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

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 Sweden, 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

AEA	annual emission allocation
AR4	Fourth Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
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
EU	European Union
EU ETS	European Union Emissions Trading System
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
IATI	International Aid Transparency
ICAO	International Civil Aviation Organization
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
NA	not applicable
NC	national communication
NE	not estimated
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
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_2O	nitrous oxide
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
OECD DAC	OECD Development Assistance Committee
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"
SEK	Swedish krona
SEPA	Swedish Environmental Protection Agency
SF_6	sulfur hexafluoride
SIDA	Swedish International Development Cooperation Agency
UNFCCC	United Nations Framework Convention on Climate Change
UNFCCC reporting guidelines on BRs	"UNFCCC biennial reporting guidelines for developed country Parties"

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 Sweden. 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 Sweden, which provided comments that were considered and incorporated, with revisions, into this final version of the report.

3. The review was conducted from 17 to 22 September 2018 in Stockholm by the following team of nominated experts from the UNFCCC roster of experts: Mr. Fernando Farias (Chile), Mr. Zeljko Juric (Croatia), Ms. Irini Nikolaou (Greece), Mr. Stephen Treacy (Ireland) and Mr. Vute Wangwacharakul (Thailand). Mr. Farias and Mr. Juric were the lead reviewers. The review was coordinated by Ms. Kirsten Macey and Mr. Davor Vesligaj (UNFCCC secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the NC7 of Sweden 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 22 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 Sweden in its NC7, including the supplementary information under the Kyoto Protocol, adheres to the UNFCCC reporting guidelines on NCs.

[1] At the time of the publication of this report, Sweden had submitted its instrument of acceptance of the Doha Amendment, but 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 Sweden in its seventh national communication, including supplementary information under the Kyoto Protocol

Section of NC	*Completeness*	*Transparency*	*Reference to description of recommendations*	*Supplementary information under the Kyoto Protocol*	*Completeness*	*Transparency*	*Reference to description of recommendations*
Executive summary	Complete	Transparent	NA	National system	Complete	Transparent	NA
National circumstances	Complete	Transparent	NA	National registry	Complete	Transparent	NA
GHG inventory	Complete	Transparent	NA	Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	NA
PaMs	Complete	Transparent	NA	PaMs in accordance with Article 2	Complete	Transparent	NA
Projections and the total effect of PaMs	Mostly complete	Mostly transparent	Issues 1, 2 and 3 in table 12	Domestic and regional programmes and/or arrangements and procedures	Complete	Transparent	NA
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent	NA	Information under Article 10	Complete	Transparent	NA
Financial resources and transfer of technology	Mostly complete	Mostly transparent	Issues 1 and 2 in table 14 and issues 1, 3 and 4 in table 15	Financial resources	Complete	Transparent	NA
Research and systematic observation	Complete	Transparent	NA	Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	NA
Education, training and public awareness	Complete	Transparent	NA				

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chapter III below. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

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 2018 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 Sweden

Supplementary information	*Reference to the section of NC7*
National registry	Annex 4
National system	Annex 3
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Chapter 4.3
PaMs in accordance with Article 2	Chapter 4.2
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Chapter 4.1
Information under Article 10	Annex 3, chapters 4.2, 6.3, 7.6, 7.7, 8 and 9.7
Financial resources	Chapters 7.3–7.7
Minimization of adverse impacts in accordance with Article 3, paragraph 14	Chapter 4.2.10

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 Sweden in its NC7 explain the relationship between its historic 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 trends, geography and land use, climate and climate change, economic developments, energy, the buildings sector, industry, transport, waste, agriculture and forestry.

9. Sweden is a parliamentary, representative democracy that is ruled by a government headed by a prime minister. Public administration is organized at the central, regional and local level with 21 county administrative boards and 290 municipalities. County administrative boards and municipalities play a key role in climate policy, particularly regarding land use, energy management, transport and waste. Municipalities are autonomous

and elected by their citizens and set climate targets and action plans to both mitigate and adapt to climate change.

10. The population of Sweden has been growing consistently by 0.6 per cent each year, and at the end of 2016 it had 10 million inhabitants; between 2013 and 2016 there was a 2.7 per cent increase in the number of apartments and a 3.9 per cent increase in the number of single-family houses. Energy use in residential and service-sector buildings, where energy for heating predominates, decreased between 1990 and 2015 even after weather correction of energy use, because of a transition from oil-fuelled heating of homes and commercial and institutional premises to heat pumps and district heating. Despite increases in population growth, there has been a decrease in overall GHG emissions. This shows a significant and progressive decoupling between the number of inhabitants of Sweden and its GHG emissions.

11. Sweden's energy system is based on domestic sources of renewable energy such as hydro, wind and biofuels, as well as imports of nuclear fuel for electricity production and oil and natural gas for transport. In 2015, hydropower accounted for 47 per cent of total electricity production, followed by nuclear power (34 per cent) and wind power (10 per cent). Biofuels and fossil-based production made up the remaining 9 per cent. Domestic transport, dominated by road traffic, has had a continuous and rapid increase in terms of kilometres travelled in recent years, which has been partially offset in terms of emissions by more energy-efficient cars and increased use of renewable fuels, resulting in a decrease in emissions per passenger-kilometre.

12. In June 2017, the Swedish Parliament approved a new National Climate Policy Framework for the country (bill 2016/17:146). This framework consists of a Climate Act, new national climate targets and a climate policy council. The Climate Policy Framework is the most important climate reform in Sweden's history and it is expected to provide further stability in future climate policy because it sets long-term conditions for the business sector and society.

13. The ERT noted that during the period 1990–2016 Sweden's GDP per capita increased by 50.1 per cent, while GHG emissions per GDP unit and GHG emissions per capita decreased by 57.4 and 36.1 per cent, respectively. Even though there has been sustained economic growth of Sweden in recent years, other parameters such as industrial energy use show a lower growth rate, indicating a progressive decoupling between the economic growth and GHG emissions of Sweden. Table 3 illustrates the national circumstances of Sweden by providing some indicators relevant to emissions and removals.

Table 3
Indicators relevant to greenhouse gas emissions and removals for Sweden for the period 1990–2016

						Change (%)	
Indicator	*1990*	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*
GDP per capita (thousands 2011 USD using purchasing power parity)	30.93	36.85	42.94	45.49	46.44	50.1	2.1
GHG emissions without LULUCF per capita (t CO_2 eq)	8.36	7.74	6.87	5.49	5.34	–36.1	–2.6
GHG emissions without LULUCF per GDP unit (kg CO_2 eq per 2011 USD using purchasing power parity)	0.27	0.21	0.16	0.12	0.12	–57.4	–4.6

Sources: (1) GHG emission data: Sweden's 2018 GHG inventory submission, version 3; (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

14. The ERT assessed the information reported in the NC7 of Sweden and recognized that the reporting on national circumstances relevant to GHG emissions and removals 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 inventory arrangements, emissions, removals and trends

(a) Technical assessment of the reported information

15. Total GHG emissions[2] excluding emissions and removals from LULUCF decreased by 26 per cent (18,622.23 kt CO_2 eq) between 1990 and 2016, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 72.1 per cent (25,665.99 kt CO_2 eq) over the same period. Table 4 illustrates the emission trends by sector and by gas for Sweden.

Table 4
Greenhouse gas emissions by sector and by gas for Sweden for the period 1990–2016

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
Sector									
1. Energy	53 022.53	50 005.63	48 126.47	38 979.88	37 790.01	–28.7	–3.1	74.1	71.4
A1. Energy industries	9 951.09	8 948.45	13 129.05	9 011.92	9 200.12	–7.5	2.1	13.9	17.4
A2. Manufacturing industries and construction	11 343.96	11 891.28	9 270.11	7 643.57	7 581.50	–33.2	–0.8	15.9	14.3
A3. Transport	19 106.92	19 766.33	20 339.74	17 850.87	16 890.93	–11.6	–5.4	26.7	31.9
A4. and A5. Other	12 231.12	8 931.67	4 440.32	3 538.92	3 377.64	–72.4	–4.6	17.1	6.4
B. Fugitive emissions from fuels	389.44	467.90	947.25	934.60	739.81	90.0	–20.8	0.5	1.4
C. CO_2 transport and storage	0.00	0.00	0.00	0.00	0.00	NA	NA	NA	NA
2. IPPU	7 119.69	7 656.31	7 547.70	6 508.51	6 895.20	–3.2	5.9	10.0	13.0
3. Agriculture	7 630.42	7 764.60	6 813.30	6 864.11	6 879.16	–9.8	0.2	10.7	13.0
4. LULUCF	–35 925.55	–37 983.34	–44 641.12	–44 865.08	–42 969.31	19.6	–4.2	NA	NA
5. Waste	3 742.30	3 222.44	1 924.23	1 402.34	1 328.34	–64.5	–5.3	5.2	2.5
6. Other	0.00	0.00	0.00	0.00	0.00	NA	NA	NA	NA
Gas[a]									
CO_2	57 506.34	54 724.98	52 927.27	43 385.56	42 568.02	–26.0	–1.9	80.4	80.5
CH_4	7 601.84	7 017.55	5 440.75	4 818.24	4 745.82	–37.6	–1.5	10.6	9.0
N_2O	5 730.38	5 690.65	4 802.61	4 566.18	4 605.87	–19.6	0.9	8.0	8.7
HFCs	5.87	721.08	989.81	896.59	882.74	1 492.9	–1.5	0.0	1.7
PFCs	568.78	375.93	187.79	35.13	31.18	–94.5	–11.3	0.8	0.1
SF_6	101.73	118.78	63.46	53.14	59.09	–41.9	11.2	0.1	0.1
NF_3	NO	NO	NO	NO	NO	–	–	–	–
Total GHG emissions without LULUCF	**71 514.95**	**68 648.97**	**64 411.70**	**53 754.84**	**52 892.72**	**–26.0**	**–1.6**	**100.0**	**100.0**

[2] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified. Values in this paragraph are calculated based on the 2018 annual submission, version 3.

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
Total GHG emissions with LULUCF	**35 589.40**	**30 665.63**	**19 770.58**	**8 889.76**	**9 923.41**	**–72.1**	**11.6**	**NA**	**NA**

Source: GHG emission data: Sweden's 2018 annual submission, version 3.

[a] Emissions by gas without LULUCF and without indirect CO_2.

16. The decrease in total emissions was driven mainly by a transition from fossil-fuel use (mainly oil-fuelled heating) for the heating of residential, commercial and institutional premises to heat pumps and district heating. Other significant drivers have been a switch from fossil-fuel use to biofuels and electricity in the manufacturing combustion sector and reduced landfill gas emissions from the waste sector. Long-term ambitious policies, such as energy and carbon taxes that have existed since the early 1990s, have also driven emission reductions. The Swedish Forestry Act also drives a strong LULUCF sector because it has two overarching, equal objectives: to support forest production through effectively and responsibly producing sustainable yields; and to protect the environment.

