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

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 Japan, 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

ACE	Actions for Cool Earth
Annex II Party	Party included in Annex II to the Convention
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
CCS	carbon dioxide capture and storage
CH ₄	methane
COP	Conference of the Parties
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
CTF	common tabular format
DIAS	Data Integration and Analysis System
ERT	expert review team
ESD	education and sustainable development
F-gas	fluorinated gas
FY	fiscal year
GCF	Green Climate Fund
GCOS	Global Climate Observing System
GDP	gross domestic product
GEF	Global Environment Facility
GEJE	Great East Japan Earthquake (March 2011)
GEOS	Global Earth Observation System of Systems
GHG	greenhouse gas
GLOBE	Global Learning and Observations to Benefit the Environment
GOOS	Global Ocean Observing System
GOSAT	Greenhouse Gases Observing Satellite
GWP	global warming potential
GWPH	Global Warming Prevention Headquarters
HFC	hydrofluorocarbon
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
JBIC	Japan Bank for International Cooperation
JCM	Joint Crediting Mechanism
JICA	Japan International Cooperation Agency
JPY	Japanese yen
LDCF	Least Developed Countries Fund
LED	light-emitting diode
LNG	liquefied natural gas
LULUCF	land use, land-use change and forestry
MAFF	Ministry of Agriculture, Forestry and Fisheries
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOE	Ministry of the Environment
MOF	Ministry of Finance

MOFA	Ministry of Foreign Affairs
NA	not applicable
NC	national communication
NDC	nationally determined contribution
NE	not estimated
NEXI	Nippon Export and Investment Insurance
NF ₃	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N ₂ O	nitrous oxide
PaMs	policies and measures
PFC	perfluorocarbon
PV	photovoltaic
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”
RES	renewable energy sources
SCCF	Special Climate Change Fund
SF ₆	sulfur hexafluoride
UNESCO	United Nations Educational, Scientific and Cultural Organization
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 Japan. 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.1).¹

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

3. The review was conducted from 28 May to 2 June 2018 in Tokyo by the following team of nominated experts from the UNFCCC roster of experts: Ms. Patricia Grobben (Belgium), Ms. Thelma Krug (Brazil), Mr. Andrew Rakestraw (United States of America), Mr. Christoph Streissler (Austria) and Mr. Marius Țăranu (Republic of Moldova). Ms. Grobben and Ms. Krug were the lead reviewers. The review was coordinated by Ms. Veronica Colerio and Ms. Katia Simeonova (UNFCCC secretariat).

B. Summary

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

¹ At the time of the publication of this report, Japan had not yet submitted its instrument of acceptance of the Doha Amendment, and 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 Japan in its seventh national communication, including supplementary information under the Kyoto Protocol

<i>Section of NC</i>	<i>Completeness</i>	<i>Transparency</i>	<i>Reference to description of recommendations</i>	<i>Supplementary information under the Kyoto Protocol</i>	<i>Completeness</i>	<i>Transparency</i>	<i>Reference to description of recommendations</i>
Executive summary	Complete	Transparent	–	National system	Mostly complete	Mostly transparent	Issue 1 in table 6
National circumstances	Complete	Transparent	–	National registry	Complete	Transparent	–
GHG inventory	Complete	Transparent	–	Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	NA	NA	–
PaMs	Mostly complete	Transparent	Issue 2 in table 8	PaMs in accordance with Article 2	Mostly complete	Transparent	Issue 5 in table 8
Projections and the total effect of PaMs	Mostly complete	Transparent	Issue 2 in table 12; issue 1 in table 14	Domestic and regional programmes and/or arrangements and procedures	Complete	Transparent	–
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent	–	Information under Article 10 ^a	Complete	Transparent	–
Financial resources and transfer of technology	Mostly complete	Transparent	Issue 1 in table 16	Financial resources	Complete	Transparent	–
Research and systematic observation	Complete	Transparent	–	Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	–
Education, training and public awareness	Complete	Transparent	–				

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

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

3. Summary of reviewed supplementary information under the Kyoto Protocol

7. Japan is a Party to the Kyoto Protocol, but it did not assume commitments in the form of an economy-wide emission reduction target under Annex B to the Kyoto Protocol for the second commitment period (2013–2020). It continues, however, to adhere to the reporting obligations under the Kyoto Protocol: 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 Japan

<i>Supplementary information</i>	<i>Reference to section of NC7</i>
National registry	Section 2.3
National system	Section 2.2; also reported in the NIR 2018
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	NA
PaMs in accordance with Article 2	Section 3.2.4
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Sections 3.1.1 and 3.1.3
Information under Article 10	Section 6.4
Financial resources	Section 6.3
Minimization of adverse impacts in accordance with Article 3, paragraph 14	Section 3.2.4.2; also reported in the NIR 2018

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 Japan 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 legislation, population trends, geography and land use, climate and climate change, economic developments, energy, transport, the buildings sector, industry, agriculture, forestry, wastewater, the government and its administrative organization, the budget for global warming countermeasures, and the labour force.

9. The GEJE, which occurred in March 2011, caused considerable loss and damage in the country, including 15,889 people dead, 2,601 people missing, more than one million buildings damaged or destroyed, and economic damage of JPY 17 trillion (approximately USD 210 billion using the Organisation for Economic Co-operation and Development exchange rates for 2011). As a consequence of the GEJE, none of the 48 existing nuclear reactors in Japan was in operation in the FY2014. This number gradually increased, yet in

2018, only 5 of the country's 39 nuclear plants were back in operation, and their output remained a fraction of the total nuclear power plant output before the GEJE.

