. Between 1990 and 2015, total CO₂ emissions (excluding LULUCF) decreased by 22.1 per cent, CH₄ emissions by 37.1 per cent, N₂O emissions by 26.9 per cent and SF₆ emissions by 28.5 per cent. HFC and PFC emissions increased by 6,440,749.3 and 3,095.2 per cent, respectively, although their share in total GHG emissions in 2015 was small (2.8 and 0.01 per cent, respectively).

17. The summary information provided on GHG emissions was consistent with the information reported in the 2017 annual submission.

(b) Assessment of adherence to the reporting guidelines

18. The ERT assessed the information reported in the NC7 of Finland and identified an issue relating to transparency. The finding is described in table 5.

Table 5

Findings on greenhouse gas inventory information from the review of the seventh national communication of Finland

No.	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement specified in paragraph 12 Issue type: transparency Assessment: encouragement	The NC7 (chapter 3.2.1) reports on the significant decrease in GHG emissions from the energy sector despite the increase in energy consumption in this sector. However, the NC7 does not discuss the different emission trends in the subsectors, including manufacturing industries and construction, energy industries and category other sectors, where most of the reduction has taken place (as shown in NC7, figure 3.5). During the review, Finland provided additional quantitative information on energy supply (the share of power generation by fuel type in 1990, and the energy mix in 2015 and 1990) in energy industries and manufacturing industries and construction to further clarify the reduction trends observed in these two subsectors (see para. 15 above). The ERT noted that one of the main factors related to the emission reductions in manufacturing industries and construction is the well-developed forest industry, which provides an increasing amount of renewable energy from biomass to other manufacturing industries, and that this is a country-specific characteristic. The ERT encourages Finland to include in its next NC information on the factors underlying the emission trends in the energy subsectors that drive the overall trend in the energy sector. During the review, Finland indicated that it appreciates the encouragement but noted that it will continue to include information in future NCs on emission trends consistent with the summary in the most recent inventory submission, that is, at the sectoral and not at the category level. The Party indicated it would take the encouragement into account when updating the energy sector description in the NIR in its next inventory submission, as appropriate.

Notes: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

3. National system for the estimation of anthropogenic emissions by sources and removals by sinks**(a) Technical assessment of the reported information**

19. Finland provided, in the NC7 (chapter 3.3), a description of how its national system for the estimation of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol is performing the general and specific functions defined in the annex to decision 19/CMP.1. The description includes all the elements mandated by paragraph 30 of the annex to decision 15/CMP.1. The ERT took note of the review of the changes to the national system reflected in the report on the individual review of the 2016 annual submission of Finland.

(b) Assessment of adherence to the reporting guidelines

20. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete and transparent. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

4. National registry**(a) Technical assessment of the reported information**

21. In its NC7 (chapter 3.4) Finland provided information on how its national registry performs the functions in accordance with the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and complies with the requirements of the technical standards for data exchange between registry systems. The ERT took note of the review of the changes to the national registry reflected in the report on the individual review of the 2016 annual submission of Finland.

(b) Assessment of adherence to the reporting guidelines

22. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete and transparent. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

B. Information on policies and measures and institutional arrangements**1. Domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol****(a) Technical assessment of the reported information**

23. Finland fulfilled its commitments under the first commitment period of the Kyoto Protocol. For the period 2008–2012, GHG emissions (338,353.531 kt CO₂ eq) were 4.7 per cent below the assigned amount (355,017.545 kt CO₂ eq). The assessment of compliance was concluded in 2016, after the review of the final inventory submission and the report submitted upon expiration of the additional period for fulfilling commitments for the first commitment period.

24. Finland accepted the Kyoto Protocol's second commitment period on 26 June 2015 and deposited its instrument of acceptance on 16 November 2017. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, Finland committed to contributing to the joint EU effort to reduce GHG emissions by 20 per cent below the base-

year level. For Finland, this commitment represents an emission reduction under the ESD and amounts to 254,438,468 AEAs for the entire period.³

25. Finland's act on the use of the Kyoto Protocol mechanisms and the decrees on joint implementation and the clean development mechanism⁴ include guidance on the contents of applications for project approvals and on authorization for entities to participate. The Act provides the main elements of the national procedures for using the mechanisms and authorizes the Ministry of the Environment to enact more detailed regulations regarding further provisions on the monitoring of emissions, the report to be filed on the emissions, the verifier's statement, the approval procedure of the verifier, the evaluation of approval criteria and the implementation of the verification process.

26. The Government and Parliament make decisions concerning climate policy. The Ministry of the Environment is administratively responsible for climate negotiations. Statistics Finland is the national entity responsible for compiling the Finnish GHG inventory and reporting obligations on GHG inventories and emissions and removals. The Energy Market Authority is the competent authority and the registry administrator for the national emissions trading registry under the Kyoto Protocol and the EU ETS. The Ministry for Foreign Affairs oversees Finland's participation in the clean development mechanism while the Ministry of the Environment oversees participation in joint implementation projects. The Ministry of Economic Affairs and Employment is responsible for overall coordination of the national energy and climate strategies, issues related to the Kyoto Protocol mechanisms, and transposition and implementation of the EU ETS. Municipal authorities also have a significant role in developing and implementing climate policy and emission reductions.

27. The National Energy and Climate Strategy for 2030, presented by the Government in November 2016, outlines the actions that will enable Finland to attain the targets specified in the Government Programme of Prime Minister Sipilä (27 May 2015) and the targets adopted by the EU for 2030, and to systematically set the course for a low-carbon society. The national strategy also specifies key measures for achieving the binding emission reduction targets (e.g. phasing out the use of coal for energy and achieving approximately 50 per cent of renewable energy in the end consumption mix).

28. Finland ensures public access to information. Access to information in official documents is a basic civil right protected by the Finnish constitution and is subject to the provisions of the Act on the Openness of Government Activities.⁵

29. Finland has national legislative arrangements and administrative procedures in place that seek to ensure that the implementation of activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources (NC7, p.133). The most important instruments are: section 10 of the Forest Act on preserving diversity and habitats of special importance;⁶ national forest and biodiversity policies, which are mutually supportive and coherent; and the PaMs outlined in the Forest Biodiversity Programme for Southern Finland 2014–2025.

(b) Assessment of adherence to the reporting guidelines

30. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete and transparent. No issues relating to the topics discussed in this chapter were raised during the review.

³ EU ESD (decision 2009/406/EC), European Commission decision 2013/162/EU of 26 March 2013 on determining member States' AEAs for the period from 2013 to 2020 pursuant to decision 406/2009/EC of the European Parliament and of the Council, and European Commission decision 2017/1471 of 10 August 2017 amending decision 2013/162/EU of 26 March 2013 to revise member States' AEAs for the period from 2017 to 2020.

⁴ Act No. 109/2017 on the use of the Kyoto Protocol mechanisms, Ministry of the Environment Decree No. 913/2007 on joint implementation projects and Ministry for Foreign Affairs Decree No. 915/2007 on the clean development mechanism.

⁵ Act No. 621/1999 as amended by Act No. 907/2015.

⁶ Act No. 1093/1996; amendments up to 567/2014 included.

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

(a) Technical assessment of the reported information

31. Finland provided information on its package of PaMs implemented, adopted and planned, by sector and by gas, in order to fulfil its commitments under the Convention and its Kyoto Protocol. Finland reported on its policy context and legal and institutional arrangements put in place to implement its commitments and monitor and evaluate the effectiveness of its PaMs.

32. Finland provided information on a set of PaMs similar to those previously reported, with a few exceptions. The ERT noted that a PaM listed in the NC6 (“Joint implementation project reduction of emissions from nitric acid production”), which started in 2009, is not reported in the NC7. During the review, the Party explained that this PaM had not been discontinued but that, because nitric production is included in the EU ETS, the estimated impact is considered under the EU ETS.

33. Finland reported that no changes had been made since the previous submission to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress made towards its target.

34. Finland gave priority to implementing the PaMs that make the most significant contribution to its emission reduction efforts. Finland provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals in accordance with the objective of the Convention. Finland reported on how it periodically updates its PaMs to reduce greater levels of emissions and on the PaMs that have been discontinued since the previous submission.

35. A significant share of PaMs are deferred to the regional and local level. Energy efficiency and waste disposal PaMs are implemented and coordinated by regional governments and their appropriate ministries. The most common mitigation measures carried out in municipalities have been: extending district heating networks; using renewable energy; improving energy efficiency; and developing and improving bicycling infrastructure. More than 130 municipalities have joined voluntary energy efficiency agreements or programmes and are thus committed to reducing municipal energy consumption.

36. The key overarching related cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD. The package is supplemented by renewable energy and energy efficiency legislation and legislative proposals on the 2020 targets for CO₂ emissions from cars and vans, the carbon capture and storage directive, and the general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package.

37. In operation since 2005, the EU ETS is a cap-and-trade system that covers all significant energy-intensive installations (mainly large point emissions sources such as power plants and industrial facilities) that produce 40–45 per cent of the GHG emissions of the EU. It is expected that the EU ETS will guarantee that the 2020 target (a 21 per cent emission reduction below the 2005 level) will be achieved for sectors under the scheme. The third phase of the EU ETS started in 2013 and the system now includes aircraft operations (since 2012) as well as N₂O emissions from chemical industries, PFC emissions from aluminium production and CO₂ emissions from industrial processes (since 2013).