17. Between 1990 and 2016, GHG emissions from the energy sector decreased by 28.7 per cent (15,232.53 kt CO_2 eq), owing mainly to oil being replaced by heat pumps and district heating for the heating of commercial, residential and institutional premises. This is shown in the trend in GHG emissions from the energy sector (other), which includes commercial and residential emissions that decreased by 72.4 per cent or 8,853.48 kt CO_2 eq as a result. Emissions from the manufacturing industries and construction sector decreased by 33.2 per cent or 3,762.47 kt CO_2 eq due largely to a similar replacement of oil by electricity and biomass. The trend in GHG emissions from fuel combustion in the transport sector also showed a notable decrease (11.6 per cent or 2,215.98 kt CO_2 eq) and this was driven by an increased share of renewable fuels and more fuel-efficient vehicles. In the energy industries sector, emissions decreased by 7.5 per cent or 750.97 kt CO_2 eq owing to a decrease in coal, oil and gas use, but it should be noted that most of Sweden's electricity is generated by nuclear or renewable energy. Fluctuations in fossil-fuel use in the energy industries sector occur predominantly because of weather effects, with emissions in 2016 from the sector being 2.1 per cent higher than in 2015 due to a colder winter and the consequential need for more heating.

18. Between 1990 and 2016, GHG emissions from the IPPU sector decreased by 3.2 per cent (224.49 kt CO_2 eq). Decreases in emissions from the metal and chemical industries were almost offset by increased emissions from products used as substitutes for ozone-depleting substances. Between 1990 and 2016, GHG emissions from the agriculture sector decreased by 9.8 per cent (751.26 kt CO_2 eq), owing mainly to a decline in livestock numbers (particularly dairy cows) and a decrease in emissions from agricultural soils due to reduced fertilizer use. Agricultural emissions appear to have plateaued in recent years, with emissions from the sector increasing slightly since 2012. The LULUCF sector was a net sink of 42,969.31 kt CO_2 eq in Sweden in 2016; net GHG removals have increased by 7,043.76 kt CO_2 eq since 1990. The trend was mainly driven by carbon stock changes in forest land (58 per cent of Sweden's land area) followed by harvested wood product removals. Between 1990 and 2016, GHG emissions from the waste sector decreased by 64.5 per cent (2,413.96 kt CO_2 eq), owing mainly to a reduction in the disposal of biodegradable waste to landfill. This reduction was driven by bans on the disposal of combustible and organic waste in landfills, introduced in 2002 and 2005, respectively.

19. The decrease in total emissions between 1990 and 2016 is attributable mainly to a decrease of 26 per cent (14,938.32 kt CO_2 eq) in CO_2 emissions and a decrease of 37.6 per cent (2,856.02 kt CO_2 eq) in CH_4 emissions. The decrease in CO_2 emissions occurred largely in the energy sector, as described in paragraph 17 above, with the reduction in CH_4 emissions occurring largely in the waste sector, as described in paragraph 18 above. There was also a significant decrease of 19.6 per cent (1,124.52 kt CO_2 eq) in N_2O emissions driven mainly by decreased emissions from the IPPU sector, where emissions arise mainly from the production of nitric acid. Between 1990 and 2016, emissions of HFCs increased by 14,926.9 per cent, from a low level of just 5.87 kt CO_2 eq to 882.74 kt CO_2 eq. This is attributable

mainly to increased use of HFCs as refrigerants and as a substitute for ozone-depleting substances. Emissions of PFCs, largely from aluminium production, decreased by 94.5 per cent (537.60 kt CO_2 eq) between 1990 and 2016, while emissions of SF_6 decreased by 41.9 per cent (42.63 kt CO_2 eq).

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

21. To reflect the most recently available data, Sweden's 2018 annual inventory submission (version 3) has been used as the basis for discussion in chapter II.A of this review report. The ERT noted that the 2018 inventory information had not undergone a technical review at the time of the review week and is different from the 2017 inventory submission used by Sweden for the NC7. The ERT also noted that there are no substantive differences between trends presented in the 2018 GHG inventory and the 2017 inventory reported in the NC7. Total GHG emissions excluding LULUCF, as reported in the NC7, decreased by 25.2 per cent between 1990 and 2015, while according to the 2018 annual inventory submission they decreased by 26 per cent between 1990 and 2016.

(b) Assessment of adherence to the reporting guidelines

22. The ERT assessed the information reported in the NC7 of Sweden 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. National system for the estimation of anthropogenic emissions by sources and removals by sinks

(a) Technical assessment of the reported information

23. Sweden provided in the NC7 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, as well as those associated with decision 24/CP.19, and the EU Monitoring Mechanism Regulation (No. 525/2013). The NC7 also contains a reference to the description of the national system provided in the report mandated by decision 2/CMP.8, submitted in 2017[3] and in the NIR of the 2018 annual submission. The national system of Sweden has been in operation since 2006.

24. The ERT noted that the organizational changes to the national system reported in the NC7, which relate mainly to the introduction of the Ordinance on Climate Reporting established in December 2014 (2014:1434) did not affect the institutional arrangements and functioning of the national system. The introduction of the Ordinance on Climate Reporting in Sweden reflects updated information as indicated by Sweden in its NC6.

(b) Assessment of adherence to the reporting guidelines

25. The ERT assessed the information reported in the NC7 of Sweden 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

26. In the NC7 Sweden 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

[3] Sweden's report to facilitate the calculation of the assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol for the second commitment period (2013–2020), available at http://unfccc.int/national_reports/initial_reports_under_the_kyoto_protocol/second_commitment_period_2013-2020/items/9499.php.

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 2017 annual submission of Sweden.

(b) Assessment of adherence to the reporting guidelines

27. The ERT assessed the information reported in the NC7 of Sweden 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

28. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, Sweden committed to contributing to the joint EU effort to reduce GHG emissions by 20 per cent below the base-year level.

29. Sweden reported in its NC7 that no legislation or administrative procedures have been introduced or enforced specifically related to the implementation of the Kyoto Protocol. Sweden reported that the central government administration and government inquiries are used to fulfil commitments under the Convention and its Kyoto Protocol.

30. In this regard, the Swedish Parliament, as a national legislator, approves and legislates political decisions related to climate policies, strategies and actions, and the Government and its agencies are responsible for their implementation, monitoring, evaluation and reporting. County administrative boards and municipalities play a key role in climate policy, because they shape and implement plans, for example regarding land use, energy management, transport and waste.

31. At the national level, the Swedish Environmental Protection Agency is responsible for the environmental quality objective "Reduced Climate Impact" and for Sweden's regular climate reporting to the UNFCCC and the EU. SIDA, the Swedish Transport Administration, Swedish Transport Agency, Swedish Forest Agency, Swedish Board of Agriculture and Swedish National Board of Housing, Building and Planning also have key roles in developing and implementing Sweden's climate strategy.

32. Sweden 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.

33. Sweden reported in its NC7 that its current forest policy puts great emphasis on using forest sustainably as a natural resource and on conserving biodiversity. Under the Forestry Act, forests are managed and harvested to contribute to sustainable forestry. The provisions of environmental legislation on nature reserves and habitat protection areas provide long-term formal protection for forest areas of high biological value, and the Forestry Act stipulates that forests must be managed using measures that meet good environmental standards. There has therefore been no need for supplementary legislation to conserve biodiversity or to ensure sustainable use of natural resources as a consequence of the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

(b) Assessment of adherence to the reporting guidelines

34. The ERT assessed the information reported in the NC7 of Sweden and recognized that the reporting is complete, transparent and adhering to the reporting guidelines for

supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

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

(a) Technical assessment of the reported information

35. Sweden 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. Sweden 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.

36. Sweden reported on its progress in the achievement of its target and mitigation actions implemented since its NC7. Sweden also provided information on changes 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. There have been no changes since the previous NC6.

37. Sweden's use of economic taxes since the early 1990s have made the most contribution to its emission reduction efforts. These have often been supplemented with other instruments such as technology procurement, information and investment grants. Legislation also plays a role in reducing GHG emissions through prohibitions, setting standards or through urban planning. Sweden also emphasized the importance of early investment such as expanding district heating networks, public transport systems and carbon-free electricity which has helped to reduce emissions. Sweden also highlighted that EU-wide policy instruments are growing in importance. Sweden periodically updates its PaMs to reduce greater levels of emissions and on the PaMs that have been discontinued since the previous submission. During the review week, Sweden also outlined that two programmes addressing transport (the super-green car rebate and the tax exemption for environmentally friendly vehicles) were being replaced by new programmes, such as a bonus-malus system for new light vehicles that is part of the 2018 budget cycle.

38. Some PaMs are deferred to the regional and local level. Sweden outlined its local climate investment programme (Climate Leap) introduced in 2015, which provides financial support for local and regional investment to mitigate climate change across all sectors, except those included in the EU ETS. Applicants compete for funding based on the climate mitigation effect of each investment. Sweden also provides climate and energy advice locally through the country's climate and energy advisers stationed in each municipality. The advisers provide citizens with information free of charge concerning heating, energy costs, energy efficiency, transport and climate. Municipalities are also eligible to apply for grants to cover part of investment costs for public transport. The investment should be coupled with other actions aimed at increasing the long-term sustainability of urban areas and the transport system. Furthermore, regional public transport agencies are eligible to apply for an electrical bus subsidy for public transportation from the Swedish Energy Agency.

39. 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 CO_2 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.

40. 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 N_2O emissions from chemical industries, PFC emissions from

aluminium production and CO_2 emissions from some industrial processes which were not covered in the earlier phases of the EU ETS (since 2013).

41. 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 includes binding annual targets for each member State for 2013–2020, which are underpinned by Sweden's national policy.

42. Sweden introduced national-level policies to achieve its targets under the ESD and domestic emission reduction targets. The key policy reported is the new National Climate Policy Framework, adopted by the Swedish Parliament in June 2017 (Government bill 2016/17:146). The Framework consists of a Climate Act, new national climate targets and a climate policy council.

43. The Climate Act places responsibility on both the current and future governments for pursuing a climate policy that is based on the national climate target of zero net emissions by 2045 and negative emissions thereafter. Sweden aims to achieve this by reducing GHG emissions by at least 85 per cent by 2045 compared with 1990 levels. Supplementary measures may count towards achieving zero net emissions. The target includes a requirement that, by 2030, non-ETS GHG emissions in Sweden should be at least 63 per cent lower than emissions in 1990 and should be at least 75 per cent lower by 2040. To achieve these targets, no more than 8 and 2 percentage points, respectively, of the emission reduction may be realized through supplementary measures. GHG emissions from domestic transport should be reduced by at least 70 per cent by 2030 compared with 2010 levels.

44. Sweden has introduced a range of cross-sectoral measures to reduce GHG emissions, with an emphasis on general economic instruments, supplemented with targeted climate measures. The main cross-sectoral measures are the energy and carbon dioxide taxes in the stationary and mobile energy sectors. An energy tax was introduced for petrol and diesel in 1924 and 1937, respectively, and was increased in two stages in 2011 and 2013. In 2016, the energy tax was increased again. The energy tax, based on the fossil carbon content in the fuel, was introduced in 1991 and has been increased incrementally since it was first implemented from SEK 0.25/kg CO_2 in 1991 to SEK 1.13/kg CO_2 in 2017. Both taxes are adjusted to changes in the consumer price index.