10. Nuclear power was developed in Japan in the 1970s in response to the need to fuel economic growth and alleviate concerns over energy security. The country's energy self-sufficiency had dropped from about 58 per cent in 1960, when Japan was using mainly domestic natural resources such as coal and hydropower, to about 10 per cent in the 1970s, when energy demand increased to meet the unprecedented growth in Japan's economy. When nuclear power plants came into operation, energy self-sufficiency increased to 20 per cent. Following the GEJE, however, it dropped again to only 6 per cent in 2011, slowly recovering to 8 per cent in 2016 with the restart of five nuclear reactors and the introduction of new RES. The main instrument to promote renewable energy has been the feed-in tariff introduced in 2012, which has led to a 26 per cent annual increase in RES. The capacity of solar PV, for example, increased by 170 per cent in 2016 compared with the 2012 level. In September 2017, the total installed capacity of RES comprised 97.8 GW, of which 48.4 was hydropower, 42.4 solar PV, 3.4 wind power, 3.1 biomass and 0.5 geothermal power.

11. In 1990, the fuel and energy mix for power generation comprised oil-fired thermal (29 per cent), nuclear (27 per cent), LNG-thermal (22 per cent), hydro (12 per cent) and coal-thermal (10 per cent). In 2016, this mix had changed substantially, with nuclear energy contributing only 2 per cent and RES accounting for 15 per cent, while the major component of the energy mix for power generation was based on fossil fuels: LNG-thermal accounted for 41 per cent, coal-thermal 33 per cent and oil-fired thermal 9 per cent.

12. The ERT noted that during the period 1990–2015 Japan's population and GDP increased by 2.9 and 27.8 per cent, respectively, while GHG emissions per GDP unit and GHG emissions per capita decreased by 18.4 per cent and increased by 1.3 per cent, respectively. Within the same period, total primary energy supply decreased by 2.0 per cent, reflecting energy efficiency gains, while total GHG emissions² increased by 4.3 per cent, mainly owing to substitution, in recent years, of nuclear energy supply with fossil fuels. Table 3 illustrates the national circumstances of Japan by providing some indicators relevant to emissions and removals.

Table 3

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

Indicator	Change (%)						
	1990	2000	2010	2014	2015	1990–2015	2014–2015
GDP per capita (thousands 2011 USD using purchasing power parity)	3 761.36	4 296.41	4 578.47	4 750.30	4 808.23	27.8	1.2
GHG emissions without LULUCF per capita (t CO ₂ eq)	10.27	10.92	10.18	10.70	10.40	1.3	–2.8
GHG emissions without LULUCF per GDP unit (kg CO ₂ eq per 2011 USD using purchasing power parity)	0.34	0.32	0.28	0.29	0.28	–18.4	–4.1

Sources: (1) GHG emission data: Japan's 2017 GHG inventory submission, version 1; (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.

² In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified, and excluding indirect emissions, unless otherwise specified. Values in this paragraph are calculated based on the 2017 annual submission, version 1.

(b) Assessment of adherence to the reporting guidelines

13. The ERT assessed the information reported in the NC7 of Japan and identified issues relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 4.

Table 4

Findings on national circumstances relevant to greenhouse gas emissions and removals from the review of the seventh national communication of Japan

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
1	Reporting requirement specified in paragraph 8 Issue type: transparency Assessment: encouragement	<p>In its NC7, Japan reported more concise information on the government structure than in its NC6, even though in the previous review report, a more detailed description of the government structure was requested. Limited information was provided in sections 1.5 (“Japan’s economy and industry”) and 1.10 (“Agriculture”) of chapter 1 (“National circumstances relevant to GHG emissions and removals”) on how national circumstances and changes in them have affected GHG emissions from the IPPU and agriculture sectors.</p> <p>During the review, in response to a question from the ERT, Japan provided information, in written form as well as during the presentation on the overview and national circumstances, on, for example, the decrease in the number of public building projects in the period 1997–2010, and the increase in the number of large projects for reconstruction after the GEJE and construction before the 2020 Tokyo Olympic Games and Paralympic Games, and the impacts of these projects on CO₂ emissions from cement production. Information was also provided on the decrease in milk consumption, increase of beef imports, decrease in cropland areas, prevention of excessive fertilization, and decrease in livestock manure generation resulting from the decrease in livestock population since 1990, and the impacts of all these factors on CH₄ and N₂O emissions from the agriculture sector.</p> <p>The ERT encourages Japan to improve the transparency of its reporting by including, in its next NC, in chapter 1 (“National circumstances relevant to GHG emissions and removals”), detailed information on the government structure (para. 8 (a)) including interministerial decision-making bodies (i.e. GWPH and its Executive Committee), and a brief description of national institutional arrangements for NCs and BRs. The ERT further encourages the Party to provide detailed information on how the Party’s national circumstances are relevant to factors affecting GHG emissions and removals, including disaggregated indicators, in order to explain the relationship between the national circumstances and emissions or removals, and other relevant information that best describes Japan’s national circumstances and historic GHG emission trends.</p>

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.

2. Information on greenhouse gas inventory arrangements, emissions, removals and trends**(a) Technical assessment of the reported information**

14. Total GHG emissions³ excluding emissions and removals from LULUCF increased by 3.0 per cent between 1990 and 2016, whereas total GHG emissions including net emissions and removals from LULUCF increased by 3.6 per cent over the same period. The year with the highest emission levels in Japan to date is 2013. Table 5 illustrates the emission trends by sector and by gas for Japan.

³ Values in this paragraph are calculated based on the 2018 annual submission, version 1.