38. The ESD became operational in 2013 and covers sectors outside the EU ETS, including transport (excluding domestic and international aviation, and international maritime transport), residential and commercial buildings, agriculture and waste, together accounting for 55–60 per cent of the GHG emissions of the EU. The aim of the ESD is to decrease GHG emissions in the EU by 10 per cent below the 2005 level by 2020 and it includes binding annual targets for each member State for 2013–2020.

39. Finland’s mitigation actions are based on its National Energy and Climate Strategy for 2030 and the Medium-term Climate Change Policy Plan (approved in September 2017).

40. The key measures reported are related to the energy sector and include the EU ETS, increasing the share of renewable energy sources and implementing energy conservation measures.

41. The mitigation effect of the renewable energy measures is the most significant (emission reductions of 13.3 and 19.3 Mt CO₂ eq by 2020 and 2030, respectively). Other policies that have delivered significant emission reductions have been maintained; for example, voluntary energy efficiency agreements with municipalities and companies (since 1997) (reductions of 7.9 and 8.4 Mt CO₂ eq by 2020 and 2030, respectively) and promotion of the use of biofuels in the transport sector (reductions of 1.5 and 1.4 Mt CO₂ by 2020 and 2030, respectively). Table 6 provides a summary of the reported information on the PaMs of Finland.

Table 6

Summary of information on policies and measures reported by Finland

<i>Sector</i>	<i>Key PaMs</i>	<i>Estimate of mitigation impact by 2020 (kt CO₂ eq)</i>	<i>Estimate of mitigation impact by 2025 (kt CO₂ eq)</i>	<i>Estimate of mitigation impact by 2030 (kt CO₂ eq)</i>
Policy framework and cross-sectoral measures	Implementation of the EU ETS in Finland			
Energy	Building regulation 2003–2010	1 660	1 660	1 660
Transport	Promotion of biofuel use in the transport sector	1 520	1 467	1 436
Renewable energy	Promotion of woodchips and other wood-based energy	7 629	8 609	9 934
	Renewed building regulation 2012	2 166	3 608	5 050
	Promotion of wind power	3 000	3 180	3 600
	Promotion of biogas in electricity and gas production	388	367	352
	Promotion of solar power	86	227	386
Energy efficiency	Voluntary energy efficiency agreements with municipalities and companies 1997–2007, 2008–2016 and 2017–2025	7 912	7 841	8 415
IPPU	Aggregated impact of the PaMs under the WEM scenario	1 821	2 259	2 763
Agriculture	Improving grassland management, improving management of organic soils, and afforestation	–	225	450
LULUCF	Improving grassland management, improving management of organic soils, and afforestation	–	570	1 140
Waste	Aggregated impact of the PaMs under the WEM scenario	2 870	3 166	3 361

Note: The estimates of mitigation impact are estimates of emissions of CO₂ or CO₂ eq avoided in a given year as a result of the implementation of mitigation actions.

(b) Policies and measures in the energy sector

42. Finland's main PaMs in the energy sector are the EU ETS, the increase in the proportion of renewable energy in energy consumption and energy conservation measures. The adopted measures for district heating and combined heat and power production will play an important role because buildings used 38 per cent of the final energy consumption in 2016. The effect of the PaMs in the energy sector is strongly influenced by external factors such as the weather (which influences electricity production from renewable sources in the Nordic-Baltic electricity market to which Finland is connected) and variations in the Nordic-Baltic electricity market (e.g. prices).

43. **Energy supply.** The Energy Authority is the national emissions trading authority. It supervises the monitoring and reporting of the emission data under the EU ETS and international emissions trading under the Kyoto Protocol. It provides information on assigned amount units and removal units for annual inventory submissions in accordance with the

“Guidelines for the preparation of information required under Article 7 of the Kyoto Protocol” (annex to decision 15/CMP.1 and annex III to decision 3/CMP.11).

44. The general objective of Finland’s energy policy is to ensure energy security at competitive prices and with the lowest possible environmental impact. Finland uses a range of primary energy sources (oil, nuclear power and fuelwood are the main contributors), of which 47 per cent were domestic (wood-based fuels, nuclear power, hydropower, wind power, waste and peat) in 2015. Two measures play an important role in energy supply: reducing primary energy consumption by reducing end use and increasing the conversion efficiency of power plants; and the shift towards fuels and energies with lower emissions.

45. The National Energy and Climate Strategy for 2030 states that Finland will phase out the use of coal for energy by 2030. No new power plants burning hard or brown coal will be built, nor will Finland make any replacement investments based on coal. Once the existing plants, which are based on pulverized fuel combustion, have been decommissioned, coal will only be used as a backup fuel in exceptional situations.

46. **Renewable energy sources.** Finland aims to increase the share of renewable energy in final energy consumption to 38 per cent by 2020 (this target was reached in 2014 and the share was 39.3 per cent in 2015). This increase in the share has been achieved by reducing energy consumption and increasing the use of renewables. Wood-based fuels, liquid biofuels, wind power and heat pumps contribute most to the target.

47. **Energy efficiency.** The NC7 includes information on the advances in the established PaMs, such as the voluntary energy efficiency agreements with municipalities and private companies (e.g. on the energy efficiency of buildings, industrial processes and services), which represented, in 2016, approximately 65 per cent of the total energy consumption in Finland. Voluntary energy audits are another important measure; the emission reduction achieved by the energy efficiency measures conducted on the basis of the proposals in the voluntary energy audits is estimated to be 0.33 Mt CO₂ per year by the end of 2020 and 0.28 Mt CO₂ per year by the end of 2025.

48. Finland assigns an important role to economic instruments such as taxation and subsidies to improve energy efficiency and to promote the development of domestic energy sources. Other measures include setting minimum standards, research, education and the dissemination of information.

49. **Residential and commercial sectors.** CO₂ emissions from the use of energy in buildings are mainly covered by the EU ETS. The energy used for space heating in residential, commercial and public buildings was 72 TWh in 2015 (25 per cent of the total end use of energy). Slightly less than 30 TWh of the energy used for space heating in 2015 was not covered by the EU ETS. The mitigation measures in this sector target both new and existing buildings, and the uses and maintenance of the building stock. In addition to PaMs in the building sector, energy use is affected by policy instruments for renewable energy, that is by changes in the prices of heat and electricity.

50. **Transport sector.** The projection made by Finland for the transport sector includes all measures that were in place in the sector to reduce emissions in June 2016. The measures are designed to achieve the target of the Climate Policy Programme for the Transport Sector and Finland’s Long-term Climate and Energy Policy, a 50 per cent reduction in emissions in 2030 compared with the 2005 level. The measures also contribute to achieving the EU’s target under the ESD.

51. The PaMs for transport include: promoting the use of biofuels; improving the energy efficiency of vehicles; and improving the energy efficiency of the transport system by promoting the choices of more environmentally friendly modes of transport and curbing the growth of vehicle-kilometres.

52. The NC7 includes information on how Finland promotes and implements the decisions of the International Civil Aviation Organization and the International Maritime Organization to limit emissions from aviation and marine bunker fuels. As an EU member State, Finland is implementing the EU ETS for aviation for flights from Finland to other countries in the European Economic Area (EU, Iceland, Liechtenstein and Norway). In 2016, Finland issued 493,036 aviation emission allowances free of charge to aircraft operators

administered by the Finnish Transport Safety Agency and sold 110,500 aviation emission allowances at the common auction platform. The Ministry of Transport and Communications is actively involved in EU policymaking to enhance the effectiveness of the EU ETS for aviation.

(c) **Policies and measures in other sectors**

53. **Industrial processes.** GHG emissions from this sector were 11.0 per cent of total emissions (including indirect CO₂ emissions, excluding LULUCF) in 2015 and F-gas emissions (HFCs, PFCs and SF₆) were 2.9 per cent of total emissions. HFC emissions have increased by 6,440,749.3 per cent since 1990. PFC emissions have declined since their peak in 1999 (35.69 kt CO₂ eq) but are still higher than in 1990 by 3,095.2 per cent. SF₆ emissions have declined since their peak in 1996 (54.16 kt CO₂ eq) but have increased continuously since the 2012 level (22.16 kt CO₂ eq), although they were in 2015 (37.55 kt CO₂ eq) still lower than in 1990 by 28.5 per cent. F-gas emissions from refrigeration and air-conditioning equipment are expected to decline owing to measures and technical changes leading to smaller charges and decreased leakage implemented under EU regulations. Key drivers for the decrease in F-gas emissions are the phase-down of HFCs that can be placed on the EU market and the ban on the use of HFCs in various applications, which will lead to the replacement of HFCs with other substances with lower global warming potentials in most applications. It is estimated that the emission reduction achieved by these additional measures will be 0.3 Mt CO₂ eq in 2030.

54. **Agriculture.** GHG emissions from this sector were 11.7 per cent of total emissions (including indirect CO₂ emissions, excluding LULUCF) in 2015. The objectives of sustainable and multifunctional agriculture in Finland include reducing GHG emissions and assessing the need for adaptation measures. The EU Common Agricultural Policy plays an important role in the adopted PaMs in the sector. Annual CH₄ and N₂O emissions from agriculture decreased by 7.6 and 9.0 per cent, respectively, over the period 1990–2015, mainly owing to a decrease in the livestock population and a decrease in nitrogen fertilization. Changes in agricultural policy and farming subsidies have had a significant influence on agricultural activities and hence on the emissions from this sector.

55. **LULUCF.** The LULUCF sector acts as a net sink in Finland. It can vary greatly from one year to the next, depending on the evolution of forestry production. For example, net removals during the period 1990–2015 range from 12.67 Mt CO₂ in 1990 to 38.00 Mt CO₂ eq in 2009. In 2015, the sector was a net sink of 25.99 Mt CO₂ eq. While Finland does not estimate the aggregated impact of mitigation actions, net removals from the LULUCF sector increased by 13.32 Mt CO₂ eq between 1990 and 2015.