45. SEPA administers grants for local and regional investments in all non-ETS sectors to cut GHG emissions through the local climate investment programme (Climate Leap). The total effect of these investments is estimated to be over 10 Mt CO_2 eq during the technical lifespan of the investments. Other cross-sectoral PaMs are the environmental code and planning legislation, the Fossil Free Sweden initiative, climate and energy advice, and research and development measures.

46. Sweden highlighted the domestic mitigation actions that are under development, such as an increased budget for Climate Leap; increased energy tax for combined heat and power plants within the EU ETS; support to municipalities to facilitate wind farms; increased financial support for solar power from SEK 1.39 billion for the period 2016–2019 to SEK 3.34 billion for the period 2017–2020; introduction of the Industrial Leap reform; tax on air travel; an emission reduction obligation (fuel change); the bonus-malus system for light vehicles; an electric vehicle premium; charge at home grant; and eco-bonus system for heavy transport. Planned national-level measures provide a foundation for significant additional actions for Sweden to achieve its 2020 emission reduction target. Table 5 provides a summary of the reported information on the PaMs of Sweden.

Table 5
Summary of information on policies and measures reported by Sweden

Sector	*Key PaMs*	*Estimate of mitigation impact by 2020 (kt CO_2 eq)*	*Estimate of mitigation impact by 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	EU ETS	NE	NE
	Energy tax	NE	NE
	Carbon dioxide tax	NE	NE
	Fossil Free Sweden initiative	NE	NE
Energy			
Production of electricity and district heating	Energy tax, carbon dioxide tax, electricity certificates system, EU ETS	19	14
	Initiatives for wind power	NE	NE
	Support for solar power	NE	NE
Residential and service sector	Energy tax, carbon dioxide tax, building regulations, energy declarations, the eco-design directive, mandatory energy labelling	0.4	0.4
Industrial emissions from combustion and processes, and product use	Hydrogen Breakthrough Ironmaking Technology (HYBRIT)	NE	NE
	EU regulation on fluorinated greenhouse gases and Best Available Techniques reference document, EU regulation on mobile air-conditioning units in cars, Swedish regulation on fluorinated gases and ozone-depleting substances	0.7	NE
Transport	Energy tax, carbon dioxide tax	2.3	NE
	Emission performance standards for new vehicles and targeted instruments related to the energy consumption of the vehicle fleet	2.6	4.3
	Targeted instruments to promote the introduction of renewable transport fuels	4.3	NE
Agriculture	Measures under the Rural Development Programme	NE	NE
	Support for biogas production	NE	NE
LULUCF	Forestry Act and Swedish National Forest Programme	NE	NE
Waste	Rules on municipal waste planning and on producer responsibility for certain products, landfill tax (2000), bans on landfill of combustible waste (2002) and of organic waste (2005)	1.9	NE

Note: The estimates of mitigation impact are estimates of emissions of CO_2 or CO_2 eq avoided in a given year as a result of the implementation of mitigation actions.

(b) Policies and measures in the energy sector

47. Energy accounted for 73 per cent of Sweden's emissions in 2015, the largest source of emissions in Sweden. Emissions fluctuate between the years mostly owing to the weather conditions that influence electricity and heat production. Fluctuations in emissions from coke production and refineries relate to changes in the economic development of industries. There is a strong policy focus on the energy sector, with a framework agreement on Swedish energy policy agreed in 2016 to set a target of 100 per cent renewable electricity production by 2040 and 50 per cent more efficient energy use by 2030 compared with the 2005 level.

48. **Production of electricity and district heating sector.** The highest mitigation impact in this sector is a group of measures: energy tax, carbon dioxide tax, electricity certificate system and the EU ETS. Sweden projects that implementation of those measures will lead to a 19 Mt CO_2 eq emission reduction by 2020, in comparison with the emission level in 1990. Other significant PaMs are initiatives for wind power, support for solar power and tax relief for microproduction of renewable energy.

49. The production of district heating has risen approximately 50 per cent since 1990. At the same time, GHG emissions from this source have remained relatively stable, because the expansion has largely been achieved by the increased use of biofuels, while the use of oil and coal has declined. The carbon dioxide tax is one of the main factors behind this trend, but the electricity certificate system is also important in phasing out fossil fuels in the sector. The low emissions from electricity generation are explained by the fact that nuclear power and hydropower account for a dominant share of production, while additional production of electricity in recent years comes mainly from biomass-fired combined heat and power plants and wind power plants.

50. **Residential and commercial/institutional sectors**. The most significant mitigation impacts are due to the energy tax, carbon dioxide tax, changes to building regulations, energy declarations, the eco-design directive and mandatory energy labelling, with a 0.4 Mt CO_2 eq emission reduction by 2020 compared to 1990 emission levels.

51. GHG emissions from the residential, commercial and institutional sectors (heating other than district heating) have fallen significantly since 1990. The energy and carbon dioxide taxes are instruments that contribute most to reducing the use of fossil fuels in this sector. The level of taxes on fossil-fuel use for heating in the sector has risen steadily since 1990. This has made it considerably more expensive to use fossil fuels than if energy taxation was kept at its 1990 level. Additionally, oil prices and the available technologies for fossil-fuel substitutes have also had a significant impact on decreasing emission trends in the sector.

52. As well as carbon dioxide and energy taxes, there are several instruments targeting energy use in buildings. Some of the most important ones include changes to building regulations, the introduction of energy performance certificates, and the eco-design, energy labelling and energy efficiency directives. In addition, there are instruments such as technology procurement, network initiatives and information campaigns at the local, regional and national level.

53. **Industrial emissions and product use**. Total emissions from combustion in manufacturing industries are trending downward. The instruments primarily affecting combustion emissions from the industrial sector are the EU ETS, energy and carbon dioxide taxes, the electricity certificate system and the Environmental Code. IPPU emissions have come almost entirely within the scope of the EU ETS since its expansion for the third trading period (2013–2020). These processes are also regulated by the Environmental Code requirement to use the best available technology. In 2017, the "Hydrogen Breakthrough Ironmaking Technology" initiative was given financial support to find solutions to reducing CO_2 emissions from the steel industry.

54. Industrial Leap is a new reform programme, which will be funded in the 2018 budget. This programme will provide financial resources amounting to SEK 300 million each year from 2018 to 2040 to support the development of technologies and processes to significantly reduce process-related GHG emissions in Swedish industry. Sweden also implemented a regulation on fluorinated gases in 2006 that complements the EU regulation. The regulation includes provisions for cooling and air conditioning and heat pump equipment. These

measures on fluorinated gases, including the EU regulation, are estimated to reduce emissions by 0.7 Mt CO_2 eq each year by 2020 compared with the 1990 emission level.

55. **Transport sector**. GHG emissions from domestic transport, where road transport dominates, increased after 1990, reaching a peak in 2006–2007 and then declined. However, since 2013, there has been a slowdown in the decline. The decrease in emissions since 2006 can be attributed to policy instruments introduced both nationally and at the EU level. Emission performance standards for new vehicles, vehicle taxes and vehicle fuel taxes have had the most significant impact on reducing GHG emissions. Sweden has also set an ambitious domestic transport sector target of a 70 per cent reduction by 2030.

56. Sweden outlined a number of new initiatives in the transport sector that have been included in the 2018 budget proposal. These include an emission reduction obligation (fuel charge) scheduled to come into effect on 1 July 2018, which places an obligation on petrol and diesel suppliers to increase biofuel blending. In July 2018, Sweden introduced the bonus-malus system for new light vehicles that is an innovative 'carrot and stick' approach. The system targets vehicles with low CO_2 emissions to qualify for a bonus at the time of purchase, while vehicles with high CO_2 emissions will be taxed at a higher rate for the first three years. The Climate Leap programme aims to support infrastructure investments in municipalities, companies and organizations such as charging points for electric vehicles or investments in biogas plants.

57. Sweden introduced a tax on air travel from 1 April 2018, designed to reduce the climate impact of aviation through taxing commercial flights from Swedish airports. There are various levels of tax depending on the distance travelled.

58. The NC7 includes information on how Sweden promotes and implements the decisions of ICAO and the International Maritime Organization to limit emissions from aviation and marine bunker fuels. Within ICAO, Sweden has been pressing for action to limit GHG emissions from international aviation, using a unified global measure. In August 2016, Sweden submitted an updated version of its 2015 "State Action Plan on CO_2 Emissions Reduction Activities" to ICAO. The action plan describes the measures and policy tools currently available or planned to reduce CO_2 emissions from international aviation, including the estimated emission reduction.

59. In the International Maritime Organization, Sweden has been driving efforts to develop several technical and operational measures aimed at reducing GHG emissions through energy efficiency measures. Sweden participates actively as a member of the High Ambition Coalition for International Shipping. Sweden is also implementing the EU regulation on measurement, reporting and verification of CO_2 emissions from maritime transport, which applies to all ships above 5,000 gross tonnes. Sweden also actively promotes the use of alternative fuels, such as liquefied natural gas and methanol, as well as related infrastructure. Furthermore, many Swedish ports have invested in infrastructure allowing ships to use shore-side electricity, considerably reducing their emissions.

(c) Policies and measures in other sectors

60. **Agriculture**. GHG emissions from the agriculture sector have been declining compared with the 1990 level; however, there are relatively few economic policy instruments directly targeting GHG emissions in the sector. The Government has introduced measures to reduce fossil-fuel use in farming and to increase awareness, and measures to reduce emissions from manure and fertilizer management and from land use. The Rural Development Programme, launched in 2014, has a SEK 36 billion budget to undertake a number of actions, including on climate mitigation, such as increasing energy efficiency, production and use of renewable energy (e.g. biogas production), improved manure handling, more efficient use of nitrogen and the restoration and establishment of wetlands.

61. In January 2015 Sweden introduced a support scheme for biogas production through anaerobic digestion of manure, which offers benefits in CH_4 reduction as well as the substitution of fossil energy. The biogas generated can be used to generate electricity or heat, or as a vehicle fuel. The Rural Network is a programme to bring together actors at the local, regional and central level to exchange information and experiences.

62. **LULUCF**. Sweden has over 58 per cent of productive forest land and it is an important natural resource that provides scope for bio-based energy supply. The Swedish Forestry Act (dating from 1993), sets out the twin objectives of production and environmental protection. Forest owners are given responsibility to conduct long-term sustainable forest management which influences CO_2 removals and emissions in various ways (e.g. via harvested wood products or fossil-fuel substitutes).

63. Sweden's Environmental Code also aims to promote sustainable development with regulations on land drainage, and the protection and restoration of peatlands with high carbon stocks. Sweden sets targets for the conservation and protection of areas containing both wetlands and forest lands, and such areas are excluded from felling programmes. In 2015, the Government initiated a dialogue with stakeholders in the National Forest Programme to increase the national supply of bio-based alternatives. The Forest Kingdom Initiative, a SEK 40 million programme running from 2012 to 2015, provided advice and training for increased production and to promote environmental awareness of offers to increase the uptake of carbon.

64. **Waste management**. Since 1990 CH_4 emissions from landfill sites have declined significantly, owing to an expansion of CH_4 recovery from landfills and reduced landfill disposal of organic materials and waste incineration with energy recovery. Demand for waste as a fuel for district heating has also encouraged diversion from landfill to incineration. PaMs at both the national and EU level have established this decline.