Table 5
Greenhouse gas emissions by sector and by gas for Japan for the period 1990–2016

	GHG emissions (kt CO ₂ eq)						Change (%)			Share (%)	
	1990	2000	2005	2010	2015	2016	1990–2016	2005–2016	2015–2016	1990	2016
<i>Sector</i>											
1. Energy	1 089 394.93	1 196 791.10	1 226 463.57	1 161 126.40	1 173 147.55	1 153 566.77	5.9	–5.9	–1.7	86.0	88.4
A1. Energy industries	368 273.59	402 424.37	454 360.91	451 015.62	500 889.33	532 297.94	44.5	17.2	6.3	29.1	40.8
A2. Manufacturing industries and construction	351 360.77	348 765.46	336 297.08	302 275.96	292 682.35	279 146.90	–20.6	–17.0	–4.6	27.7	21.4
A3. Transport	205 212.49	257 045.49	240 918.07	224 189.20	210 735.86	208 796.39	1.7	–13.3	–0.9	16.2	16.0
A4. and A5. Other	159 383.25	186 208.32	193 403.19	182 286.23	167 627.82	132 086.22	–17.1	–31.7	–21.2	12.6	10.1
B. Fugitive emissions from fuels	5 164.84	2 347.45	1 484.32	1 359.39	1 212.20	1 239.31	–76.0	–16.5	2.2	0.4	0.1
C. CO ₂ transport and storage	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NA, NE, NO	NA	NA	NA	NA	NA
2. IPPU	110 422.65	108 173.57	86 720.82	80 157.56	92 812.49	95 855.97	–13.2	10.5	3.3	8.7	7.3
3. Agriculture	37 620.75	35 305.46	35 190.66	35 837.76	33 642.46	33 505.37	–10.9	–4.8	–0.4	3.0	2.6
4. LULUCF	–62 445.87	–87 822.29	–91 316.45	–69 814.17	–60 314.55	–56 771.18	–9.1	–37.8	–5.9	NA	NA
5. Waste	29 256.03	31 975.04	27 026.28	23 180.44	21 458.79	21 639.74	–26.0	–19.9	0.8	2.3	1.7
6. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indirect CO ₂	5 370.16	4 131.74	3 102.88	2 355.73	2 102.80	2 102.32	–60.9	–32.2	0.0	NA	NA
<i>Gas^a</i>											
CO ₂	1 155 263.41	1 262 734.46	1 286 856.31	1 211 572.87	1 223 666.48	1 204 318.62	4.2	–6.4	–1.6	91.2	92.3
CH ₄	44 337.53	37 778.53	35 551.20	34 735.13	31 140.88	30 792.28	–30.6	–13.4	–1.1	3.5	2.4
N ₂ O	31 739.13	29 689.94	25 063.87	22 475.78	20 979.49	20 676.48	–34.9	–17.5	–1.4	2.5	1.6
HFCs	15 932.31	22 852.00	12 781.83	23 305.23	39 242.60	42 517.72	166.9	232.6	8.3	1.3	3.3
PFCs	6 539.30	11 873.11	8 623.35	4 249.54	3 308.10	3 375.33	–48.4	–60.9	2.0	0.5	0.3
SF ₆	12 850.07	7 031.36	5 053.01	2 423.87	2 152.71	2 252.99	–82.5	–55.4	4.7	1.0	0.2
NF ₃	32.61	285.77	1 471.75	1 539.74	571.03	634.44	1 845.5	–56.9	11.1	0.0	0.0
Total GHG emissions without LULUCF	1 266 694.36	1 372 245.17	1 375 401.33	1 300 302.15	1 321 061.29	1 304 567.85	3.0	–5.2	–1.2	100.0	100.0

	<i>GHG emissions (kt CO₂ eq)</i>						<i>Change (%)</i>			<i>Share (%)</i>	
	<i>1990</i>	<i>2000</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2016</i>	<i>1990– 2016</i>	<i>2005– 2016</i>	<i>2015– 2016</i>	<i>1990</i>	<i>2016</i>
	Total GHG emissions with LULUCF	1 204 248.49	1 284 422.89	1 284 084.88	1 230 487.98	1 260 746.74	1 247 796.67	3.6	–2.8	–1.0	NA
Total GHG emissions without LULUCF, including indirect CO₂	1 272 064.52	1 376 376.91	1 378 504.21	1 302 657.89	1 323 164.09	1 306 670.18	2.7	–5.2	–1.2	NA	NA
Total GHG emissions with LULUCF, including indirect CO₂	1 209 618.65	1 288 554.63	1 287 187.76	1 232 843.72	1 262 849.54	1 249 899.00	3.3	–2.9	–1.0	NA	NA

Source: GHG emission data: Japan's 2018 annual submission, version 1.

^aEmissions by gas without LULUCF and without indirect CO₂.

15. The increase in total emissions was driven mainly by an increase in CO₂ emissions of 4.2 per cent between 1990 and 2016, attributed to economic growth and associated energy demand. The recent increase in coal consumption for power generation in the energy industries, resulting from a shift from nuclear to fossil fuel-based electricity generation after the GEJE, also played a part. Emissions of HFCs also increased considerably, by 166.9 per cent, in the same period, as a result of substitution by HFCs of ozone-depleting substances controlled by the Montreal Protocol. In contrast, emissions from manufacturing industries decreased by 20.6 per cent from 1990 to 2016. The increasing trend of emissions from transport was reversed in 2002, resulting in an overall increase in emissions of only 1.7 per cent in 2016 compared with the 1990 level.

16. Between 1990 and 2016, GHG emissions from the energy sector increased by 5.9 per cent (64,172 kt CO₂ eq) owing mainly to an increase in fossil fuel-based electricity production. While CO₂ emissions from liquid fuels decreased by 31.0 per cent (200,185 kt CO₂) in this period, CO₂ emissions from solid fuels increased by 47.7 per cent (145,950 kt CO₂) and from gaseous fuels increased by 116.9 per cent (136,192 kt CO₂). Japan performed a factor analysis to identify the main drivers of emission trends for energy-related CO₂ emissions. This analysis showed that, apart from the increased carbon intensity due to the fuel shift mentioned in paragraph 15 above, the decrease in energy intensity of the country's economy has contributed considerably to a reduction in emissions over the past years. The ERT commends Japan for undertaking the factor analysis, which supports a deeper understanding of the drivers of energy consumption and the effects of PaMs.