56. **Waste management.** GHG emissions from the waste sector were 54.3 per cent lower in 2015 than in 1990 and will decrease further according to the WEM scenario projections. PaMs include the EU directive on landfills (directive 1999/31/EC) and the implementation of national legislation and strategies that aim at reducing the amount of waste generated and minimizing the amount of waste, especially organic waste, delivered to landfill. For example, Decree No. 331/2013 on landfills sets 10 per cent as the maximum total organic carbon in waste landfilled from 2016 (except building waste, where this limit applies from 2020). The estimated aggregated impact of the PaMs is a reduction of 2.87 Mt CO₂ and 3.36 Mt CO₂ in emissions for 2020 and 2030, respectively.

57. **Urban structure and land use.** Finland reported important measures in urban development to reduce emissions from buildings (residential, commercial and industrial) and transport. For example, building sufficient public transportation and networks of pedestrian and bicycle lanes, and directing construction of new buildings to areas with existing services and transport networks. In land-use planning, Finland facilitates the development of wind power potential by favouring the construction of wind power infrastructure in large units at a sufficient distance from permanent housing.

(d) Minimization of adverse impacts in accordance with Article 2 and Article 3, paragraph 14, of the Kyoto Protocol

58. In the NC7 (chapter 4.10) Finland reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties. In Finland, all major policies and activities undergo environmental impact assessments, including an assessment of their impacts in other countries; for example, environmental impact assessments have been carried out for all national energy and climate strategies. A life cycle analysis of fuel imports, including their related impacts outside Finland, has been implemented. The Party has also participated in developing sustainability criteria for biofuels through scientific studies. In line with the National Energy and Climate Strategy for 2030, the potential adverse environmental impacts due to the increased use of bioenergy are identified and addressed as early as possible. Finland supports developing countries to build their capacities and develop their economic infrastructure, thus helping them diversify their economies and improve energy production.

59. Further information on how Finland 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 was reported in the 2017 annual submission. The Party reported on: the assessment of economic and social consequences of response measures, adverse effects of climate change and social, environmental and economic impacts on other Parties. The Party gives particular priority to: the progressive reduction or phasing out of market imperfections; fiscal incentives, tax and duty exemptions and subsidies in all GHG-emitting sectors; cooperation on the development, diffusion, transfer and wide use of technologies that emit lower levels of GHGs and those that capture and store GHGs from fossil fuel use by supporting, at a policy level, methane capture for electricity generation (instead of gas flaring) and carbon capture and storage; and assisting developing country Parties that are highly dependent on the export and consumption of fossil fuels in diversifying their economies, for which several projects are in place.

60. Finland reported on the assessment of the economic and social consequences of response measures. Finland presented several initiatives and projects aimed at minimizing adverse impacts related, for example, to: increasing access to sustainable energy in the recipient country or region; supporting both soft and hard technology transfer; and strengthening institutional frameworks for coordinating climate change at the national and regional level with a view to enabling countries to adopt integrated approaches for climate-resilient and low-carbon development.

(e) Assessment of adherence to the reporting guidelines

61. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

C. Projections and the total effect of policies and measures, including information on complementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

1. Projections overview, methodology and results

(a) Technical assessment of reporting information

62. Finland reported updated projections for 2020 and 2030 relative to actual inventory data for 2015 under the WEM scenario. The WEM scenario reported by Finland includes implemented and adopted PaMs until late 2016.

63. In addition to the WEM scenario, Finland reported the WAM scenario. The WAM scenario includes planned PaMs established in the National Energy and Climate Strategy for 2030. Finland provided a definition of its scenarios, explaining that its WEM scenario

includes policies such as the EU ETS, the promotion of renewable energy, the energy audit programme, energy efficiency improvement, the EU F-gas regulation, the EU Common Agricultural Policy, the National Forest Strategy 2025 and the Waste Act,⁷ while its WAM scenario includes the promotion of “nearly zero-energy” buildings, the expansion of the use of biofuels in the transport sector, criteria for public procurement of equipment containing F-gases, the intensification of long-term grass cultivation, and afforestation. The definitions indicate that the scenarios were prepared according to the UNFCCC reporting guidelines on NCs. The ERT noted that Finland did not include a WOM scenario.

64. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions, and on a gas-by-gas basis for CO₂, CH₄, N₂O, PFCs, HFCs and SF₆ for 2016–2030. The projections are also provided in an aggregated format for each sector as well as for a Party total using global warming potential values from the IPCC Fourth Assessment Report.

65. Finland did not report emission projections for indirect GHGs such as carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides, although the national GHG inventory covers these emissions. During the review, the Party clarified that indirect GHGs are not significant emission sources, although they are included in the national total, and that indirect GHGs comprised 0.1–0.2 per cent of total GHG emissions, excluding LULUCF, for the period 1990–2015.

66. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately and were not included in the totals. Finland reported on factors and activities affecting emissions for each sector, stating that the annual growth rate of international marine transportation and aviation is estimated to be 2.0 per cent and 3.0 per cent by 2030, respectively, without taking into consideration PaMs aiming at improving energy efficiency and increasing the use of alternative fuels. During the review, the Party clarified that the fuel sold to ships and aircraft is strongly affected by fuel prices and differences in fuel prices in different countries and, therefore, projections are difficult to make.

(b) Methodology, assumptions and changes since the previous submission

67. The methodology used for the preparation of the projections is very similar to that used for the preparation of the emission projections reported in the NC6. Model development and updates have been made (e.g. to ensure consistency with inventory methods that have changed). Finland reported supporting information further explaining the methodologies by including brief information on how overlaps are avoided when estimating the total impacts of PaMs (see, e.g., p.163 of the NC7).

68. Finland reported the variables and assumptions in the NC7 (chapters 5.1 and 5.8.2). To prepare its projections, Finland relied on the following key assumptions:

(a) Population will grow steadily, up to 5.63, 5.75 and 5.85 million in 2020, 2025 and 2030, respectively;

(b) The annual growth of GDP during the period 2016–2020 is 1.6 per cent, and during the period 2020–2030, 2.6 per cent. The GDP drivers from 2020 are expected to be machinery and equipment manufacturing, forest industries (e.g. pulp and paper) and financial and insurance services;

(c) The international fuel prices are those from the International Energy Agency’s *World Energy Outlook 2015*.⁸

69. The assumptions were updated on the basis of the most recent economic developments, particularly the upward revision of the annual GDP growth rate for 2020–2030: 1.9 per cent in the NC6 but 2.6 per cent in the NC7.

70. In its NC6 Finland had assumed that it would be self-sufficient in electricity production on a yearly basis from 2020 onward. However, in the NC7 Finland reported that

⁷ Act. No. 646/2011, amendments up to 528/2014 included.

⁸ <https://webstore.iea.org/world-energy-outlook-2015>.

the recent increased integration of the Nordic-Baltic electricity market (to which Finland belongs) means that self-sufficiency in electricity supply is no longer a feasible aim or a reasonable assumption. The NC7 indicates that Finland could be temporarily self-sufficient in electricity supply for a few years in the late 2020s, when a new nuclear power plant and additional wind power plants are expected to replace part of the conventional fossil fuel based power generation.

71. The most significant new, implemented PaMs affecting future projections since the NC6 are a regulation ensuring improvements in energy and resource efficiency in the renovation and alteration of buildings,⁹ and a regulation reducing the amount of organic waste disposed to landfills.¹⁰

72. Finland provided information in the NC7 (chapter 5.1) on the changes since the submission of its NC6 to the assumptions, methodologies, models and approaches used and on the key variables and assumptions used in the preparation of the projection scenarios.

73. Sensitivity analyses were conducted for the WEM scenario by varying the economic growth of industry, services and the building sector, although no sensitivity analysis was made for the transport sector (NC7, chapter 5.6). If the annual growth rate were 1 percentage point lower than the rate assumed in the WEM scenario, GHG emissions in 2030 would be 4 Mt CO₂ eq lower than in the WEM projection, and most of the emission reductions would take place in the EU ETS sector (only 0.4 Mt CO₂ eq would be reduced in the non-ETS sectors).

74. The NC6 included a ‘business as usual’ scenario. The previous ERT recommended that Finland improve the transparency of the information on the total effect of PaMs reported in the NC by updating the values presented in the ‘business as usual’ scenario (FCCC/IDR.6/FIN, para. 78). In its NC7, the Party did not include a ‘business as usual’ scenario and estimated the total effect of implemented and planned PaMs by aggregating the estimated effects of individual PaMs by sector, including a brief description of how the estimations avoided overlapping (NC7, p.163). During the review, Finland clarified that the ‘business as usual’ scenario used in previous submissions was not able to reflect the national circumstance that Finland’s mitigation PaMs started as early as the 1970s. The ERT agrees with the changes and concludes that the issue raised by the previous ERT has been resolved.

(e) Results of projections

75. The projected emission levels under different scenarios, and information on the Kyoto Protocol target and the quantified economy-wide emission reduction target, are presented in table 7 and the figure below.