65. Since 1991, all municipalities in Sweden have been required to have a waste plan; and a national waste plan and prevent programme act as guidance in developing these and setting priorities. In 2000, Sweden introduced a tax on landfill waste. Starting at SEK 250 per tonne it has increased gradually to SEK 500 per tonne in 2015. In 2002, a ban on landfilling combustible materials was introduced and in 2005 a similar ban on organic material was implemented. These initiatives help to prevent and reduce the adverse effects on human health and the environment from landfilling.

66. Analysis on the effect of these measures in the waste sector found that the waste management measures reduced GHG emissions by 1.7 Mt CO_2 eq by 2015 compared with the emission level in 1990 and are projected to reduce emissions by 1.9 Mt CO_2 eq by 2020.

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

67. In its NC7 Sweden 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.

68. Further information on how Sweden 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 Party's 2018 annual submission. Under Sweden's policy for global development, all policy areas must interact in a way that the country can make an effective contribution to equitable and sustainable global development. When decisions in a given policy area are judged to affect this goal of equitable and sustainable global development, an impact assessment, including an environmental assessment, is carried out. These assessments can also include an appraisal of the risk of adverse effects on other countries.

69. Sweden reported a range of measures to help improve the ability of developing countries to adapt to climate change and promote sustainable development, including information on cooperating on technology transfer; research on global sustainability, particularly in developing countries; and transdisciplinary research which focuses on the environment, climate, natural resources, energy and other relevant areas from the perspective of both the natural sciences and social sciences. A large proportion of Sweden's development cooperation includes development of climate-friendly technology or technology transfer. Transfer of technology is often combined in an integrated way with capacity-building for developing countries to ensure long-term sustainability of the new technologies arriving to the country.

(e) Assessment of adherence to the reporting guidelines

70. The ERT assessed the information reported in the NC7 of Sweden and identified issues relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 6.

Table 6
Findings on policies and measures, including those in accordance with Article 2 of the Kyoto Protocol, from the review of the seventh national communication of Sweden

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement[a] specified in paragraph 23 Issue type: transparency Assessment: encouragement	The ERT noted that in the description of its PaMs Sweden did not report the mitigation impacts of all of its individual PaMs or collections of PaMs. During the review Sweden acknowledged it is very difficult to provide a quantitative estimation of the impacts of PaMs because some measures affect more than one sector (e.g. the energy and carbon dioxide taxes) and for other measures data are not easy to estimate. The ERT encourages Sweden to improve the transparency of its reporting in its next NC by providing quantitative estimates of the impact of both individual or collections of PaMs or by providing clear explanations as to why it may not be feasible to provide such information.
2	Reporting requirement[a] specified in paragraph 24 Issue type: completeness Assessment: encouragement	The ERT noted that Sweden did not report information on the non-GHG mitigation benefits of its PaMs in its NC7, such as reduced air pollution or health benefits. During the review Sweden recognized that improvements could be made to the reporting, by providing information on the co-benefits of its PaMs. The ERT encourages Sweden to provide information on the non-GHG mitigation benefits of PaMs in the next NC.

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.

[b] Paragraph number listed under reporting requirement refers to the relevant paragraph of the reporting guidelines for supplementary information.

C. Projections and the total effect of policies and measures, including information on supplementarity 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 the reported information

71. Sweden reported updated projections for 2020, 2025, 2030 and 2035 relative to actual inventory data for 2015 under the WEM scenario. The WEM scenario reported by Sweden includes implemented and adopted PaMs until July 2016.

72. Sweden did not report a WAM scenario. During the review the Party explained that it considers measures to be "planned" and hence eligible for a WAM scenario only if they exist in a bill before parliament. Once the bill is enacted the measures are considered adopted and become part of the WEM scenario. As there were no PaMs at the parliamentary bill stage in July 2016 Sweden did not have any measures for a WAM scenario. Although not reported in detail, Sweden did provide a "1990 scenario" in its NC7 that could be considered to be a WOM scenario. Sweden provided definitions of its scenarios explaining that its WEM scenario includes policies such as the carbon dioxide and energy taxes, renewable transport fuel policies and bans on landfilling organic material, while its "1990 scenario" includes only measures that were already in place in 1990. Detailed projections by gas and by sector are

provided for the WEM scenario, whereas only totals in graph form are provided for the "1990 scenario". The definitions indicate that the WEM scenario was prepared according to the UNFCCC reporting guidelines on NCs. The ERT considers that the "1990 scenario" would require some additional description if it were to be submitted as a WOM scenario in accordance with the guidelines, for example the nature of the projection and which PaMs were excluded.

73. The projections are presented on a sectoral basis (in line with the GHG inventory sectors) using different sectoral categories from those used in the reporting on mitigation actions and on a gas-by-gas basis for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case) for 1990–2035. The projections are also provided in an aggregated format for each sector as well as for a Party total using GWP values from the AR4. Sweden has provided additional subsectoral projections for most sectors (e.g. transport by mode) as well as providing sectoral projections on a gas-by-gas basis for the main gases relevant to each sector.

74. Sweden did not report emission projections for indirect GHGs such as carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides.

75. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately and were not included in the totals. Sweden reported on factors and activities affecting emissions for each sector.

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

76. The methodology used for the preparation of the projections is largely the same as that used for the preparation of the emission projections for the NC6; the differences are mainly due to different underlying assumptions. Sweden reported supporting information in tabular format, explaining that the key differences in the assumptions since the NC6 relate to fuel prices, carbon prices and growth rates. The ERT noted that it would be helpful if a similar table were also provided outlining differences (if any) in the methodologies and models used. In annex 5 to the NC7 Sweden provided details of the different models and approaches used in preparing projections for the different sectors. Some examples include the use of the National Institute of Economic Research's EMEC general equilibrium model for projections on economic development, the TIMES-Nordic energy system model for projections on electricity and heating production, and the Swedish Agricultural Sector model for projecting agricultural activity data. For other activity data, a combination of models (both Excel based and stand-alone) and expert assessments were used.

77. To prepare its projections, Sweden relied on the following key underlying assumptions: annual GDP growth of 2.28 per cent to 2035, crude oil price of USD 109/barrel in 2020 and USD 117/barrel in 2035, and population of 10.6 million in 2020 and 11.5 million in 2030. The main variables and assumptions used were reported in CTF table 5 in accordance with the UNFCCC reporting guidelines on BRs. The assumptions were updated based on the most recent economic developments known at the time of the preparation of the projections.

78. In accordance with the UNFCCC reporting guidelines on BRs, Sweden provided information in CTF table 5 on assumptions, methodologies, models and approaches used, and on the key variables and assumptions used in the preparation of the projection scenarios. To explain the changes, Sweden provided supporting documentation. Sweden also provided information on sensitivity analyses.

79. Sensitivity analyses were conducted for a number of important assumptions, such as 30 per cent higher fossil-fuel prices, 30 per cent higher economic growth and 10 per cent higher mileage. The analysis found that in the higher mileage scenario emissions were approximately 1.2 Mt CO_2 eq higher in 2030 and in the higher fuel price scenario emissions were approximately 1.2 Mt CO_2 eq lower. The higher economic growth scenario resulted in approximately 0.2 Mt CO_2 eq higher emissions, mainly owing to increased production in the industrial sector.

(c) Results of projections

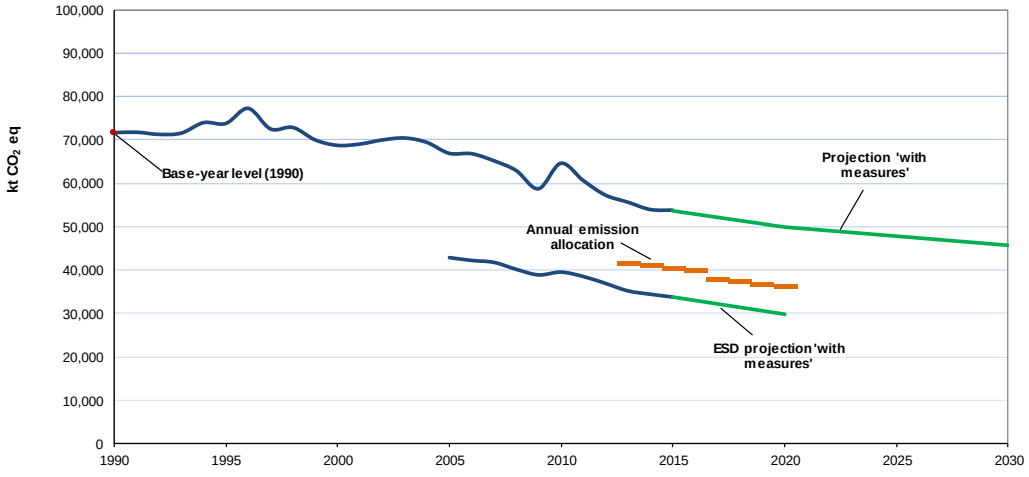
80. The projected emission levels under different scenarios and information on the Kyoto Protocol targets and the quantified economy-wide emission reduction target are presented in table 7 and the figure below.

Table 7
Summary of greenhouse gas emission projections for Sweden

	GHG emissions (kt CO_2 eq per year)	*Changes in relation to base-year[a] level (%)*	*Changes in relation to 1990 level (%)*
Kyoto Protocol base year[b]	72 057.12	NA	NA
Quantified emission limitation or reduction commitment under the Kyoto Protocol (2013–2020)[c]	39 444.32	NA	NA
Quantified economy-wide emission reduction target under the Convention[d]	NA	NA	NA
Inventory data 1990[e]	71 636.61	NA	NA
Inventory data 2015[e]	53 690.36	–25.1	–25.1
WEM projections for 2020[f]	49 898.62	–30.3	–30.3
WEM projections for 2030[f]	45 603.26	–36.3	–36.3

[a] "Base year" in this column refers to the base year used for the target under the Kyoto Protocol, while for the target under the Convention it refers to the base year used for that target.
[b] The Kyoto Protocol base-year level of emissions is provided in the initial review report, contained in document FCCC/IRR/2016/SWE.
[c] 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 target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020. The target for non-ETS sectors is 17 per cent for Sweden under the ESD. The value presented in this line is based on annex II to European Commission decision 2013/162/EU and as adjusted by Commission implementing decision 2013/634/EU that established the assigned amount for the EU member States and divided by 8 years to calculate the annual emission level.
[d] The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its 28 member States. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020.
[e] From Sweden's BR3 CTF table 6.
[f] From Sweden's NC7.

Greenhouse gas emission projections reported by Sweden



Sources: (1) data for the years 1990–2015: Sweden's 2017 annual inventory submission, version 2; total GHG emissions excluding LULUCF; (2) data for the years 2015–2030: Sweden's NC7 and BR3; total GHG emissions excluding LULUCF.

81. Sweden's Kyoto Protocol target for the second commitment period (2013–2020) is a joint target for the EU and its 28 member States and Iceland. The target is to reduce emissions by 20 per cent in the period 2013–2020 compared with the Kyoto Protocol base-year level. Under the Convention, Sweden's target is also a joint target for the EU and its 28 member States: a 20 per cent reduction by 2020 compared with 1990. The EU targets are split into the EU ETS (which is an EU-wide target, and it is expected that the market mechanism of the EU ETS will guarantee that emissions from sectors under this scheme will achieve the 2020 target) and the ESD for sectors not covered by the EU ETS (see paras. 41 and 42 above). The target for Sweden is a reduction of 17 per cent between 2005 and 2020 under the ESD. In addition, Sweden has set itself an ambitious national target of a 40 per cent reduction by 2020 compared with the 1990 level.