17. Between 1990 and 2016, GHG emissions from the IPPU sector decreased by 13.2 per cent (14,566.68 kt CO₂ eq) owing mainly to a reduction in emissions from the mineral industry and chemical industry, in particular in N₂O emissions from the latter industry. These reductions have been partly offset by a major increase in HFC emissions attributable to their substitution for ozone-depleting substances controlled by the Montreal Protocol. The increase in the 1990–2016 period was 166.9 per cent (42,517.72 kt CO₂ eq), making HFC emissions the largest source of IPPU emissions.

18. Between 1990 and 2016, GHG emissions from the agriculture sector decreased by 10.9 per cent (4,115.38 kt CO₂ eq), owing mainly to a decrease in CH₄ emissions from enteric fermentation due to a decrease in the number of cattle, and a decrease in N₂O emissions from agricultural soils due to a decrease in the use of fertilizers. These reductions have been partly offset by increases in CH₄ emissions from rice cultivation.

19. The LULUCF sector was a net sink of 56,771.18 kt CO₂ eq in Japan in 2016; net GHG removals have decreased by 5,674.69 kt CO₂ eq since 1990. The trend was mainly driven by removals in forest land, which are due to the high average age of Japan's forests.

20. Between 1990 and 2016, GHG emissions from the waste sector decreased by 26.0 per cent (7,616.29 kt CO₂ eq) owing mainly to reduced CH₄ emissions from solid waste disposal and, since about the year 2000, reduced CO₂ emissions from waste incineration, which together reflect the success of Japan's waste management policy.

21. In 2016, CO₂ emissions from the energy sector remained by far the dominant source of total GHG emissions, accounting for 87.8 per cent. The energy sector also accounted for 95.8 per cent of total CO₂ emissions, followed by the IPPU sector, which accounted for only 3.8 per cent. Energy industries accounted for 46.2 per cent of energy-related CO₂ emissions, followed by manufacturing industries and construction, 24.2 per cent, and transport, 18.1 per cent. The most salient increase in emissions stems from energy industries and is due to an increase in solid fuel consumption for electric power generation, particularly since 2011. CH₄ emissions in 2016 were 30.6 per cent lower than those in 1990. Their decrease is due to a decrease in fugitive emissions from solid fuels and a decrease in emissions from the waste sector. N₂O emissions decreased by 34.9 per cent between 1990 to 2016, mainly owing to a technological change in the production of adipic acid.

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

(b) Assessment of adherence to the reporting guidelines

23. The ERT assessed the information reported in the NC7 of Japan 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**

24. Japan 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 most of the elements mandated by paragraph 30 of the annex to decision 15/CMP.1. The ERT took note of the review of the changes to the national system reflected in the report on the individual review of the 2017 annual submission of Japan.

(b) Assessment of adherence to the reporting guidelines

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

Table 6

Findings on the national system for the estimation of anthropogenic emissions by sources and removals by sinks from the review of the seventh national communication of Japan

<i>No.</i>	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement specified in paragraph 30 Issue type: completeness Assessment: recommendation	<p>The NC7 does not include all mandatory elements, such as the contact information for the national entity and its designated representative with overall responsibility for the national inventory, requested by decision 15/CMP.1, paragraph 30(a) and a transparent description of the process for collecting activity data, as requested by decision 15/CMP.1, paragraph 30(c).</p> <p>During the review, Japan provided the required information on the national entity, while presenting Japan's national system under Article 5, paragraph 1, of the Kyoto Protocol. The Party explained that this information was provided in the GHG inventory submitted in 2017, even though the NC7 does not include a cross reference to it. The national entity responsible is the Ministry of the Environment, General Affairs Division, Global Environment Bureau, Low-Carbon Society Promotion Office and the contact information is the following email address: CHIKYU-TEITANSO@env.go.jp.</p> <p>The ERT recommends that Japan improve the completeness of its reporting by including in its next NC contact information for the national entity and its designated representative with overall responsibility for the national inventory and a detailed description of the process for collecting activity data, or a cross reference to the NIR where the information can be found.</p>

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

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

26. In the NC7 Japan provided information on how its national registry performs the functions in accordance with the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and complies with the requirements of the technical standards for data exchange between registry systems. The ERT took note of the review of the changes to the national

registry reflected in the report on the individual review of the 2017 annual submission of Japan.

(b) Assessment of adherence to the reporting guidelines

27. The ERT assessed the information reported in the NC7 of Japan 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. The Constitution of Japan, enacted in 1947, is the fundamental law of Japan, a constitutional monarchy with legislative, executive and judiciary branches of government. Executive power is vested in the Cabinet, comprising 1 office and 12 ministries, of which the Prime Minister is leader. The ministries directly involved in climate policy are MAFF, METI, MEXT, MLIT, MOE, MOF and MOFA. At the subnational level, Japan has 47 prefectures, which are further divided into 791 cities, 744 towns and 189 villages. The nation has been undergoing administrative reorganization by merging many of the cities, towns and villages with the aim of cutting administrative costs.

29. The responsibility for climate change policymaking in Japan lies with the entire Cabinet, including MOE. Legal instruments related to climate change are adopted and revised by the Diet. The key laws underpinning the climate change policy of Japan are the Basic Environment Law (1993, Law No. 91) (the law is implemented through basic environment plans, which are updated every five years), the Act on Promotion of Global Warming Countermeasures (1998, Act No. 117), the Act on the Rational Use of Energy (1979, Act No. 49), the Act on Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities (2000, Act No. 100) and the Act on Rational Use and Proper Management of Fluorocarbons (2001, Act No. 64; amended in 2013, Act No. 39; entered into force in 2015).