Table 7

Summary of greenhouse gas emission projections for Finland

	<i>GHG emissions (kt CO₂ eq per year)</i>	<i>Changes in relation to base-year^a level (%)</i>	<i>Changes in relation to 1990 level (%)</i>
Kyoto Protocol base-year	71 350.15	NA	0.08
Quantified emission limitation or reduction commitment under the Kyoto Protocol (2013–2020) ^b	30 068.07	NA	NA
Quantified economy-wide emission reduction target under the Convention ^c	NA	NA	NA
Inventory data 1990 ^d	71 290.64	–0.1	NA
Inventory data 2015 ^d	55 559.21	–22.1	–22.1
WEM projections for 2020 ^d	56 031	–21.5	–21.4
WAM projections for 2020 ^d	55 920	–21.6	–21.6
WEM projections for 2030 ^d	48 493	–32.0	–32.0
WAM projections for 2030 ^d	43 810	–38.6	–38.5

⁹ Ministry of the Environment Decree No. 4/13.

¹⁰ Government Decree No. 331/2013, as amended.

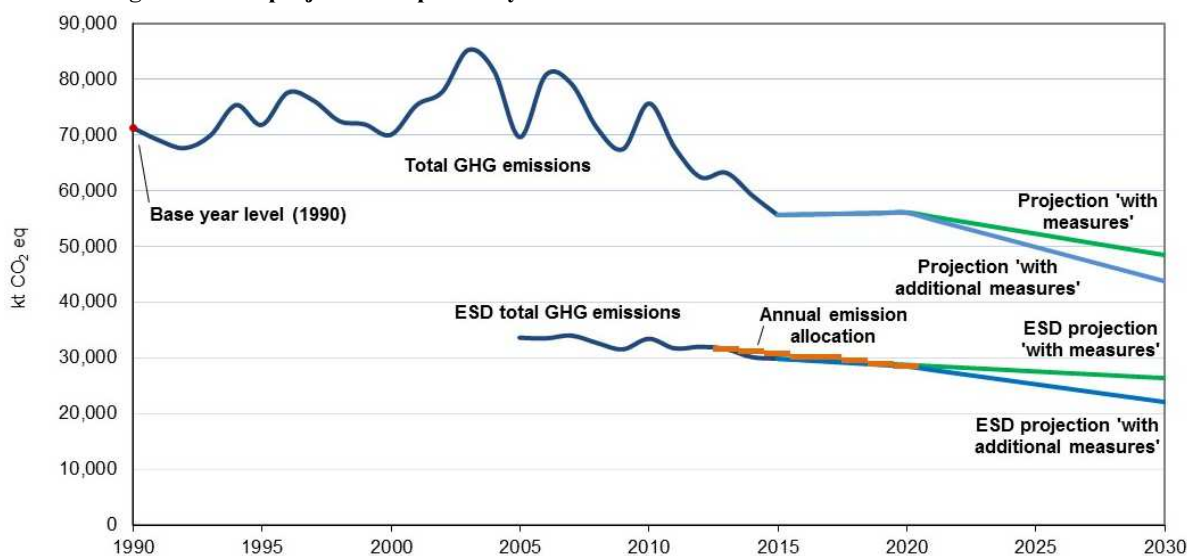
^a “Base year” in this column refers to the base year used for the target under the Kyoto Protocol. The Kyoto Protocol base-year level of emissions is provided in the initial review report, contained in document FCCC/IRR/2016/FIN.

^b The Kyoto Protocol target for the second commitment period (2013–2020) is a joint target of the EU and its 28 member States and Iceland. The joint target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020. Finland’s share of the emission reduction target is a target path with quantified emission allowances for the period 2013–2020, defined in: (1) the EU ESD (decision 2009/406/EC); (2) European Commission decision 2013/162/EU of 26 March 2013 on determining member States’ AEAs for the period from 2013 to 2020 pursuant to decision 406/2009/EC of the European Parliament and of the Council; and (3) European Commission decision 2017/1471 of 10 August 2017 amending decision 2013/162/EU of 26 March 2013 to revise member States’ AEAs for the period from 2017 to 2020. Finland’s share of the emission reduction target includes emissions and removals from LULUCF activities under the Kyoto Protocol.

^c The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its 28 member States. The joint target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020.

^d From Finland’s 2017 GHG inventory submission, which was also used in Finland’s NC7.

Greenhouse gas emission projections reported by Finland



Sources: (1) data for the years 1990–2015: Finland’s 2017 annual inventory submission; total GHG emissions excluding LULUCF; (2) data for the years 2016–2030: Finland’s NC7; total GHG emissions excluding LULUCF.

76. Finland’s total GHG emissions excluding LULUCF in 2020 and 2030 are projected to be 56,031 and 48,493 kt CO₂ eq, respectively, under the WEM scenario, which represents a decrease of 21.4 and 32.0 per cent, respectively, below the 1990 level. Under the WAM scenario, emissions in 2020 and 2030 are projected to be lower than those in 1990 by 21.6 and 38.5 per cent and amount to 55,920 and 43,810 kt CO₂ eq, respectively. The 2020 projections suggest that Finland will continue contributing to the achievement of the EU target under the Convention.

77. Finland’s target for non-ETS sectors is to reduce its total emissions by 16.0 per cent below the 2005 level by 2020. Finland’s AEAs, which correspond to its national emission target for non-ETS sectors, change linearly from 31,776,522 t CO₂ eq in 2013 to 28,513,533 t CO₂ eq for 2020 (including adjustments resulting from the implementation of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, as shown in table 4.1 of the NC7). According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to reach 28.8 Mt CO₂ eq by 2020. Under the WAM scenario, Finland’s emissions from non-ETS sectors in 2020 are projected to be 28.5 Mt CO₂ eq. The projected level of emissions for the non-ETS sectors under the WEM scenario is 1.0 per cent above the AEAs for 2020 and, under the WAM scenario, 0.05 per cent below. The ERT noted that this suggests that Finland expects to meet its ESD target under the WAM scenario.

78. In addition to its target for non-ETS sectors, under the EU climate and energy package, Finland is also required to achieve a domestic target of a 38 per cent share for renewable energy sources in final energy consumption by 2020 and a 50 per cent share by 2030, and to limit the final energy consumption to 310 TWh in 2020. The projections indicate that Finland expects to meet its domestic targets. Information provided during the review shows that the share of renewable energy will increase to over 40 per cent in both the WEM and the WAM scenario in 2020, and increase to 49.8 per cent in 2030 under the WAM scenario. The final energy consumption would be 311 TWh in 2020 (WEM scenario) and generally remain stable during the 2020s.

79. Finland presented the WEM and WAM scenarios by sector for 2020 and 2030, as summarized in table 8.

Table 8

Summary of greenhouse gas emission projections for Finland presented by sector

Sector	GHG emissions and removals (kt CO ₂ eq)					Change (%)			
	1990	2020		2030		1990–2020		1990–2030	
		WEM	WAM	WEM	WAM	WEM	WAM	WEM	WAM
Energy (not including transport)	41 457	30 678	30 678	24 464	22 957	–26.0	–26.0	–41.0	–44.6
Transport	12 101	10 763	10 654	10 044	7 194	–11.1	–12.0	–17.0	–40.6
Industry/industrial processes	5 370	6 349	6 347	6 493	6 169	18.2	18.2	20.9	14.9
Agriculture	7 525	6 611	6 611	6,378	6 378	–12.1	–12.1	–15.2	–15.2
LULUCF	–12 672	–10 644	–10 644	–4 221	–5 361	–16.0	–16.0	–66.7	–57.7
Waste	4 672	1 629	1 629	1 112	1 112	–65.1	–65.1	–76.2	–76.2
Other (specify)	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total GHG emissions without LULUCF	71 291	56 031	55 920	48 493	43 810	–21.4	–21.6	–32.0	–38.5

Sources: (1) GHG emission data: Finland's 2017 annual inventory submission; (2) WEM and WAM projections: Finland's NC7.

80. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions are expected to occur in the energy sector (excluding transport) and the waste sector, amounting to projected reductions of 10.78 Mt CO₂ eq (26.0 per cent) and 3.0 Mt CO₂ eq (65.1 per cent) between 1990 and 2020, respectively. However, during the same period, emissions from IPPU are projected to increase by 1.0 Mt CO₂ eq (18.2 per cent). The pattern of projected emissions reported for 2030 under the same scenario remains the same. The most significant emission reductions are also expected to occur in the energy sector (excluding transport) and the waste sector, amounting to projected reductions of 17.0 Mt CO₂ eq (41.0 per cent) and 3.0 Mt CO₂ eq (76.2 per cent) between 1990 and 2030, respectively. Emissions from IPPU are projected to increase by 1.1 Mt CO₂ eq (20.9 per cent) during the same period.

81. Under the WEM scenario, the sink effect of the LULUCF sector is expected to decrease by 16.0 and 66.7 per cent for 2020 and 2030, respectively, compared with the 1990 level. Under the WAM scenario, the sink effect of the LULUCF sector for 2020 is the same as under the WEM scenario but is expected to increase for 2030 from –4.22 Mt CO₂ eq to –5.36 Mt CO₂ eq.

82. Additional measures, to be implemented in the 2020s or by 2030 at the latest, are considered under the WAM scenario. Compared with the WEM scenario, an additional emission reduction of 4.7 Mt CO₂ eq would be achieved in 2030. Over half of the additional reduction would come from the transport sector (2.8 Mt CO₂ eq), mainly as a result of three PaMs: promoting the use of biofuel, improving the energy efficiency of vehicles and improving the energy efficiency of the transport system (contributing 1.5, 1.0 and 0.3 Mt

CO₂ eq, respectively, to the additional reduction). In addition, the “nearly zero-energy” regulation for new buildings that will enter into force in 2018 and an obligation to blend 10 per cent bio-liquid into light fuel used for the heating of buildings will contribute to the additional reduction under the WAM scenario.