82. Sweden's total GHG emissions excluding LULUCF in 2020 and 2030 are projected to be 49,898.62 and 45,603.26 kt CO_2 eq, respectively, under the WEM scenario, which represents a decrease of 30.3 and 36.3 per cent, respectively, below the 1990 level. The 2020 projections suggest that Sweden will continue contributing to the achievement of the EU target under the Convention (see para. 81 above).

83. Sweden's target for non-ETS sectors is to reduce its total emissions by 17 per cent below the 2005 level by 2020. Sweden's AEAs, which correspond to its national emission target for non-ETS sectors, change linearly from 41,685 kt CO_2 eq in 2013 to 36,080 kt CO_2 eq for 2020. According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to reach 29,700 kt CO_2 eq by 2020. The projected level of emissions under the WEM scenario is 17.7 per cent below the AEAs for 2020, representing a reduction in emissions of around 30 per cent below the 2005 level. The ERT noted that this suggests that Sweden expects to meet its target under the WEM scenario.

84. In addition to its target for non-ETS sectors, Sweden committed itself to achieving a domestic target of a 40 per cent reduction in emissions below the 1990 level by 2020, one third of which can be met by investing in emission reductions in other countries. The projections indicate that Sweden expects to meet its domestic target, with the Government now intending to try to meet it using only domestic measures. The projections indicate a gap-to-target of 900 kt CO_2 eq in 2020 if only domestic measures are considered. In June 2017 the Swedish Parliament introduced further targets for the non-ETS sector of 63 per cent below the 1990 level in 2030 and 75 per cent below the 1990 level in 2040, of which 8 per cent and 2 per cent, respectively, may be met by supplementary measures. A new target was also introduced for domestic transport emissions of 70 per cent below the 2010 level by 2030. By 2045, Sweden aims to have no net emissions of GHGs into the atmosphere. The projections estimate ESD emissions of 26,000 kt CO_2 eq in 2030, indicating a gap-to-target of around 9,000 kt CO_2 eq compared with the new 2030 target. The projections estimate transport emissions in 2030 to decrease by around 35 per cent below the 2010 level. To meet the new targets, new PaMs will be required beyond what is in the current WEM scenario.

85. Sweden presented the WEM scenario by sector for 2020 and 2030, as summarized in table 8.

Table 8
Summary of greenhouse gas emission projections for Sweden presented by sector

	GHG emissions and removals (kt CO_2 eq)			*Change (%)*	
		2020	*2030*	*1990–2020*	*1990–2030*
Sector	*1990*	*WEM*	*WEM*	*WEM*	*WEM*
Energy (not including transport)	17 353	7 907	7 278	–54.4	–58.1
Transport	19 917	15 338	13 443	–23.0	–32.5
Industry/industrial processes	19 497	14 782	14 421	–24.2	–26.0
Agriculture	7 615	6 354	5 882	–16.6	–22.8
LULUCF	–36 703	–43 322	–42 222	18.0	15.0
Waste	3 740	1 058	723	–71.7	–80.7

	GHG emissions and removals (kt CO_2 eq)			*Change (%)*	
		2020	*2030*	*1990–2020*	*1990–2030*
Sector	*1990*	*WEM*	*WEM*	*WEM*	*WEM*
Other (Product use and Working machinery)	3 483	4 459	3 857	34.5	28.0
Total GHG emissions without LULUCF	**71 637**	**49 899**	**45 603**	**–30.3**	**—36.3**

86. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions are expected to occur in the energy (excluding transport) sector, amounting to projected reductions of 9,446.52 kt CO_2 eq (54.4 per cent between 1990 and 2020). The pattern of projected emissions reported for 2030 under the same scenario remains the same, with projected reductions in the energy (excluding transport) sector of 10,075.80 kt CO_2 eq (58.1 per cent between 1990 and 2020). Most of the reductions in the energy (excluding transport) sector had already occurred by 2015 and were mainly driven by the switch to electric and district heating in residential, commercial and institutional premises. The transport sector is projected to account for the largest portion of emission reductions from 2015 to 2020 and 2030.

87. Sweden presented the WEM scenario by gas for 2020 and 2030, as summarized in table 9.

Table 9
Summary of greenhouse gas emission projections for Sweden presented by gas

	GHG emissions and removals (kt CO_2 eq)				*Change (%)*
		2020	2030	1990–2020	1990–2030
Gas	1990	WEM	WEM	WEM	WEM
CO_2	57 548	40 707	37 543	–29.3	–34.8
CH_4	7 640	4 312	3 628	–43.6	–52.5
N_2O	5 773	4 262	4 096	–26.2	–29.1
HFCs	5	535	253	11 527.8	5 389.6
PFCs	569	34	34	–94.1	–94.1
SF_6	102	50	50	–51.2	–50.9
NF_3	–	–	–	–	–
Total GHG emissions without LULUCF	**71 637**	**49 899**	**45 603**	**–30.3**	**–36.3**
Total GHG emissions with LULUCF	**34 933**	**6 576**	**3 382**	**–81.2**	**–90.3**

Source: Sweden's BR3 CTF table 6.

88. For 2020 the most significant reductions are projected for CO_2 emissions: 16,841.27 kt CO_2 eq (29.3 per cent) between 1990 and 2020. CH_4 emissions are projected to decline by 3,328.06 kt CO_2 eq (43.6 per cent) and N_2O emissions by 1,511.68 kt CO_2 eq (26.2 per cent) over the same period.

89. For 2030 the situation is similar, with the most significant reductions projected for CO_2 emissions: 20,004.88 kt CO_2 eq (34.8 per cent) between 1990 and 2020. CH_4 emissions are projected to decline by 4,011.37 kt CO_2 eq (52.5 per cent) and N_2O emissions by 1,677.92 kt CO_2 eq (29.1 per cent) over the same period.

90. Sweden provided information in tabular format comparing differences in the key assumptions with the projections presented in the NC7/BR3, those presented in the NC6 and those presented in the BR2. GDP growth rate assumptions are broadly comparable across the

three sets of projections (2.28 per cent per annum in the NC7/BR3). Fossil-fuel prices are slightly lower in the NC7/BR3 projections (oil is projected to be USD 117/barrel in 2035), whereas future ETS carbon prices and new renewable electricity assumptions are higher (EUR 42/t CO_2 and 28.4 TWh, respectively). As with the projections presented in Sweden's NC6, the NC7 projections were prepared in accordance with the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* using GWPs from the AR4 and, owing to the updated GWPs used, the numbers are not directly comparable with the projections presented in the NC6.

(d) Assessment of adherence to the reporting guidelines

91. The ERT assessed the information reported in the NC7 of Sweden and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 10.

Table 10
Findings on greenhouse gas emission projections reported in the seventh national communication of Sweden

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement[a] specified in paragraph 28 Issue type: completeness Assessment: encouragement	Sweden did not report in its NC7 a WOM scenario or a WAM scenario. During the review Sweden provided detailed information on a scenario that only considers measures in place in 1990, as briefly described in the NC7. Sweden also explained that it considers measures to be "planned" and hence eligible for a WAM scenario only if they exist in a bill before parliament. Once the bill is enacted the measures are considered adopted and become part of the WEM scenario. As there were no PaMs at the parliamentary bill stage in July 2016 Sweden did not have any measures for a WAM scenario. The ERT encourages Sweden to provide a WOM and a WAM scenario, as applicable, to improve the completeness of its reporting.
2	Reporting requirement[a] specified in paragraph 43 Issue type: transparency Assessment: encouragement	Sweden has reported detailed descriptions of the models used in preparing its projections in annex 5 to its NC7 but did not provide information on the synergies and overlaps between the different models used. During the review Sweden explained that some models used the same underlying assumptions whereas others were independent of each other. The ERT reiterates the encouragement made in the previous review report that Sweden provide concise information highlighting the synergies and overlaps between the different models used.

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

92. In the NC7 Sweden presented the estimated and expected total effect of those implemented and adopted PaMs for which savings estimates have been made and presented a graph showing an estimate of the total effect of its PaMs from 1990 to 2015, in accordance with the WEM scenario, compared with a situation without such PaMs. Information is presented in terms of GHG emissions avoided or sequestered by sector for 2015 and 2020. Information was not provided by gas (on a CO_2 eq basis), although such information was largely provided in the description of individual PaMs in chapter 4 of the NC7. The PaMs for which savings estimates have been made in the NC7 represent a minority of the total number of implemented and adopted PaMs.

93. Sweden reported that the total estimated effect of its adopted and implemented PaMs for which savings estimates have been made is 30,800 kt CO_2 eq. According to the

information reported in the NC7, PaMs implemented in the electricity and district heating sector will deliver the largest emission reductions, followed by PaMs implemented in the transport and waste sectors. For the industry sector it is projected that emission increases will result from the PaMs for which estimates have been made. Sweden did not estimate the effect of implemented and adopted measures from its agriculture sector. Table 11 provides an overview of the total effect of PaMs as reported by Sweden.

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

	2020	
Sector	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Effect of planned measures (kt CO_2 eq)*
Energy (without transport)	19 400	
Transport	9 200	
IPPU	300	
Agriculture	NE	
Waste management	1 900	
Total	**30 800**	

Source: Sweden's NC7.
Note: The total effect of implemented and adopted PaMs is defined as the sum of the effects of the instruments implemented for which estimates have been made.

(b) Assessment of adherence to the reporting guidelines

94. The ERT assessed the information reported in the NC7 of Sweden and identified issues relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 12.

Table 12
Findings on the assessment of the total effect of policies and measures from the review of the seventh national communication of Sweden

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 40 Issue type: completeness Assessment: recommendation	Sweden did not report the estimated and expected total effect of PaMs, by gas, in its NC7. During the review Sweden acknowledged that improvements could be made to the report by providing information on the total effect of PaMs, by gas. The ERT reiterates the recommendation made in the previous review report that Sweden present the estimated and expected total effect of PaMs, by gas, on a CO_2 eq basis.
2	Reporting requirement specified in paragraph 39 Issue type: completeness Assessment: recommendation	Sweden did not report the effect of implemented and adopted measures from its agriculture sector. During the review Sweden provided information on the PaMs on the agriculture sector and highlighted that there are relatively few economic policy instruments targeting GHG emissions in this sector. The ERT recommends that Sweden report the effect of implemented and adopted measures from its agriculture sector.
3	Reporting requirement specified in paragraph 39	Sweden reported a table in its NC7 (table 5.19) showing the total effect of PaMs. However, there were errors in the table, resulting in the sectoral breakdown not adding up to the reported total.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Issue type: transparency Assessment: recommendation	During the review Sweden provided an updated table with the correct numbers. The ERT recommends that Sweden present the correct information in its next NC to ensure that the sectoral breakdown adds up to the reported total effect of PaMs.