30. Coordination of the implementation, monitoring and review of mitigation policies is carried out by GWPH, which was established within the Cabinet in 1997 with the aim of implementing the Kyoto Protocol. It is chaired by the Prime Minister and includes all Cabinet ministers. GWPH, as well as the Executive Committee of GWPH, examines on an annual basis the status of achievement of the target, by gas and by source and sink categories, using relevant indices, as well as the progress of individual actions and measures on the basis of stringent rules and regular evaluations and examinations by relevant councils.

31. The Kyoto Protocol Target Achievement Plan for the first commitment period, national and local government action plans, guidelines for controlling GHG emissions, GHG emissions accounting, reporting and disclosure systems, and emissions trading in accordance with the Kyoto Protocol mechanisms, as well as GWPH itself, were all implemented in accordance with the provisions of the Act on Promotion of Global Warming Countermeasures.

32. For Japan, the Convention entered into force on 21 March 1994. After the GEJE, Japan revised its earlier pledge for 2020 under the Cancun Agreements and committed in 2013 to reducing its GHG emissions under the Convention by 3.8 per cent below the 2005 level by 2020. The new pledge effectively translates to a 5 per cent emission increase in 2020 compared with the 1990 level. In May 2016, Japan resubmitted this pledge and added “or more” so as to capture additional emission reductions resulting from reintegration into the power grid of nuclear power plants that have passed the stringent safety standards adopted after the GEJE.

33. In 2013, GWPH replaced the Kyoto Protocol Target Achievement Plan with the Plan for Global Warming Countermeasures, which aims at achieving the target pledged under the

Cancun Agreements. GWPH has the responsibility of ensuring coordination among ministries and agencies that work on the implementation of the Plan for Global Warming Countermeasures. Regional energy and global warming mitigation councils have been established to follow up and support the efforts of local governments and agencies to implement the national plan.

34. Japan adopted a midterm target of a GHG emission reduction of 26 per cent by FY2030 compared with the FY2013 level (or 25.4 per cent compared with the FY2005 level). This target was submitted to the UNFCCC in 2016 as Japan's NDC under the Paris Agreement. Japan aims to achieve the midterm target through domestic emission reductions and through removals from elected LULUCF activities. During the review, the Party explained that to achieve its NDC, major emission reductions are required in 2030 compared with the 2013 emission level from its "commercial and other" sector (40 per cent) and "residential" sector (39 per cent). The NDC was set following bottom-up estimates, by sector, of reductions and removals that could be achieved with existing domestic PaMs, taking into account technological and cost considerations. Japan considers its NDC to be consistent with the IPCC AR5 long-term emission pathways up to 2050 towards achieving the global temperature goal of limiting the increase in the global average temperature to below 2 °C. This goal implies at least a 50 per cent reduction of global GHG emissions by 2050, and as a part of this, the goal of developed countries reducing GHG emissions in aggregate by 80 per cent or more by 2050. Japan intends to contribute to long-term reductions through future actions that will be ongoing, such as the development and diffusion of low-carbon technologies and the transition to a low-carbon economy and society.

35. Japan's long-term goal is to reduce GHG emissions by 80 per cent by 2050, while pursuing both mitigation of global warming and economic growth. During the review, the Party explained that its long-term goal is currently being discussed among the relevant stakeholders within the Expert Panel established in the Cabinet, and that the Government's policy towards achievement of the goal would be developed in 2019. The Party views promoting innovative technologies and innovations in lifestyle and finding solutions to address economic and social problems as essential for achieving its long-term goal. At the same time, Japan encourages domestic investment in this field in order to increase international competitiveness while gathering knowledge and ideas to achieve significant emission reductions through long-term and strategic efforts.

36. In 2016, the Government of Japan launched the Plan for Global Warming Countermeasures in order to address climate change in a comprehensive and strategic manner. The plan is the cornerstone of Japan's policy for achieving its NDC by 2030 as it introduces key measures to be implemented by the national Government and local governments, as well as by businesses and citizens.

37. Japan has legislative arrangements and administrative procedures in place to make information publicly accessible. According to the Law Concerning the Promotion of Business Activities with Environmental Consideration by Specified Corporations, etc., by Facilitating Access to Environmental Information, and Other Measures (2004, part of Act No. 77), the Japanese Government encourages the use of environmental information by stakeholders and by the general public and provides the conditions for business activities with environmental considerations to be highly valued by society and by markets.

38. Japan has national legislative arrangements and administrative procedures in place that seek to ensure 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. Japan reported that measures for managing forest carbon sinks to enhance activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol promote forest conservation and sustainable forest management. This in turn contributes to the conservation of biodiversity and the sustainable use of natural resources because these measures are linked to objectives regarding the multiple roles of forests, as well as the supply and usage of forest products. These objectives are outlined in the Basic Plan for Forest and Forestry, which was elaborated in accordance with the Forest and Forestry Basic Act (1964, Act No. 161).

(b) **Assessment of adherence to the reporting guidelines**

39. The ERT assessed the information reported in the NC7 of Japan 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.

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

(a) **Technical assessment of the reported information**

40. Japan provided information on its package of PaMs implemented by sector and by gas, in order to fulfil its commitments under the Convention and the Paris Agreement. In response to the recommendations made in the previous review report, Japan reported consistent information on its PaMs between the textual and tabular information, as well as including more detail.