83. Finland presented the WEM and WAM scenarios by gas for 2020 and 2030, as summarized in table 9.

Table 9

Summary of greenhouse gas emission projections for Finland presented by gas

Gas	GHG emissions and removals (kt CO ₂ eq)					Change (%)			
	1990	2020		2030		1990–2020		1990–2030	
		WEM	WAM	WEM	WAM	WEM	WAM	WEM	WAM
CO ₂	57 114 ^a	45 392	45 284	39 157	34 803	–20.3	–20.5	–31.2	–38.9
CH ₄	7 746	4 498	4 498	3 817	3 817	–41.9	–41.9	–50.7	–50.7
N ₂ O	6 377	4 757	4 757	4 727	4 723	–25.4	–25.4	–25.9	–25.9
HFCs	0.02	1 343	1 341	751	426	6 717 200.0	6 706 050.0	3 752 450.0	2 132 250.0
PFCs	0.2	4	4	4	3	1 681.0	1 681.0	1 576.2	1 385.7
SF ₆	52	36	36	38	38	–31.5	–31.5	–27.0	–27.0
NF ₃	NO	NO	NO	NO	NO	NA	NA	NA	NA
Total GHG emissions without LULUCF	71 291	56 031	55 920	48 493	43 810	–21.4	–21.6	–32.0	–38.5

Sources: (1) GHG emission data: Finland’s 2017 annual inventory submission; (2) WEM and WAM projections: Finland’s NC7.

^a Emissions including indirect CO₂ emissions.

84. For 2020 the most significant reductions are projected for CO₂ and CH₄ emissions: 11.6 Mt CO₂ (20.3 per cent) and 3.2 Mt CO₂ eq (41.9 per cent) between 1990 and 2020, respectively. However, F-gas emissions are projected to increase by 1.3 Mt CO₂ eq (25 times higher than in 1990) in the same period, driven mainly by HFC emissions.

85. The pattern of projected emissions reported for 2030 under the WEM scenario is similar to that for 2020. The most significant reductions are also expected to occur for CO₂ and CH₄ emissions: 17.8 Mt CO₂ (31.2 per cent) and 3.9 Mt CO₂ eq (50.7 per cent) between 1990 and 2030, respectively. However, the trend of F-gas emissions changes in the period 2020–2030 compared with the period 1990–2020; in 2030, these emissions are projected to be higher than in 1990 (by 0.7 Mt CO₂ eq, or 14 times higher) but lower than in 2020 (by 0.6 Mt CO₂ eq, or 46.5 per cent lower).

86. If additional measures are considered (i.e. under the WAM scenario), as in the WEM scenario, the most significant emission reductions are expected for CO₂ and CH₄ (reductions of 22.1 and 3.9 Mt CO₂ eq between 1990 and 2030, respectively), and the increasing trend of F-gas emissions for the period 1990–2020 changes to a decreasing trend for the period 2020–2030, although emissions in 2030 are still expected to be nine times higher than in 1990.

87. The ERT noted the updated assumption on annual growth rate of GDP during the 2020s does not trigger an incremental increase of overall emissions in that period. The projected emissions in 2030 are 49.8 Mt CO₂ eq under the WEM scenario in the NC6, whereas this value is 48.5 Mt CO₂ eq in the NC7. During the review, the Party clarified that although the Government of Finland’s expectation of economic growth after 2020 is higher than the assumption used in the NC6, the starting level is lower owing to the prolonged recession. As a result, the economy is expected to reach the same level as in the projection of the NC6 by around 2030. Further, the new mitigation PaMs and optimized energy mix would offset the extra emissions that will possibly be caused by faster GDP growth. The ERT also noted that the energy intensity of Finland is projected to grow from 1.94 TWh/billion 2010 EUR in 2015 to 2.03 TWh/billion 2010 EUR in 2020, an increase of 4.3 per cent,

although the emission intensity in terms of GHG emissions per GDP unit will decline by about 6.1 per cent during the same period. During the review, Finland clarified the information in the NC7 by explaining that the timber, pulp and paper, and metal production industries, which are energy intensive, have a relatively important role in economic recovery, and also that the export of pulp has increased recently and several new investments in pulp production are in the pipeline and under consideration.

(d) Assessment of adherence to the reporting guidelines

88. The ERT assessed the information reported in the NC7 of Finland and identified issues relating to completeness and transparency. The findings are described in table 10.

Table 10

Findings on greenhouse gas emission projections reported in the seventh national communication of Finland

<i>No.</i>	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement ^a specified in paragraph 48 Issue type: transparency Assessment: recommendation	The ERT noted that detailed information on factors and activities for the energy sector is provided in the NC7 (tables 5.15–5.18, pp.168 and 169); however, equivalent information for other sectors is not reported. The ERT also noted that information on growth rate by subsector was reported in the NC6 (table 5.14, p.168) but not in the NC7. During the review, Finland explained that a table on economic growth by sector (such as table 5.15 in the NC6) is no longer as relevant for the projections, because emission trends have been decoupled from economic trends. The Party provided factors and activities for the projection period for the waste (solid waste disposal volume) and the agriculture (number of livestock raised and area of crop planting) sectors, and additional activity data for the transport sector (basic and reduced mileages). The ERT noted the significant impact of the well-developed forest industry on the emission trend by providing increasing amounts of renewable energy. The ERT recommends that Finland provide in its next NC information regarding factors and activities for all sectors, including the assumptions for the forest industry and the renewable energy that it produces, to allow readers to gain a better understanding of the development trend by sector.
2	Reporting requirement ^a specified in paragraph 28 Issue type: completeness Assessment: encouragement	The ERT noted that a WOM scenario is not reported in the NC7. During the review, the Party clarified that the WOM scenario is not applicable to Finland's national circumstances because mitigation PaMs have been implemented since the 1970s; therefore, any WOM scenario created on the basis of previous climate and energy strategies (e.g. 2013, 2008 or 2005) would be very complicated and require significant effort, particularly in predicting industrial structure. The ERT encourages Finland to explain in its next NC why reporting the WOM scenario is not possible.
3	Reporting requirement ^a specified in paragraph 35 Issue type: completeness Assessment: encouragement	The ERT noted the Party did not report emission projections for indirect GHGs, although Finland estimates and reports these in its GHG inventory and includes them in the calculation of the base-year historical emissions. During the review, Finland clarified that the emissions of indirect GHGs are not significant (less than 0.1 per cent of the total emissions in 2015, and 0.1–0.2 per cent for the period 1990–2015). The ERT encourages Finland to include in its next NC emission projections for indirect GHGs.
4	Reporting requirement ^a specified in paragraph 37 Issue type: transparency	The ERT noted that estimates for projected emissions for the ETS and non-ETS sectors are provided in the NC7 in a figure but not in tabular format. During the review, Finland provided these emissions in tabular format for the ETS and non-ETS sectors for both the WEM and the WAM scenario. The projections under the WEM scenario indicate that the non-ETS emissions will decrease by 15.0

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
Assessment: encouragement	<p>and 22.1 per cent in 2020 and 2030, respectively; and under the WAM scenario the non-ETS emissions will decrease by 15.9 per cent and 34.8 per cent in 2020 and 2030, respectively. Updated emissions for the ETS and non-ETS sectors for 2005 were also provided during the review, taking into consideration the adjusted scope of the ETS sector.</p> <p>The ERT encourages Finland to report in its next NC the projected emissions for the ETS and non-ETS sectors in all scenarios in tabular format, together with updated historical emissions for the ETS and non-ETS sectors, in order to track the reduction progress in a more transparent manner.</p>	

Note: The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

^a Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs.

2. Assessment of the total effect of policies and measures

(a) Technical assessment of the reported information

89. In the NC7 Finland presented the estimated and expected total effect of implemented and planned PaMs. Information is presented in terms of GHG emissions avoided or sequestered, by gas (on a CO₂ eq basis), in 2010, 2015, 2020 and 2030. It also presented relevant information on factors and activities for the energy sector for 1990–2030 in textual and tabular format. However, the information for other sectors is not presented with the same level of detail.

90. The UNFCCC reporting guidelines on NCs encourage Parties, including Parties included in Annex I to the Convention, to present the total effect of PaMs for the years 2005, 2010, 2015 and 2020. The ERT noted that the guidelines use five-year intervals but do not mention 2025 or 2030. If a Party chooses to report the total effect for 2030, the ERT considers that it might improve transparency to report the information also for 2025, but Finland did not report the total effects of implemented and adopted or planned PaMs for 2025 in the NC7 (table 5.11). During the review, the Party provided the total effects of implemented and adopted PaMs (37.3 Mt CO₂ eq) and planned PaMs (2.8 Mt CO₂ eq) for 2025.

91. Finland reported that the total estimated effect of its implemented and adopted PaMs is 33.3 Mt CO₂ eq in 2020 and 42.0 Mt CO₂ eq in 2030 under the WEM scenario. According to the information reported in the NC7, PaMs implemented in the energy sector (excluding transport) will deliver the largest emission reductions, followed by PaMs implemented in the waste and transport sectors. Table 11 provides an overview of the total effect of PaMs as reported by Finland. Under the WAM scenario, the planned PaMs would introduce more reduction potential, compared with the WEM scenario, 0.002 and 6.3 Mt CO₂ eq in 2020 and 2030, respectively.