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

(a) Technical assessment of the reported information

95. In the NC7 Sweden provided information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. The Swedish Programme for International Climate Initiatives has been established to support developing countries to achieve a reduction in GHG emissions through the implementation of clean development mechanism and joint implementation projects as well as multilateral carbon funds and collaboration. Projects have been implemented in more than 50 developing countries, with priority being given to least developed countries, small island developing States and Africa. The majority of projects are related to renewable energy, energy efficiency and waste management. Sweden has committed SEK 2.4 billion to support those activities.

96. During the review Sweden explained that in 2016, the Swedish Parliament decided to cancel international credits generated during the first commitment period of the Kyoto Protocol. The cancellation was conducted in 2017. These cancelled international credits cannot be utilized to fulfil commitments under the Kyoto Protocol and Sweden therefore reports the financial support to these Kyoto Protocol mechanisms as climate finance.

97. Sweden's projections under the WEM scenario to 2020 indicate an overachievement in relation to the target under the ESD (17 per cent reduction by 2020 compared with the 2005 level) amounting to over 6 Mt CO_2 eq. For the years 2013 and 2014 Sweden's ESD emissions were lower than the ESD target. Sweden highlighted in its NC7 that the surplus for 2013 and 2014 will be deleted. Sweden has also taken a decision to delete the ESD surplus for 2015 and the Government has proposed to the Swedish Parliament that the surplus for 2016 should also be deleted.

98. Sweden's annual use of international credits is restricted to 3 per cent of 2005 emissions, which equals 10.9 Mt CO_2 eq for the entire period 2013–2020. During the review Sweden explained that, although it can use credits from international projects to meet the target, it does not plan to use the market-based mechanisms to meet its Kyoto Protocol target for the second commitment period. However, all necessary preparations are being made to enable investments in international projects to meet the target under the ESD if necessary.

(b) Assessment of adherence to the reporting guidelines

99. The ERT assessed the information reported in the NC7 of Sweden and recognized that the reporting on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 is complete, transparent and adhering to the reporting guidelines for supplementary information. 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

100. Sweden 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.

101. Sweden indicated what "new and additional" financial resources it has provided and clarified how it has determined such resources as being "new and additional". Sweden's definition is based on the common definition that climate financing should be additional to the international development aid goal, which, for Sweden is 0.7 per cent of gross national income. Sweden has exceeded the 0.7 per cent goal and has broad support from the Swedish Parliament to continue delivering 1 per cent of gross national income as ODA. The ERT commends Sweden for reporting on how it exceeds its international development aid goal.

102. While Sweden reported on its financial support to the Adaptation Fund (see table 13 below), it did not describe how its resources address the adaptation and mitigation needs of non-Annex I Parties.

103. In the NC7 Sweden described how it has increased its multilateral climate finance substantially from 2013 to 2016, with an overall increase of 106 per cent, or more than double (based on domestic currency values). Of this amount, the support for adaptation activities increased by 64 per cent, for cross-cutting measures increased by 295 per cent, while support for mitigation decreased by 42 per cent.

104. Sweden reported detailed information on assistance to developing countries on adaptation to address adverse effects. The bilateral ODA is channelled through SIDA, with the emphasis on low-income and middle-income countries and increasing focus on supporting countries with climate change adaptation to meet the needs of country partners. Sweden reported information on the assistance that it has provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change in order to help them to meet the costs of adaptation to those adverse effects. In the NC7 Sweden reported that, in addition to the support provided to the Adaptation Fund, it also provided bilateral climate change support focusing on climate-vulnerable countries such as Bangladesh, Bolivia (Plurinational State of), Burkina Faso, Ethiopia Kenya, Mali, Mozambique, Somalia, the United Republic of Tanzania and Zambia.

105. In addition, Sweden provided climate finance through a number of other multilateral climate change funds, such as the Adaptation Fund and the Least Developed Countries Fund. In 2016 Sweden provided a USD 15.3 million contribution to the Adaptation Fund and is the largest donor per capita in the world to the Financial Mechanism under the Convention.

106. Sweden has also highlighted its role in championing gender integration in the multilateral climate funds, through the promotion of separate gender policies and action plans that support gender-responsive actions. The integration of gender issues is slowly improving, which helps contribute to raising the efficiency and long-term sustainability of projects and programmes funded by multilateral climate funds. The ERT commends Sweden for reporting on its efforts to champion gender integration in climate finance.

107. With regard to the most recent financial contributions aimed at enhancing the implementation of the Convention by developing countries, Sweden reported that its climate finance has been based on the policy framework of Sweden, which integrates climate change perspectives on all international development cooperation and with emphasis on low-income and middle-income countries. As described in the NC7, national ownership of the long-term sustainability of climate initiatives is directed towards recipient countries and the organization's own needs, priorities and strategies are weighted into Sweden's strategies and is a fundamental entry point for all bilateral support. The support also increasingly emphasizes gender integration. Financial support during the period 2015–2016 and its

allocation between adaptation, mitigation and cross-cutting measures indicates that more emphasis was given to cross-cutting and adaptation measures. Table 13 includes some of the information reported by Sweden on its provision of financial support.

Table 13
Summary of information on provision of financial support by Sweden in 2013–2016
(Millions of United States dollars)

	Year of disbursement			
Allocation channel of public financial support	*2013*	*2014*	*2015*	*2016*
Official development assistance				
Climate-specific contributions through multilateral channels including:	75.99	24.50	59.81	119.33
Global Environment Facility	12.58	10.53	12.42	19.31
Least Developed Countries Fund	17.65	2.19		17.52
Special Climate Change Fund				
Adaptation Fund	15.35			23.32
Green Climate Fund	0.77	1.46	35.57	46.72
Trust Fund for Supplementary Activities	0.23	0.22	0.54	0.23
Financial institutions including regional development banks	–	–	11.28	12.20
United Nations bodies	–	–	–	–
Other	–	–	–	–
Climate-specific contributions through bilateral, regional and other channels	29.01	–	–	–
Other	–	–	–	–

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

108. Sweden applied Rio Markers to estimate climate-related multilateral funding support. The Green Tool Box was used to monitor and assess the climate-related bilateral ODA, when tracking and monitoring financial support from public sources. The system enhances information flow from policy to operation level and improves transparency, monitoring and assessment of support both vertically and horizontally. Sweden also made efforts to enable climate finance reporting through IATI.

109. To further enhance its data reporting system, Sweden made efforts to harmonize its data system to support the preparation of NCs, BRs and the report on the EU Monitoring Mechanism Regulation. The OECD DAC gender policy marker was also used to track gender integration in climate finance of Sweden. This harmonization aimed to increase coherence between reports and reduce the burden of reporting.

(b) Assessment of adherence to the reporting guidelines

110. The ERT assessed the information reported in the NC7 of Sweden and identified an issue relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table 14.

Table 14
Findings on financial resources, including under Article 11 of the Kyoto Protocol, from the review of the seventh national communication of Sweden

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement[a] specified in paragraph 51 Issue type: transparency Assessment: recommendation	Sweden did not report the financial contribution in Swedish kronor instead of United States dollars to the Global Environment Facility in table 3 of its NC7. During the review Sweden explained that the values in millions of United States dollars are provided in the NC7, annex 6, table 7(a), and annex 1, table 7(a) for the corresponding periods. The ERT recommends that Sweden, in its next NC, report the financial contribution in millions of United States dollars to the Global Environment Facility in table 3 in accordance with the UNFCCC reporting guidelines on NCs.
2	Reporting requirement[a] specified in paragraph 52 Issue type: completeness Assessment: recommendation	Sweden did not provide detailed information on the assistance provided for the purpose of assisting developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse effects in its NC7. During the review Sweden explained that the assistance provided through bilateral, regional and other channels is predominantly directed towards adaptation and cross-cutting areas. The ERT recommends that Sweden, in its next NC, report information on the assistance provided to developing countries that are particularly vulnerable to the adverse effects of climate change.

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

(a) Technical assessment of the reported information

111. Sweden provided 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. Sweden provided examples of support provided for the deployment and enhancement of the endogenous capacities and technologies of non-Annex I Parties.

112. The ERT noted that Sweden 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. Sweden highlighted a number of examples, including the support provided to the Consultative Group for International Agricultural Research for agricultural research to improve food security support, to Mozambique to rehabilitate two old hydroelectric power stations using modern technology, and a project in Indonesia to focus on renewable energy and energy efficiency, as well as to provide joint research and development for a bioenergy road map.

113. Sweden 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

114. The ERT assessed the information reported in the NC7 of Sweden and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 15.

Table 15
Findings on technology development and transfer, including information under Article 10 of the Kyoto Protocol, from the review of the seventh national communication of Sweden

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement[a] specified in paragraph 54	Sweden did not report details of measures aiming to promote, facilitate and finance technology transfer and did not clearly distinguish between public and private sector activities.
	Issue type: transparency	During the review Sweden explained that technology transfer is integrated into financial support and therefore difficult to separate. All financial support, including implementation of activities, contains technology transfer to various degrees.
	Assessment: recommendation	The ERT recommends that Sweden provide details of measures to promote, facilitate and finance technology transfer and distinguish between activities undertaken by the public and private sectors.
2	Reporting requirement[a] specified in paragraph 54	The ERT noted that Sweden did not report on ways it has encouraged private sector activities to help meet the commitments under Article 4, paragraphs 3, 4 and 5, of the Convention.
	Issue type: completeness	During the review Sweden acknowledged that improvements could be made to its reporting on technology transfer.
	Assessment: encouragement	The ERT encourages Sweden to report in its next NC on ways it encourages private sector activities to help meet commitments.
3	Reporting requirement[a] specified in paragraph 55	Although Sweden provided information in its NC7 through examples (in boxes) on activities related to technology transfer, including success stories, Sweden did not use table 6 to report this information.
	Issue type: transparency	During the review Sweden acknowledged that improvements could be made to its reporting on technology transfer.
	Assessment: recommendation	The ERT recommends that Sweden, where feasible, report in its next NC activities related to technology transfer, including success and failure stories, using table 6 in accordance with the UNFCCC reporting guidelines on NCs.
4	Reporting requirement[a] specified in paragraph 56	Sweden did not provide information in textual format on steps taken to promote, facilitate and finance transfer of technology or to support the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties.
	Issue type: completeness	During the review Sweden acknowledged that improvements could be made to its reporting on technology transfer.
	Assessment: recommendation	The ERT recommends that Sweden, in its next NC, provide information in textual format on steps taken to promote, facilitate and finance transfer of technology and to support the development and enhancement of the endogenous capacities and technologies of developing countries.

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.

E. Vulnerability assessment, climate change impacts and adaptation measures

1. Technical assessment of the reported information

115. In the NC7 Sweden 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.

116. In the NC7 Sweden provided a description of climate change vulnerability and impacts of climate change on physical and biological systems, as well as socioeconomic

sectors. The first vulnerability assessment report on climate change impacts was prepared in 2005 and updated in 2015. Many sectors were assessed, including energy security, dam safety, spatial planning, financial markets and insurance, electronic communications, shipping, roads and railways, cultural heritage, agriculture, reindeer husbandry, forestry, tourism, drinking water and health effects.