41. Japan gave priority to implementing the PaMs that make the most significant contribution to its emission reduction efforts. Japan provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals in accordance with the objective of the Convention. To this end, Japan takes mitigation actions and updates its policies on the basis of available international scientific knowledge and a detailed analysis of feasible reductions that can be achieved in each sector with existing technologies and innovation. The Party also strives to address the global warming challenge through promoting innovation, research and development (see section II.F below). Japan reported on how it periodically updates its PaMs to reduce greater levels of emissions (see para. 30 above).

42. Some PaMs are deferred to the regional and local level in the context of the local government action plans, which are established and implemented by local governments. The content of these plans is guided by the Act on Promotion of Global Warming Countermeasures and the requirement for such plans to align with the national Plan for Global Warming Countermeasures. The local plans need to address the promotion of renewable energy, the promotion of activities by local businesses and by residents, the improvement of public transport, and the development of a recycling-oriented society through actions. Follow-up on the results from the local plans is being undertaken together with the national Government. During the review, Japan provided information on several actions at the local level; for example, measures at municipal solid waste disposal sites, and the promotion of urban greening.

43. The Plan for Global Warming Countermeasures has six overall concepts that guide Japan's approach to mitigation actions: promoting PaMs that provide benefits for the environment, economy and society in a holistic way; using a combination of policy instruments to ensure achievement of the targets; regularly updating and reviewing the targets in line with the long-term goal of the Paris Agreement; enhancing research and development of innovative low-carbon technologies; advancing low-carbon technologies globally through JCM and other efforts; and raising public awareness and acknowledging the importance of assessment and review processes (plan-do-check-act cycle).

44. The budget allocated in 2017 for implementing the PaMs under the Plan for Global Warming Countermeasures was JPY 818 billion (USD 7.47 billion), which represented 0.15 per cent of Japan's nominal GDP in that year. Nearly half of this budget is allocated to PaMs that contribute to the Party's NDC.

45. The key overarching cross-sectoral policies reported by Japan are various fiscal, financial and voluntary instruments, as well as mandatory accounting. They comprise a domestic credit scheme (J-Credit Scheme); a special tax for climate change mitigation; the Low Carbon Society Establishment Finance Initiative; green bonds; and the introduction of a mandatory GHG accounting, reporting and disclosure programme. These policies and instruments are discussed in paragraphs 46–50 below.

46. The **J-Credit Scheme** aims to promote GHG emission reductions and removals in Japan by 2030 that are cost-efficient and enhance corporate social responsibility activities

and voluntary carbon offsetting. During the review, Japan presented details of the scheme. The scheme is voluntary and requires interested companies to register their participation with the central government. Credits resulting from emission reductions are certified by a steering committee and can be used for achieving commitments under voluntary action plans (see para. 71 below), the Act on Promotion of Global Warming Countermeasures or the Energy Efficiency Act (Joint Energy Efficiency Projects). As at January 2018, 235 projects had been registered, representing an estimated emission reduction of 7,900 kt CO₂ eq in 2030, and the actual certified credits issued amounted to 2,900 kt CO₂ eq. There are two ways to trade the credits: over the counter (price is not known) and via auctions held several times a year. The most recent auction, held in April 2018, had trading prices of USD 11–13 per t CO₂ eq and about USD 15 for renewable energy credits.

47. The **tax for climate change mitigation** was introduced in 2012 as a levy on all fossil fuels with the revenue being used for mitigation actions addressing energy-related CO₂ emissions, such as promoting renewable energy and improving energy efficiency. The rate increased gradually over three and a half years after introduction of the tax and has reached JPY 289 per t CO₂ (USD 2.6 per t CO₂). The tax revenue increased accordingly to reach about JPY 260 billion per year.

48. The **Low Carbon Society Establishment Finance Initiative** was launched by the Government in 2013 to mobilize additional private finance for domestic climate action. The initiative has three components: an investment fund for promoting local low-carbon investments (JPY 4.8 billion), an interest subsidy for expanding environmental finance (JPY 1.6 billion) and an eco-lease promotion programme (JPY 1.9 billion).

49. Japan has promoted the issuance of **green bonds** by companies, local governments and financial institutions since 2014 with a view to attracting private funds for investment in green projects related to renewable energy, the improvement of the energy efficiency of buildings, and so forth. The results are encouraging: in 2017, bonds were issued for more than JPY 160 billion (which is more than five times the amount issued in 2014). The Government of Japan intends to further promote the green bonds market across Japan.

50. The **mandatory GHG accounting, reporting and disclosure programme** aims to support voluntary action by businesses and the general public. For energy-related CO₂ reporting, the reporting framework of the Energy Savings Act serves as the legal basis for the programme. Even though the impact from this programme is not assessed, it is an important part of Japan's portfolio of PaMs because in 2014 it already covered about half of the total GHG emissions and it has helped to raise the awareness of businesses and other stakeholders about the scale of emissions, the associated risk to competitiveness, and options and opportunities to reduce emissions. Table 7 provides a summary of the reported information on the PaMs of Japan.

Table 7
Summary of information on policies and measures reported by Japan

<i>Sector</i>	<i>Key PaMs</i>	<i>Estimate of mitigation impact by 2020 (kt CO₂ eq)</i>	<i>Estimate of mitigation impact by 2030 (kt CO₂ eq)</i>
Policy framework and cross-sectoral measures	Plan for Global Warming Countermeasures	–	–
	J-Credit Scheme	3 210	6 510
	Special tax for climate change mitigation	–	6 190 ^a
Energy			
Transport	Diffusion of next-generation vehicles and improvement of fuel efficiency	7 025	23 790
Renewable energy	Maximum introduction of renewable energy – expanded use of electricity generated by renewable energy	–	156 160 to 165 990