Table 11
Projected effects of Finland's planned, implemented and adopted policies and measures by 2020 and 2030

Sector	2020		2030	
	Effect of implemented and adopted measures (kt CO ₂ eq)	Effect of planned measures (kt CO ₂ eq)	Effect of implemented and adopted measures (kt CO ₂ eq)	Effect of planned measures (kt CO ₂ eq)
Energy (without transport)	26 248	0	33 539	1 600
Transport	2 373	NA	2 368	2 755
Industrial processes	1 821	0.002	2 763	324
Agriculture	NA	0	NA	500
Land-use change and forestry	NA	0	NA	1 140
Waste management	2870	0	3 361	0
Total	33 312	0.002	42 031	6 319

Source: Calculated by the ERT on the basis of the information provided in Finland's NC7 (chapter 4) and CTF table 3.

Note: The total effect of implemented and adopted PaMs and of planned PaMs is calculated as the sum of the individual effect of each PaM.

(b) Assessment of adherence to the reporting guidelines

92. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

3. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

(a) Technical assessment of the reported information

93. In the NC7 Finland provided information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. In its NC7, Finland stated that the estimated total effect of PaMs for 2020 indicate that the Kyoto Protocol target for the second commitment period will be met entirely by domestic action, and the possible use of the Kyoto Protocol mechanisms would be supplemental to domestic action.

94. Finland did not retire any Kyoto Protocol units to cover its emissions from the non-ETS sector for the first commitment period of the Kyoto Protocol. The CERs and ERUs acquired through a Government purchase programme were carried over to the second commitment period of the Kyoto Protocol. Finland requested that 14,018,572 AAUs, 6,798,242 CERs and 2,917,220 ERUs be carried over from the first to the second commitment period. The number of AAUs include 10,000,000 AAUs transferred by the EU to Finland's holding account with the purpose of enabling Finland's compliance with its commitments in the second commitment period, after LULUCF accounting rules for the second commitment period were agreed by decision 2/CMP.7.

(b) Assessment of adherence to the reporting guidelines

95. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete and transparent. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

D. Provision of financial and technological support to developing country Parties, including information under Articles 10 and 11 of the Kyoto Protocol

1. Financial resources, including under Article 11 of the Kyoto Protocol

(a) Technical assessment of the reported information

96. Finland reported information on the provision of financial support required under the Convention and its Kyoto Protocol, including on financial support provided, committed and pledged, allocation channels and annual contributions.

97. Finland provided details on what “new and additional” financial resources it has provided and clarified how it has determined such resources as being “new and additional”. Finland’s definition for new and additional financial resources is to use 2009 as the baseline year. Total Finnish climate funding (grants) in 2009 was EUR 26.8 million; therefore, anything above EUR 26.8 million each year is considered new and additional. The approach used for reporting on new and additional resources has not changed since the NC6.

98. Finland reported the financial support that it has provided to non-Annex I Parties, distinguishing between support for mitigation and adaptation activities and recognizing the capacity-building elements of such support. It explained how it tracks finance for adaptation and mitigation using the Rio markers, which were developed for the Development Assistance Committee of the Organization for Economic Co-operation and Development and are publicly available in the Committee’s Creditor Reporting System. The Rio markers facilitate the tracking of adaptation- and mitigation-related (and also biodiversity and desertification) finance. The methodology used for preparing information on international climate support is explained in the NC7 (chapter 7.3).

99. With regard to the most recent financial contributions aimed at enhancing the implementation of the Convention by developing countries, Finland reported that its climate finance has been allocated on the basis of: (1) Finland’s Development Policy Programme, a government decision-in-principle of 16 February 2012;¹¹ and (2) Finland’s *Government Report on Development Policy: One World, Common Future – Towards Sustainable Development*, a government report to the Finnish Parliament of 4 February 2016.¹² Both reports were mentioned and referenced in the NC7 (chapter 7), as were the principles underlying the allocation of climate finance, such as democratic ownership and accountability, a focus on the least developed countries, the sustainable management of natural resources, environmental protection and gender equality. Detailed project planning for funding is undertaken only after consulting with the recipient partner countries on their needs and priorities. During the review, Finland provided further information on the assumptions used to report information on finance. Support for sustainable development is the underlying assumption of Finland’s assistance to developing countries. When supporting sustainable development in developing countries, Finland strives to enhance climate sustainability by using opportunities for supporting adaptation as a necessary part of long-term development, and by facilitating low-emission development pathways for developing countries. Table 12 includes some of the information reported by Finland on its provision of financial support.

Table 12

Summary of information on provision of financial support by Finland in 2013–2016

(Millions of United States dollars)

Allocation channel of public financial support	Year of disbursement			
	2013	2014	2015	2016
Official development assistance	1 435.36	1 634.57	1 308.36	1 060.00

¹¹ <http://www.ulkoasiainministerio.fi/public/download.aspx?ID=97374&GUID={A708126D-F09D-4608-B420-C00E12E46385}>.

¹² <http://www.ulkoasiainministerio.fi/public/download.aspx?ID=155593&GUID={6E4F9704-3A6B-4207-977D-0FBC44E084AF}>.

<i>Allocation channel of public financial support</i>	<i>Year of disbursement</i>			
	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>
Climate-specific contributions through multilateral channels, including:	15.89	26.76	46.03	2.47
Global Environment Facility	5.91	8.18	4.45	2.47
Least Developed Countries Fund	7.46	7.96	1.77	0
Special Climate Change Fund	2.52	3.85	1.00	0
Adaptation Fund	0	6.63	0	0
Green Climate Fund	0	0	38.49	0
UNFCCC Trust Fund for Supplementary Activities	0	0.13	0.32	0
Multilateral institutions, including regional development banks	52.12	40.47	29.08	12.55
United Nations bodies	13.79	27.96	10.20	3.56
Other (Nordic Development Fund)	2.96	4.60	3.86	NA
Climate-specific contributions through bilateral, regional and other channels	42.15	58.94	42.73	29.02
Other	0	0	0	0

Sources: (1) Query Wizard for International Development Statistics, available at <http://stats.oecd.org/qwids/>; (2) BR3 CTF tables.

(b) Assessment of adherence to the reporting guidelines

100. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

2. Technology development and transfer, including information under Article 10 of the Kyoto Protocol

(a) Technical assessment of the reported information

101. Finland provided in the NC7 (chapter 7.4) information on steps, measures and activities related to technology transfer, access and deployment benefiting developing countries, including information on activities undertaken by the public and private sectors. Finland provided examples of support provided for the deployment and enhancement of the endogenous capacities and technologies of non-Annex I Parties.

102. The ERT noted that Finland reported on its PaMs as well as success and failure stories in relation to technology transfer, and in particular on measures taken to promote, facilitate and finance the transfer and deployment of climate-friendly technologies. Finland reported activities related to technology transfer, including success stories, in the NC7 (table 7.6). Finland provided an overview of renewable energy and forest-related projects financed during the reporting period. The Party also reported that it promotes business-to-business partnerships in environmentally sound technologies. Finland's development policy and development cooperation efforts promote an inclusive green economy through the establishment of public-private partnerships.

103. Finland also reported its activities for financing access by developing countries to technology transfer, both 'soft' and 'hard'. Soft technology (e.g. building capacity, creating information networks and enhancing training and research) activities undertaken by Finland include supporting the meteorological services of 14 Pacific small island developing States and institutionalizing environmentally, socially and economically sustainable forest management in the Lao People's Democratic Republic. 'Hard' technology (e.g. equipment for controlling GHG emissions and for adaptation measures) activities undertaken by Finland include grants to: Viet Nam for a waste disposal plant with landfill gas collection; Honduras, Kenya and Viet Nam to improve their electricity distribution networks; and the United

Republic of Tanzania and Uganda to efficiently increase forest areas. During the review, the Party explained that the differences between soft and hard technologies are not always clear, and some activities have characteristics of both. In developing countries, the private sector and entrepreneurs play a key role in economic development.

104. The ERT noted that Finland has several long-term partner countries, with which cooperation is based on country programmes that are prepared in consultation with the partners and that build on their national development plans. With regard to the provision of technology transfer support, Finland prioritized, inter alia, adaptation activities that focus on capacity-building and business development, investment preparation in relation to renewable energy and energy efficiency, hydro-meteorological services and the design of national forest monitoring systems and national forest inventories. Finland also provided support to regional programmes in Southern and Eastern Africa, the Andean region, Central America, Indonesia and the Mekong region.

105. Finland provided information on steps taken to promote, facilitate and finance the transfer of technology to developing countries and to build their capacity in order to facilitate implementation of Article 10 of the Kyoto Protocol.

(b) Assessment of adherence to the reporting guidelines

106. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

E. Vulnerability assessment, climate change impacts and adaptation measures

1. Technical assessment of the reported information

107. In the NC7 Finland provided the required information on the expected impacts of climate change in the country; the adaptation policies covering regional, sectoral and cross-sectoral vulnerabilities and considerations; and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. Finland provided a description of climate change vulnerability and impacts on biodiversity, water resources, agriculture, fisheries and game, reindeer husbandry, forestry, energy, land-use planning and building, industry and commerce, mining, transport and communications, tourism and recreation, insurance, health and cultural heritage, and highlighted the adaptation response actions taken and planned at different levels of government. Extreme events such as storm winds, heatwaves, heavy rain and snowfall, and freezing rain are predicted to increase in Finland.

108. There are ongoing studies of risks and vulnerabilities in various sectors, including water resources, forestry, biodiversity, agriculture, natural resources, communications and the building stock. Recent studies include: flood hazard and risk mapping; species modelling for butterflies and birds; analysis of changes in cultivated areas of crop species; analysis of vulnerability of natural resources; forecasting of extreme weather conditions; analysis of variability in and predictability of hydropower; and analysis of social vulnerability in the Helsinki metropolitan area.