117. During the review Sweden highlighted that, since publication of its NC7, it has adopted the National Adaptation Strategy. This strategy will provide more structure in how Sweden works on adaptation. The strategy includes planning and building regulations, which give power to the local municipalities to undertake climate adaptation, and the national Board on Housing Building and Planning has been given the task of coordinating the national adaptation work.

118. During the review Sweden also highlighted that it has more than 50 case studies on adaptation, including 40 in the English language. These case studies highlight the adaptation problem, the costs incurred, the results of the adaptation measure, and finally evaluate the benefits of the action.

119. Impetus has been given to addressing adaptation matters with the adoption of 21 regional action plans by regional government offices covering the entire country. Those action plans proposed nearly 800 actions for adaptation. Table 16 summarizes the information on vulnerability and adaptation to climate change presented in the NC7 of Sweden.

Table 16
Summary of information on vulnerability and adaptation to climate change reported by Sweden

Vulnerable area	*Examples/comments/adaptation measures reported*
Agriculture and farming	*Vulnerability*: the change in climate will result in lengthening of the growing season and yield is expected to increase by about 5 per cent. Crop conditions, however, could deteriorate and risk of drought and flooding is expected to increase. Farm animals housed indoors may suffer from the increased temperature and humidity, leading to increased risks of mortality and diseases. Extreme weather events, shifting of the seasons and changes in vegetation will also pose major challenges for reindeer herding. *Adaptations*: greater demand on water infrastructure in agriculture is likely, because climate change will lead to more rainfall and more drought; therefore, measures such as ditches, embankments and irrigation dams will be necessary. Farming infrastructure needs to adapt to higher temperatures and increase awareness of new or emerging diseases affecting animals. Reindeer herders need to show flexibility and access to several different types of pasture.
Biodiversity and natural ecosystems	*Vulnerability*: a warmer climate shifts the climatic and vegetation zones northwards, and changes the reproduction patterns, population distribution and sizes of animals and plants, as well as the incidence of pathogens; endangered species may disappear; alpine areas will decrease sharply affecting some species' habitats; and temperature rise and decreased salinity due to higher freshwater input to the Baltic Sea will change coastal biodiversity. *Adaptations*: increased knowledge of and greater collaboration among public agencies and authorities will better support decisions and tools for climate change adaptation.
Fisheries	*Vulnerability*: temperature rise and decreased salinity will affect marine life; cold-water species will be replaced by warm-water species; and increase of cyanobacteria owing to water temperature rise will cause damage to fish populations. *Adaptation*: no specific adaptation measure is reported.
Forests	*Vulnerability*: the growing season will be extended, resulting in favourable production changes for forestry; some problems and risks of pests, fungi, increase of rotten roots and forest fires are expected; possible increase of windfalls; and optimizing construction and maintenance of forest roads. *Adaptations*: government agencies work in collaboration to achieve greater knowledge, stronger collaboration and organization among the public agencies to establish and

Vulnerable area	*Examples/comments/adaptation measures reported*
	develop preparedness for climate change risks. Knowledge of the effects of climate change and scope for action is conveyed to forest owners. Increase the diversity of planted tree species.
Human health	*Vulnerability*: a positive effect is expected from fewer extremely cold winter days with the associated mortality and cardiovascular diseases; however, increases in heatwaves during the summer may particularly affect vulnerable groups such as the elderly and people with cardiovascular and lung diseases; air pollution, waterborne infections and wound infections caused by vibrio bacteria are expected to increase; an extended growing season may increase the production and spread of pollen-producing species which will lead to an increase in pollen allergies; and floods may contaminate water resources posing risks to human health. *Adaptations*: adaptation actions are taken in municipalities to prepare for extreme weather events. The National Knowledge Centre for Climate Change compiles and disseminates data to support decisions and tools for climate change adaptation.
Infrastructure and economy	*Vulnerability*: high water flows will have an impact on dam safety; buildings along lakes, rivers and coastal areas are vulnerable to flooding and landslides; flooding and landslides will also affect road networks and railways; and rising sea levels may have adverse effects on ports and harbours. *Adaptation*: reconstruction measures, and operating and water conservation measures are included in the adaptation measures. Mapping of stability and flood risks has been implemented. Risks of landslides, washing-away and flooding in the road and rail networks have been surveyed and necessary measures taken.
Water resources	*Vulnerability*: Sweden is already seeing the impact of climate change on water resources, with increased average temperatures, increasing precipitation altering drainage patterns, evaporation and groundwater formation. Sea level rise is already impacting parts of southern Sweden. In south-eastern parts of the country water resources are expected to decrease. Lack of water and saltwater ingress in water sources used for drinking water may arise in some areas. Surface water resources are more exposed than groundwater resources to a range of risk factors and are therefore more vulnerable to increases in temperature, intensity of precipitation and pollution. Rise in sea levels may mean risk of saltwater intrusion into water sources close to coasts. *Adaptation*: the main actions proposed in the adaptation plans concern flood protection, protection of drinking water, shoreline protection and a number of flood management and control measures are implemented at the county or municipality level; in particular, regulation of flow of water, raising the minimum level for construction and investment in pump systems.

120. Sweden provided information on financial support for international adaptation activities such as the Adaptation Fund, the Least Developed Countries Fund and adaptation windows in other multilateral funds. Sweden also provided information on bilateral cooperation with developing countries, in particular with Parties vulnerable to the adverse effects of climate change, such as Bangladesh, Bolivia (Plurinational State of), Burkina Faso, Kenya, Mali, Mozambique, Somalia, the United Republic of Tanzania and Zambia, which is channelled through SIDA.

2. Assessment of adherence to the reporting guidelines

121. The ERT assessed the information reported in the NC7 of Sweden 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

122. Sweden highlighted its research bill "Collaborating for knowledge – for society's challenges and strengthened competitiveness", which was adopted by the Swedish Parliament in April 2017. The bill proposes six national research programmes over a 10-year period, and most of the programmes are in line with the aims of the Paris Agreement and the Sustainable Development Goals. The bill also foresees research based on satellite data for observing the state of the Earth, the seas and the atmosphere, as well as research on resource-efficient processes and material flows, the substitution of raw materials and the circular bio-based economy.

123. Sweden 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 Global Climate Observing System and the IPCC. Sweden also provided information on the identification of opportunities for and barriers to free and open international exchange of data and information on action taken to overcome such barriers.

124. Sweden reported information on 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. Sweden also reported on key developments in research initiatives since the NC6, including its support for strategic research areas at higher education institutions, with the aim of strengthening international collaboration and innovation within research. In 2015 the programme was evaluated, reconstructed and continued. Two strategic research areas have a climate focus: climate processes and models, and research on the effects of climate change.

125. In terms of activities related to systematic observation, Sweden reported on programmes and support for climate observing systems, including satellite and non-satellite climate observation. Various hydrological, meteorological and oceanographical measurements are operated by the Swedish Meteorological and Hydrological Institute which is the co-lead (through its Rossby Centre) within the EC-Earth project to develop the new Earth system model that will be part of the global climate modelling project CMIP6 (Coupled Model Intercomparison Project, phase 6) which is expected to provide a wealth of information for the next IPCC Sixth Assessment Report.

126. Sweden also participates in several international research infrastructures related to climate, such as the Integrated Carbon Climate Observing System – European Research Infrastructure (known as ICOS-ERIC), the European Consortium for Ocean Research Drilling, the Global Biodiversity Information Facility and Life Watch. In addition, the Party participates in coordinated observations in the Arctic and Antarctic through the organizations International Arctic Science Committee and the Science Committee on Antarctic Research. The Swedish National Data Service at the University of Gothenburg became responsible for the Environment Climate Data Sweden data portal in June 2016 in an effort to improve researchers' access to environmental and climate data.

127. Sweden also reported actions taken to support capacity-building in developing countries. Sweden provides funding through SIDA supporting research on policy and individual capacity-building, in particular in sub-Saharan Africa but also in other countries in Africa, Latin America, the Middle East and South-East Asia. SIDA supports 72 research organizations, including 13 universities (in Bolivia (Plurinational State of), Ethiopia, Mozambique, the United Republic of Tanzania and Uganda). Regional research cooperation in South Asia and South-East Asia focuses on the economics of climate change; evaluation of the impacts of climate change; economic analysis of adaptation measures; evaluation of the mitigation strategies, particularly those that offer local co-benefits; and examination of institutions and policies for low-carbon growth and long-term adjustment to climate change.

In particular, in South-East Asia the majority of the projects have a climate focus, including REDD-plus,[4] climate change vulnerability and climate-resilience development.

2. Assessment of adherence to the reporting guidelines

128. The ERT assessed the information reported in the NC7 of Sweden 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

129. In the NC7 Sweden provided information on its actions relating to education, training and public awareness at the domestic and international level. The Party provided extensive information on public awareness, climate change communication, information centres, general policy on education, training activities in primary and secondary schools and in higher education, the involvement of the public and non-governmental organizations, and information about participation in international activities.

130. The NC7 highlighted the importance of communicating climate change knowledge as a key factor in achieving emission reductions and implementing adaptation actions. Sweden encourages communication to raise public awareness, public participation and education on climate change by providing clear and easily accessible information. The new National Climate Policy Framework, adopted in 2018, reflects broad national support for climate action and public awareness.

131. SEPA regularly conducts surveys on the attitudes of Swedes on climate change. During the review Sweden highlighted that a survey had been undertaken in June 2018 which found that 98 per cent of Swedes think it is important to protect nature. Climate change is also a 'top-of-mind' issue in Swedish society, with the vast majority of civil society prepared to contribute to emission reductions by taking action themselves. Non-governmental organizations, think tanks and networks also play an active role in public debate on particular solutions for mitigating climate change by creating arenas and meeting places for discussion.

132. The NC7 provided information about the key role that SEPA plays towards achieving many of the Party's environmental quality objectives, through strategic communications and cross-sectoral synergies. SEPA arranges annually the "Climate Forums", bringing together agencies, organizations, municipalities, businesses and politicians. Other organizations participate in communications on climate change; for example, the Swedish Energy Agency is responsible for delivering information to citizens and businesses on energy efficiency. The Swedish Meteorological and Hydrological Institute develops and distributes information about the weather, water and climate change adaptation for the purpose of providing knowledge and high-quality decision support for the public and business sectors and for citizens.

133. The Swedish Government has launched the Fossil Free Sweden initiative with the aim of making Sweden one of the world's first fossil-free welfare States. Fossil Free Sweden mobilizes and supports these actors by providing a platform for dialogue, cooperation and inspiration between themselves and the Government.

134. A number of Swedish agencies all have responsibility to spread the message and action on climate change through their sectors. For example, the Swedish Transport Administration is in charge of environmental issues associated with the State road and rail networks, and works to reduce emissions that affect climate by promoting attractive accessible towns and cities characterized by reduced car dependence, energy-efficient goods,

[4] In decision 1/CP.16, paragraph 70, the Conference of the Parties encouraged developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks.

transport chains, more energy-efficient road vehicles and railway rolling stock on a sustainable energy basis, and by reducing the emissions of GHGs from infrastructure buildings and through maintenance in a life cycle perspective. The Swedish Consumer Agency works on eco-labelling; the Swedish Museum of Natural History focuses on exhibitions on climate issues; and the Swedish Forest Agency informs forest owners and forest officers on the impacts of climate change.