Sector	Key PaMs	Estimate of mitigation impact by 2020 (kt CO ₂ eq)	Estimate of mitigation impact by 2030 (kt CO ₂ eq)
	Maximum introduction of renewable energy – expanded use of heat generated by renewable energy	–	36 180
Energy efficiency	Introduction of highly energy-efficient equipment and devices		
	Industrial sector	42 325 ^b	71 017
	Commercial and other sector	9 086 ^c	11 484
	Residential sector	9 389 ^d	15 279
	Thermal power generation	7 000 ^e	11 000
IPPU	Measures related to F-gases	17 900 ^f	47 000
Agriculture	Measures for reduction of CH ₄ emissions associated with rice cultivation	330 to 920	640 to 2 430
	Measures for sinks in agricultural soils	7 080 to 8 280	6 960 to 8 900
LULUCF	Strategies for forest sinks	38 000	27 800
Waste	Advancement of combustion in sewage sludge incineration facilities	500	780

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

^a Estimate by the ERT on the basis of the information provided during the review that the estimated CO₂ reduction effect of the tax is a 4.4 per cent reduction in emissions in 2030 compared with the 2013 level. The ERT used 2013 net emissions, excluding LULUCF and indirect CO₂ emissions.

^b Estimates by the ERT, calculated as the sum of the mitigation impact of all individual activities included in “Promotion of introduction of highly energy-efficient equipment and devices for all the industrial sectors and cross industrial” in CTF table 3.

^c Estimates by the ERT, calculated as the sum of the mitigation impact of all individual activities included in “Diffusion of highly energy-efficient equipment and devices (commercial and other sector)” in CTF table 3.

^d Estimates by the ERT, calculated as the sum of the mitigation impact of all individual activities included in “Diffusion of highly energy-efficient equipment and devices (residential sector)” in CTF table 3.

^e Impact of mitigation activity from “Persuasion of high efficiency in thermal power generation” included in “Reduction of CO₂ emission intensity in the power sector”.

^f Estimates by the ERT, calculated as the sum of the mitigation impact of all legal instruments aimed at reducing F-gases (excluding the impact of voluntary initiatives in industry).

51. Japan presented information on its PaMs by gas, subdivided by sector. This is not consistent with paragraph 17 of the UNFCCC reporting guidelines on NCs, which requires reporting by sector, subdivided by gas (see table 8, issue 2 below).

(b) Policies and measures in the energy sector

52. **Energy supply.** Energy production and consumption accounted for 88.4 per cent of the total GHG emissions in 2016 or 1,154 million tonnes CO₂ eq. This was an increase of 5.9 per cent compared with the 1990 level and a decrease of 5.9 per cent compared with the 2005 level. Fuel combustion by the energy industries accounted for 44.2 per cent of total CO₂ emissions (excluding LULUCF) in 2016. According to the NC7, the main primary energy sources are petroleum (41.0 per cent), coal (25.9 per cent) and LNG (24.3 per cent). In 2015, 43.0 per cent of the final energy consumption was in the industrial sector (including non-energy use), 32.0 per cent was in the residential and commercial sector and 23.0 per cent was in the transport sector.

53. Japan’s energy policy is designed to achieve safety, energy security, economic efficiency, environmental objectives and relevant policy targets. The policy is implemented through Strategic Energy Plans, reviewed at least every three years. The plans in recent years have been based on two pillars: increasing energy efficiency (and reducing final energy

demand); and reducing emissions from the energy supply sector. These pillars are supported by PaMs that aim to reduce CO₂ emission intensity through the introduction of new RES, the use of nuclear power from existing plants that have been reviewed as safe to resume operation by the Nuclear Regulation Authority (see para. 54 below) and the setting of power generation efficiency standards for new fossil fuel powered plants. During the review, the Party presented the main elements of its 2018 Strategic Energy Plan, showing that Japan aims to achieve a power generation mix for 2030 that comprises 22–24 per cent RES, 20–22 per cent nuclear, 27 per cent LNG, 26 per cent coal and 3 per cent petroleum. These shares are based on the assumption that Japan will achieve a reduction in energy demand of 17 per cent in 2030 compared with the 2013 level.

54. In 2015, the electricity industry voluntarily agreed to achieve an emission factor of 0.37 kg CO₂/kWh for power generation, corresponding with the national energy mix agreed in the 2015 Strategic Energy Plan and with the NDC. The measures in place to achieve this emission factor are monitored and evaluated annually and will be revised if it becomes clear that with such measures the goal of 0.37 kg CO₂/kWh is not achievable. During the review, Japan informed the ERT that the emission factor was 0.53 kg CO₂/kWh for 2015 and 0.52 kg CO₂/kWh for 2016. The further improvement of the power generation efficiency of coal-fired thermal power by 6.7 per cent, the introduction of CCS (see para. 55 below) and the pace of reconnection of nuclear power plants to the grid will largely affect the emission factor. During the review, Japan informed the ERT that safety standards for nuclear power plants were revised after the GEJE. Plants that meet the standards can restart operations. As at April 2018, the contribution of nuclear power remained minimal; only seven plants had met the standards and restarted operation. The number of plants in operation is increasing every year, although the public's trust in their safety still needs to be regained. During the review, Japan further explained that it believes that the restart of nuclear power plants will not impact the diffusion rate of renewable energy.