109. Finland has given impetus to addressing adaptation matters with the adoption of NAP 2022, which aims to ensure that Finnish society has the capacity to manage risks and adapt to changes. The implementation of NAP 2022 is followed by a coordination group, comprising ministries, research institutes, regional authorities and experts, and implementation will be evaluated in 2018. A national project on proactive management of weather and climate risks, ELASTINEN, was completed and generated tools and information for climate risk assessment and management, cost-benefit analyses for urban areas and the energy, water and agriculture sectors, and cross-border effects. SIETO, a follow-up project on the assessment of weather and climate risks for planning and implementing actions in accordance with the risks identified during the first project, is ongoing.

110. Finland participates in several research projects that provided further direction to government agencies on enhancing preparedness for climate change. For instance, Finnish research institutions participated in the Nordic Centres of Excellence on Resilience and Societal Security and in European Joint Programming Initiatives on modelling and studying risks to agriculture and adaptation responses. Table 13 summarizes the information on vulnerability and adaptation to climate change presented in the NC7 of Finland.

Table 13

Summary of information on vulnerability and adaptation to climate change reported by Finland

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Agriculture and food security	<i>Vulnerability:</i> increased risks for disease and pest outbreaks; unevenness of precipitation is an increasing challenge to sustainable agricultural systems. <i>Adaptation:</i> development of risk profiles, emergency plans and warning systems for pests and diseases; diversification of crop rotations and development of soil cultivation methods.
Fisheries, game and reindeer husbandry	<i>Vulnerability:</i> decreased variety of fish species; transfer of diseases through invasive species such as wild boar. <i>Adaptation:</i> establishment of monitoring systems; management and restoration of habitats.
Forestry	<i>Vulnerability:</i> alien pests and pathogens, and damage by insects. <i>Adaptation:</i> pest and disease monitoring, with support services provided to forest owners and managers; modification of legislation to adjust timber removal deadlines before the occurrence of pests.
Energy	<i>Vulnerability:</i> extreme weather conditions damaging transmission lines; long periods of drought reducing hydropower production capacity. <i>Adaptation:</i> legal arrangements for design of the distribution network to prevent interruptions exceeding six hours; investments to move power lines from forests to roadsides.
Land-use and planning and buildings	<i>Vulnerability:</i> flood risks; extreme weather events; changing groundwater conditions. <i>Adaptation:</i> legislation on flood risk management and guidelines on national land use have been revised and reinforced in order to support adaptation objectives; information networks to enable flood risks and hazards to be communicated to the public.
Transport and communications	<i>Vulnerability:</i> increased wear and rutting of transportation networks; increased ice cover on roads and pedestrian ways; communication system damage owing to flooding, storms or icy rain. <i>Adaptation:</i> proactive planning of transport infrastructure; improvement of safety equipment; use of de-icing chemicals, and removal of trees posing risks for roads and railways; grounding of aerial cables.

111. Finland provided a detailed description of its international adaptation activities in the NC7. In its latest *Government Report on Development Policy*, published in February 2016,¹³ climate sustainability is one of the cross-cutting objectives of Finland's development policy and development cooperation. Finland supports the United Nations International Strategy for Disaster Reduction and the current level of funding is EUR 1 million per year. The Party also provided information on bilateral cooperation with developing countries, in particular adaptation activities and projects related to meteorology, agriculture, food security, forestry and water. For example, Finland implemented a project in Morocco to improve water resources and water biodiversity by protecting water sources and their environment, and related training events were organized for organizations, schools, decision makers and inhabitants of rural villages. Another example is a regional project in sub-Saharan Africa to disseminate and communicate the research results on climate change impacts on ecosystem services and food security to rural communities and professionals to strengthen their capacities to monitor and adapt to climate change.

¹³ <http://www.ulkoasiainministerio.fi/public/download.aspx?ID=155593&GUID={6E4F9704-3A6B-4207-977D-0FBC44E084AF}>.

2. Assessment of adherence to the reporting guidelines

112. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

F. Research and systematic observation

1. Technical assessment of the reported information

113. Finland provided information on its general policy and funding relating to research and systematic observation and both domestic and international activities, including contributions to the World Climate Programme, the International Geosphere–Biosphere Programme, the Global Climate Observing System and the IPCC. Finland also provided information on the identification of opportunities for and barriers to free and open international exchange of data and information and on action taken to overcome such barriers.

114. In 2015, Finland's total research and development expenditure was more than EUR 6.1 billion, or 2.9 per cent of GDP. The private sector accounted for 67 per cent of the expenditure, with 24 per cent by the higher education sector and 9 per cent by the public sector. Regarding funding, 53 per cent was from the private sector, 21 per cent from the public sector, 12 per cent from the higher education sector and 14 per cent from foreign funding.

115. Finland has implemented and planned international and domestic policies and programmes on climate change research, systematic observation and climate modelling that aim to advance capabilities to predict and observe the physical, chemical, biological and human components of the Earth's system over space and time. Finland coordinates several national research infrastructure investments and participates in European and other international infrastructure projects, such as the Aerosols, Clouds, and Trace Gases Research Infrastructure Network, the Arctic Monitoring and Assessment Programme, Global Atmosphere Watch, the Integrated Carbon Observation System, the World Climate Research Programme and World Weather Watch. Since the NC6, Finland has carried out a detailed vulnerability and risk assessment for agriculture, fisheries, forestry, game management and reindeer husbandry. There are also ongoing research studies on mitigation measures, such as developing chemical looping combustion technology for bio-carbon dioxide capture and storage, and developing a combined forestry and energy model that aims to assist Finland in transitioning to a low-carbon society.

116. In terms of activities related to systematic observation, Finland reported on national plans, programmes and support for ground- and space-based climate observing systems, including satellite and non-satellite climate observation. Finland also reported on challenges related to the maintenance of a consistent and comprehensive observation system. Finland participates in terrestrial, ocean and atmospheric observation systems, which are providing data for research on climate change impacts, adaptation and mitigation. The data sets produced are open to public use via an online service in operation since 2013.

117. The NC7 reflects actions taken to support capacity-building and the establishment and maintenance of observation systems and related data and monitoring systems in developing countries. Finland provided funding for scientists from developing countries working on global climate change research.

118. The Finnish Meteorological Institute has engaged with the Ministry for Foreign Affairs, the EU and the World Bank to develop the institutional capacities of national meteorological and hydrological services in developing countries. There are several ongoing activities in the small island developing States and countries in South-Eastern Europe, as well as in Azerbaijan, Bahamas, Bhutan, Chile, Jamaica, Kyrgyzstan, Nepal, South Sudan, Sri Lanka, Sudan, Tajikistan and the former Yugoslav Republic of Macedonia. In addition to these, the Finnish Meteorological Institute is planning new projects in Bhutan, India, Kenya, Myanmar, Nepal and Viet Nam, which will focus on institutional capacity-building of meteorological and hydrological services, including observation, services, data management

and strategic planning. The Ministry for Foreign Affairs supports higher education cooperation in developing countries. There are 15 projects implemented in Cambodia, Egypt, Indonesia, Kenya, Lao People's Democratic Republic, Mozambique, Namibia, Nigeria, South Africa, State of Palestine, Sudan, Uganda, United Republic of Tanzania, Viet Nam and Zambia, in fields such as agriculture, education sciences, natural and medical sciences, engineering, communication, and information and communications technology. There are 23 projects approved for the period 2013–2015 targeting training on landscape planning or curricula development for energy efficiency and renewable energy. There are an additional 20 projects approved for the period 2017–2020 directly targeting climate change subjects. Furthermore, the Finnish Natural Resources Institute has implemented activities focusing on resources assessment and the prediction of forest resources in Cambodia, Lao People's Democratic Republic, Mongolia, Mozambique, Myanmar and Thailand as well as in the United Republic of Tanzania and other African countries.

119. The ERT commends Finland for its wide range of systematic observation activities, its global contribution and its provision of support to developing countries.

2. Assessment of adherence to the reporting guidelines

120. The ERT assessed the information reported in the NC7 of Finland and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

G. Education, training and public awareness

1. Technical assessment of the reported information

121. In the NC7 Finland provided information on its actions relating to education, training and public awareness at the domestic and international level. The Party provided information on the general policy on education, training and public awareness, primary, secondary and higher education, public information campaigns, training programmes, education materials, resource or information centres, the involvement of the public and non-governmental organizations and its participation in international activities.

122. In Finland, climate change is embedded in educational and public awareness policies. For instance, the National Energy and Climate Strategy for 2030 (adopted in 2016) states that citizens must be provided with up-to-date information on climate and energy policies, and the Medium-term Climate Change Policy Plan (September 2017) mentions knowledge-based and educational needs for furthering climate change policy. Finland also implements the Doha work programme on Article 6 of the Convention to engage all stakeholders in education, training, public awareness, public participation, public access to information and international cooperation.

123. Education on climate change and sustainable development has been included in the curricula for primary and secondary education; furthermore, an online, free website, Teacher's Climate Guide,¹⁴ presents climate change from the perspective of each subject taught at school. At the higher education level, Finland includes climate change under environment, chemistry and energy programmes.

124. In Finland, many higher education institutions and research institutions provide international training and cooperate with research institutions, higher education institutions and governmental institutions in developing countries to support institutional development. The number of training activities related to development cooperation has increased in recent years, partly because of the newly initiated and nationally funded development cooperation programmes, such as the Higher Education Institutions Institutional Cooperation Instrument and the North–South–South Higher Education Institution Network Programme. Both programmes include projects related to climate change and sustainable development that are carried out in, for example, Ghana and other countries in West Africa, India, Kenya, Uganda and Venezuela. In addition, universities in Finland run programmes on climate change,

¹⁴ <https://teachers-climate-guide.fi/>.

forests and natural resources in partnership with universities in Brazil, China, Europe, Ghana, North America and the Russian Federation, or train experts from developing countries, such as China, Sudan and Thailand.