135. In its NC7 Sweden provided information regarding the role of the National Swedish Agency for Education, which is working towards the fourth goal of the 2030 Agenda for Sustainable Development. This is to ensure inclusive and high-quality education for all and promote lifelong learning. Examples of communications under this initiative include "A Climate smart meal", the Green Flag Award, the Forest in Schools project, the Knowledge link, Earth Hour teaching handbooks, Our City 2030, Food on Sustainable Way, Energifallet, and Greenspeakers, as well as programmes and information campaigns in the curricula and syllabuses in schools.

136. In Sweden there is an increasing awareness of products and services affecting the climate. To address this need, several agencies and organizations provide online information to consumers, while a growing volume of actors offer advice and guidance on climate change. Some examples of these information activities are the municipal energy and climate advisers, the Earth Hour Campaign, the Smergy (Smart Energy) Campaign, the Climate calculator, the Climate Account and the On-line Energy Tests. Several events also play an important role in creating action for climate change in business development, such as the Climate Forum, the Energy Outlook, Climate Adaptation Sweden, and Ecotransport (Sustainable Transport). It must be noted that during the Almedalen Week, an event where 40,000 policymakers, organizations and businesses interact with the public and the media annually, around 1,500 seminars were held on the topic climate change between 2014 and 2016.

2. Assessment of adherence to the reporting guidelines

137. The ERT assessed the information reported in the NC7 of Sweden and identified an issue relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 17.

Table 17
Findings on education, training and public awareness from the review of the seventh national communication of Sweden

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 65	Sweden did not report the extent of public participation in the preparation or domestic review of the national communication in its NC7. The ERT noted that this is not in accordance with the UNFCCC reporting guidelines on NCs.
	Issue type: completeness	During the review Sweden explained that there was extensive public participation on climate policies.
	Assessment: encouragement	The ERT encourages Sweden to report the extent of public participation in the preparation or domestic review of the NC, for example by providing the information provided during the review, in its next NC.

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

III. Conclusions and recommendations

138. The ERT conducted a technical review of the information reported in the NC7 of Sweden 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 Sweden.

139. The information provided in the NC7 includes all of the elements of the supplementary information under Article 7 of the Kyoto Protocol.

140. Sweden's total GHG emissions excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 26 per cent below its 1990 level, whereas total GHG emissions including LULUCF were 72.1 per cent below its 1990 level in 2016. The decrease in total emissions was driven mainly by a transition away from fossil-fuel use for the heating of residential, commercial and institutional premises. Other significant drivers have been a switch from fossil-fuel use to biofuels and electricity in the manufacturing combustion sector and reduced landfill gas emissions from the waste sector. Long-term ambitious policies have also driven emission reductions, such as energy and carbon taxes, which have existed since the early 1990s. The Swedish Forestry Act also drives a strong LULUCF sector as it has two overarching, equal objectives to support forest production and protect the environment.

141. Sweden's main policy relating to energy and climate change is the National Climate Policy Framework, adopted by the Swedish Parliament in June 2017 (Government bill 2016/17:146). The Framework consists of a Climate Act, new national climate targets and a climate policy council. The new Framework includes ambitious climate change goals for 2030 and a goal of zero net emissions by 2045. Sweden will pursue climate policies based on these national climate targets. Sweden's energy and carbon dioxide taxes have had the most significant GHG benefits. Some other policies that have delivered significant emission reductions include targeted instruments to address transport emissions by supporting environmentally friendly vehicles and fuels, the local climate investment programme (Climate Leap), environmental code planning and building legislation, the Fossil Free Sweden initiative, climate and energy advice, and the Swedish Forestry Act.

142. The GHG emission projections provided by Sweden include those under the WEM scenario. Under this scenario, emissions are projected to be 30.3 per cent below the 1990 level in 2020. According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to reach 29,700 kt CO_2 eq by 2020. On the basis of the reported information, the ERT concludes that Sweden expects to meet its 2020 target under the WEM scenario.

143. The projections indicate that Sweden can meet its Kyoto Protocol target for the second commitment period (ESD contribution equivalent to 17 per cent reduction below 2005 levels by 2020) and that GHG emissions are not expected to exceed the Kyoto Protocol target even by 2020. On the basis of the reported information, the ERT concludes that Sweden will overachieve its target for the non-ETS sector, because the projected level of emissions under the WEM scenario is around 30 per cent below the 2005 level. The projections indicate that Sweden expects to meet its domestic target of a 40 per cent reduction in emissions below the 1990 level by 2020, with the Government now intending to try to meet it using only domestic measures.

144. 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. Sweden does not plan to use the market-based mechanisms to meet its Kyoto Protocol target for the second commitment period, which is compatible with Sweden's target under the ESD in the framework of the joint EU target for the second commitment period.

145. Sweden continued to provide climate financing to developing countries in line with its climate finance programmes. It has increased its multilateral contribution since the NC6 and its total public financial support in 2013 and 2016 totalled USD 327.68 million and USD 328.29 million per year, respectively. For those years, Sweden's support provided for mitigation action was lower than its support provided for adaptation. Sweden also provided support on technology transfer over the periods, such as agricultural technology to improve food production and hydroelectric power station rehabilitation.

146. In the NC7 Sweden provided a description of climate change vulnerabilities and the impacts of climate change on physical and biological systems as well as socioeconomic sectors. The vulnerability assessment report on climate change impacts was updated in 2015. Many sectors were assessed, including energy security, dam safety, spatial planning, financial markets and insurance, roads and railways, cultural heritage, agriculture, reindeer

husbandry, forestry, tourism, drinking water and health effects. The regional governmental offices have adopted 21 regional action plans (as many as the counties of Sweden), covering the entire country and proposing 800 actions. The information provided in the NC7 is complete and transparent.

147. In April 2017 the law regarding research policy was adopted with the aim of addressing society's challenges and strengthening competitiveness while being in line with the Paris Agreement and the Sustainable Development Goals. One of the six national research programmes which that law established was dedicated to climate change challenges and implementation of the Paris Agreement. Furthermore, Sweden provided information on projects or programmes related to research and systematic observation in both domestic and international activities, including contributions to the World Climate Programme, the Global Climate Observing System and the IPCC.

148. In the NC7 Sweden provided comprehensive information on the institutions and agencies focused on communication with the public concerning the impacts of climate change and possible solutions; online information to consumers, and advice and guidance on climate change; and programmes and information campaigns in the curricula and syllabuses in schools. The ERT commends Sweden for reporting the information provided and encourages Sweden to continue its diverse activities on education training and public awareness.

149. In the course of the review the ERT formulated the following recommendations for Sweden to improve its adherence to the UNFCCC reporting guidelines on NCs and its reporting of supplementary information under the Kyoto Protocol:[5]

(a) To improve the completeness of its reporting by:

(i) Presenting the estimated and expected total effect of PaMs, by gas, on a CO_2 eq basis (see issue 1 in table 12);

(ii) Reporting the effect of implemented and adopted measures from its agriculture sector (see issue 2 in table 12);

(iii) Reporting information on the assistance provided to developing countries particularly vulnerable to the adverse effects of climate change (see issue 2 in table 14);

(iv) Providing information in textual format on steps taken to promote, facilitate and finance transfer of technology and to support the development and enhancement of the endogenous capacities and technologies of developing countries (see issue 4 in table 15);

(b) To improve the transparency of its reporting by:

(i) Presenting the correct information to ensure that the sectoral breakdown adds up to the reported total effect of PaMs (see issue 3 in table 12);

(ii) Reporting the financial contribution in millions of United States dollars to the Global Environment Facility in table 3 of the NC (see issue 1 in table 14);

(iii) Providing details of measures to promote, facilitate and finance technology transfer and distinguish between activities undertaken by the public and private sectors (see issue 1 in table 15);

(iv) Reporting activities related to technology transfer, including success and failure stories, using table 6 of the NC (see issue 3 in table 15).

IV. Questions of implementation

150. 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

[5] The recommendations are given in full in the relevant sections of this report.

14, of the Kyoto Protocol with regard to timeliness, completeness and transparency. No question of implementation was raised by the ERT during the review.

Annex

Documents and information used during the review

A. Reference documents

2018 GHG inventory submission of Sweden. Available at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2018.

BR3 of Sweden. Available at http://unfccc.int/files/national_reports/biennial_reports_and_iar/submitted_biennial_reports/application/pdf/1973425_sweden-br3-1-swe_br3_20171222.pdf.

BR3 of Sweden; Additional Information. Available at http://unfccc.int/files/national_reports/biennial_reports_and_iar/submitted_biennial_reports/application/pdf/1973425_sweden-br3-1-swe_add_table_nc7andbr3_20171222.pdf.

BR3 CTF tables of Sweden. Available at https://cop23.unfccc.int/sites/default/files/resource/530176_Sweden-BR3-2-Final%20CTF_swe_2018_v2.0.xlsx.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories". Annex to decision 24/CP.19. Available at http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf.

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

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". 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.

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.

NC7 of Sweden. Available at http://unfccc.int/files/national_reports/annex_i_natcom_/application/pdf/6950713_sweden-nc7-1-swe_nc7_20171222.pdf.

NC7 of Sweden; Additional Information. Available at http://unfccc.int/files/national_reports/annex_i_natcom_/application/pdf/6950713_sweden-nc7-1-swe_add_table_nc7andbr3_20171222.pdf.

Report on the individual review of the annual submission of Sweden submitted in 2016. FCCC/ARR/2016/SWE. Available at https://unfccc.int/sites/default/files/resource/swe_0.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 Sweden. FCCC/IRR/2016/SWE. Available at https://unfccc.int/sites/default/files/resource/docs/2017/irr/swe.pdf.

Report of the technical review of the second biennial report of Sweden. FCCC/TRR.2/SWE. Available at https://unfccc.int/sites/default/files/resource/docs/2016/trr/swe.pdf.

Report on the technical review of the sixth national communication of Sweden. FCCC/IDR.6/SWE. Available at https://unfccc.int/sites/default/files/resource/docs/2014/idr/swe06.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.

"UNFCCC biennial reporting guidelines for developed country Parties". FCCC/SBSTA/2014/INF.6. Annex I to decision 2/CP.17. Available at http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention. Available at: https://unfccc.int/topics/mitigation/workstreams/pre-2020-ambition/compilation-of-economy-wide-emission-reduction-targets-to-be-implemented-by-parties-included-in-annex-i-to-the-convention.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Anna-Karin Nystrom and Ms. Malin Kanth (SEPA), including additional material. The following documents[6] were provided by Sweden:

Swedish Code of Statutes (Svensk författningssamling) SFS 2014:1434. 2014. Climate Reporting Regulation (Klimatrapporteringsförordning).

Swedish Environmental Protection Agency (Naturvardsverket). 2015. Agreement for joint work with Sweden's climate reporting (AgreeÖverenskommelse for gemensamt arbete med Sveriges klimatrapportering).

Svante Axelsson (national coordinator Fossil Free Sweden). Roadmap for Fossil Free competitiveness A Summary of Roadmaps from Swedish Business Sectors. http://fossilfritt-sverige.se/roadmaps-for-fossil-free-competitiveness/.

[6] Reproduced as received from the Party.