125. Communication on climate change is handled by several ministries, research organization communities and civil society actors. Since 2010, the Ministry of Environment has coordinated cooperation on climate communication through the Steering Group for Climate Communications, which consists of all relevant ministries as well as research organizations, the Association of Finnish Local and Regional Authorities, funding agencies and the think tank Demos Helsinki. The steering group shares best practices and expertise, publishes an online magazine, *Klimaatti*,¹⁵ and produces infographics and visual statistics to raise awareness.

126. As a result of Finland’s extensive national cooperation on climate change, a web portal, Climate Guide,¹⁶ was launched in 2011 and currently features approximately 250 articles, checklists, solutions for adaptation and mitigation, learning modules, observational and modelled data, mapping tools, interactive visualizations and videos. The portal targets the general public, decision makers and all stakeholders, including municipalities, and contributed to more than one third of Finland’s municipalities having a climate change strategy or being in the process of preparing one. In the Carbon Neutral Municipalities (HINKU) project, the 36 municipalities involved (12.5 per cent of the total number of municipalities) are committed to reducing their emissions by 80 per cent in 2030 compared with the 2007 level. Another example at the local level is the Finnish Sustainable Communities (FISU) network, where the municipalities involved are committed to becoming carbon neutral and waste free by 2050 or earlier.

127. Raising awareness on energy efficiency is the responsibility of the Ministry of Economic Affairs and Employment and the Ministry of Environment. National Energy Awareness Week has been successfully run since 1997, targeting companies, organizations, schools.

128. In Finland, media coverage on climate change is extensive, and non-governmental organizations have several campaigns and activities on climate change; as a result, Finns are well informed of climate change issues.

2. Assessment of adherence to the reporting guidelines

129. The ERT assessed the information reported in the NC7 of Finland and identified an issue relating to completeness. The finding is described in table 14.

Table 14
Findings on education, training and public awareness from the review of the seventh national communication of Finland

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
1	Reporting requirement specified in paragraph 65 Issue type: completeness Assessment: encouragement	The ERT noted that Finland did not report in its NC7 on the extent of public participation in the preparation or domestic review of the NC. During the review, Finland provided this information. The ERT encourages Finland to include in its next NC information on the extent of public participation in the preparation or domestic review of the NC.

Notes: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

¹⁵ www.klimaatti.fi (in Finnish).

¹⁶ <https://ilmasto-opas.fi/en/>.

III. Conclusions and recommendations

130. The ERT conducted a technical review of the information reported in the NC7 of Finland in accordance with the UNFCCC reporting guidelines on NCs. The ERT concludes that the reported information mostly adheres to the UNFCCC reporting guidelines on NCs and that the NC7 provides an overview of the national climate policy of Finland.

131. The information provided in the NC7 includes all elements of the supplementary information under Article 7 of the Kyoto Protocol. 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 was provided by Finland in its 2017 annual submission.

132. Finland's total GHG emissions including indirect CO₂ emissions and excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 22.1 per cent below its 1990 level, whereas total GHG emissions including indirect CO₂ emissions and including LULUCF were 49.6 per cent below its 1990 level in 2015. Emission decreases were driven by: the increases in energy efficiency and biomass fuel consumption, which resulted in a decrease in fuel combustion in all energy subsectors, including transport; the import of electricity; the decrease in emissions from agriculture due to reduced use of fertilizers and improved manure management; the decrease in emissions from waste due to increased recycling and reduction of organic waste in landfills; and the increase in removals from the LULUCF sector due to increasing growing stock. Those factors outweighed the increase in emissions from IPPU, which were mainly a result of the increase in HFC emissions.

133. Finland's main policy frameworks relating to energy and climate change are the National Energy and Climate Strategy for 2030 and the Medium-term Climate Change Policy Plan. Both documents take into account the EU ETS and the ESD. The mitigation actions with the most significant mitigation impact are related to the energy sector and include the EU ETS, increasing the share of renewable energy sources and implementing energy conservation measures.

134. The GHG emission projections provided by Finland include those under the WEM and WAM scenarios. In the two scenarios, emissions are projected to be 21.4 and 21.6 per cent below the 1990 level in 2020, respectively. On the basis of the reported information, the ERT concludes that Finland expects to contribute to the EU 2020 target of a 20 per cent emission reduction compared with the 1990 level under the WEM and WAM scenarios.

135. The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its 28 member States to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020. Under the ESD, Finland has a target of reducing its emissions by 16 per cent below the 2005 level by 2020. Finland reported on its progress in achieving the AEAs for 2013–2016 and the revised AEAs for 2017–2020. According to the revision, Finland's AEAs (its national emission target for non-ETS sectors) change linearly from 31,776,522 t CO₂ eq in 2013 to 28,513,533 t CO₂ eq for 2020. The ESD projections for 2020 are 1.0 per cent above and 0.05 per cent below the AEA for 2020 under the WEM and WAM scenarios, respectively. On the basis of the reported information, the ERT concludes that Finland expects to meet its target for non-ETS sectors under the WAM scenario.

136. The NC7 contains information on how the Party's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. Finland does not plan to make use of the Kyoto Protocol mechanisms to meet its Kyoto Protocol target.

137. Finland continued to provide climate financing to developing countries in line with its climate finance programmes, such as the Development Policy Programme and the *Government Report on Development Policy: One World, Common Future – Towards Sustainable Development* (2016). The overall financial support for climate projects has increased since the NC6, despite the decrease in 2016. Its public financial support in 2015 and 2016 totalled USD 128.0 million and USD 47.6 million per year, respectively. For those years, Finland's support provided for mitigation action was lower than its support provided for adaptation.

138. Finland does not track technology development and transfer in its climate action, but technology development and transfer forms an integral part of many activities related to climate change mitigation and adaptation, encompassing both ‘soft’ technology (e.g. building capacity, creating information networks and enhancing training and research) and ‘hard’ technology (e.g. equipment to control GHG emissions and for adaptation measures). The private sector and entrepreneurs play a key role in providing this support. Finland reported on success and failure stories in relation to technology transfer.

139. Finland provided comprehensive information on its continuous, diverse and extensive work on vulnerability and adaptation across different sectors, including some country-specific sectors (reindeer husbandry), and at different levels of government. NAP 2022 and its implementation measures and the ELASTINEN and SIETO projects are the main instruments to address vulnerability and adaptation and to increase awareness.

140. Finland actively participates in climate change research, systematic observation and climate modelling activities in the EU and internationally. Finland has also carried out several national plans and programmes to support climate observing systems, including ocean and terrestrial observing systems at the national, regional and global level. Finland is also involved in research on mitigation (e.g. the role of forests in energy systems, an area in which it has considerable expertise).

141. Finland reported on its multiple activities on education, training and public awareness, and how these are included in general education and public awareness policies. Finland also reported on the international cooperation and capacity-building activities of its higher education institutions and research institutions.

142. During the review, the ERT formulated the following recommendation for Finland to improve its adherence to the UNFCCC reporting guidelines on NCs and its reporting of supplementary information under the Kyoto Protocol:¹⁷ improving the transparency of its reporting by providing more detailed information on the factors and activities for all sectors in the projections of GHG emission (see table 10, issue 1).

IV. Questions of implementation

143. During the review the ERT assessed the NC7, 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, transparency and adherence to the UNFCCC reporting guidelines on NCs. No questions of implementation were raised by the ERT during the review.

¹⁷ The recommendations are given in full in the relevant sections of this report.

Annex

Documents and information used during the review

A. Reference documents

2017 GHG inventory submission of Finland. Available at

<https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/submissions/national-inventory-submissions-2017>.

“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”. Annex to decision 15/CMP.1. Available at

<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf>.

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Annex III to decision 3/CMP.11. Available at

<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf>.

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

“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”. Annex to decision 13/CP.20. Available at

<http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf>.

NC7 of Finland. Available at

http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/952371_finland-nc7-1-fi_nc7_final.pdf.

Report on the individual review of the annual submission of Finland submitted in 2016.

FCCC/ARR/2016/FIN. Available at

<https://unfccc.int/sites/default/files/resource/docs/2017/arr/fin.pdf>.

Report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Finland. FCCC/IRR/2016/FIN.

Available at <https://unfccc.int/sites/default/files/resource/docs/2017/irr/fin.pdf>.

Report on the technical review of the sixth national communication of Finland.

FCCC/IDR.6/FIN. Available at

<https://unfccc.int/sites/default/files/resource/docs/2014/idr/fin06.pdf>.

Revisions to the guidelines for review under Article 8 of the Kyoto Protocol. Annex I to decision 4/CMP.11. Available at

<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf>.

Other

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl>.

B. Additional information provided by the Party

Responses to questions during the review were received from Finnish experts from various ministries, research institutes and Statistics Finland, including additional material. The following documents¹ were provided by Finland:

Government Report on the National Energy and Climate Strategy for 2030. Available at <http://tem.fi/documents/1410877/2769658/Government+report+on+the+National+Energy+and+Climate+Strategy+for+2030/0bb2a7be-d3c2-4149-a4c2-78449ceb1976/Government+report+on+the+National+Energy+and+Climate+Strategy+for+2030.pdf>.

¹ Reproduced as received from the Party.