55. During the review, Japan presented its policies for new technologies. The possibility of the practical use of CCS technologies by 2020 is envisaged. Potential storage sites – including offshore sites – have been identified and the necessary PaMs will be considered in the near future. Japan considers that the low carbon price (introduced through the tax for climate change mitigation (see para. 47 above)) is the main barrier for CCS and that the introduction of a carbon market or regulatory measures might be necessary for the technology to be taken up. CCS will allow Japan to increase its coal-fired power capacity in accordance with the Strategic Energy Plans while still working towards the achievement of its 2030 GHG emission reduction target. Japan already has coal-fired plants producing 45 GW in operation, and the Party informed the ERT that the construction of plants for an additional 10 GW capacity is in the pipeline. The ERT noted that if these plants are constructed and put into operation, they may offset the gains from RES and lead to a substantial increase in emissions, an increased risk in lock-in carbon-intensive infrastructure, and underachievement of the NDC. During the review, Japan explained that a regulatory framework based on the Act on the Rational Use of Energy and the Sophisticated Methods of Energy Supply Structures has been introduced for utilizing coal-fired power and that the energy mix and CO₂ emission reduction target for FY2030 will be achieved through these efforts.

56. **Renewable energy sources.** Since the GEJE in 2011, Japan has shifted the focus of its energy policy and geared its efforts towards increasing the share of renewable energy capacity for both power and heat generation. This has resulted in a 15 per cent share of RES (including hydropower that was in operation before the GEJE) in the overall power generation in 2016 compared with 10 per cent in 2012. The main technology promoted is solar PV, with wind, geothermal, hydro and biomass also promoted but to a lesser extent. As mentioned in paragraph 53 above, Japan aims for a 22–24 per cent share of renewable energy in its power generation mix by 2030. In absolute terms, this means 236.6–251.5 TWh electricity generated from RES, including 40 per cent from hydropower, 30 per cent from solar PV, 18 per cent from biomass, 7 per cent from wind and about 5 per cent from geothermal.

57. Japan promotes renewable energy generation and use while considering issues such as reliable supply, cost and environmental aspects. The introduction of a feed-in tariff scheme in 2012 boosted renewable energy, with capacity increasing at an annual rate of 26 per cent.

Most of this increase was realized by the deployment of solar PV, which increased by 170 per cent between 2012 and 2016. The feed-in tariff scheme was the successor of the Surplus Electricity Purchasing Scheme introduced in 2009, which in turn replaced the Renewable Portfolio Standards scheme introduced in 2003.

58. During the review, Japan informed the ERT of the main challenges encountered regarding renewable energy deployment, namely, the relatively high cost of renewable energy generation (compared with that in other countries), finding a sustainable balance in RES technologies (until 2016, solar PV accounted for almost 95 per cent of the additional installed RES capacity) and constraints related to grid access and capacity. To reduce costs for RES deployment, Japan introduced in 2017 an auction for solar PV above 2 MW, sets forward-looking price targets (e.g. a midterm price target) and promotes cost reduction through technological advances (including support of research and development). A number of barriers unrelated to cost, for example location constraints, also prevent Japan from realizing the proven renewable energy potential of technologies other than solar PV, in particular wind. Japan tries to expand renewable energy production close to the areas of energy demand to avoid grid constraint. It sees doing so also as a means to revitalize local economies and create jobs locally, thereby reducing rural depopulation.

59. Japan provided additional information during the review on its promotion of hydrogen energy based on renewable energy. Renewable energy hydrogen stations and fuel cell buses, forklifts and garbage trucks have already been introduced on a pilot scale.

60. **Energy efficiency.** PaMs targeting the improvement of energy efficiency have by far the largest total combined GHG emission reduction potential in Japan. The Act on the Rational Use of Energy, which entered into force in 1979, aims at ensuring the effective utilization of fuel resources and thus increasing energy security. The Act has been amended several times with a view to enhancing energy efficiency in various sectors. It specifies a framework under which business operators with overall annual energy consumption (head offices, manufacturing plants, branch offices, sales offices, etc.) of at least 1,500 kl are required to measure and report their energy consumption to the Government annually. In 1998, under a revision of the Act, the Top Runner Programme was created. This programme sets energy efficiency standards for household appliances, equipment and building materials based on models with the highest efficiency in each category. The energy efficiency standards for large buildings became mandatory in 2015. In its Fourth Strategic Energy Plan approved in 2014, Japan set an ambitious goal of net zero energy consumption as standard for new constructed buildings by 2030 (see para. 65 below).

61. During the review, Japan presented an overview of the energy efficiency improvements it has achieved, expressed in terms of final energy consumption over real GDP and with an emphasis on the period 1970–1990, when its achievements were most significant. In the following 20 years, the rate of improvement has slowed down; however, Japan is aiming for a 35 per cent improvement in final energy consumption efficiency in 2030 compared with the 2012 level.

62. Japan promotes energy efficiency improvement in all sectors through a diverse portfolio of instruments tailored to each: voluntary agreements with the industrial and power sectors; subsidies for the introduction of highly energy-efficient technologies in the industrial, commercial and other, residential, and transport (all modes) sectors; and standards for automobiles and household electrical appliances (under the Top Runner Programme) in the transport and residential sectors. Japan also uses taxation, awareness-raising and the promotion of innovation and technology development across all sectors. Existing energy efficiency and conservation measures are expected to reduce final energy demand by 13 per cent in 2030 compared with the WOM scenario.

63. Estimates for the mitigation impact of the deployment of highly energy-efficient equipment and devices in final demand sectors as well as strict standards for buildings clearly show the significant contribution these measures will have to the achievement of Japan's emission reduction targets for 2020 and 2030.

64. **Residential and commercial sectors.** These sectors accounted for 10.1 per cent of the total energy-related CO₂ emissions from energy consumption in 2016. Inventory data for 2016 show a decrease in these emissions of 33 per cent compared with the 2005 level and

15.6 per cent compared with the 1990 level. The emission decrease is mainly due to a decrease in the population and an associated decrease in the number of households, and the effect of energy efficiency measures. During the review, Japan highlighted that a major improvement in energy efficiency in the buildings sector is envisaged as the energy consumption of this sector comprised one third of the total final energy consumption in 2013, which was the second largest contribution after the industrial sector.

65. While the Top Runner Programme for household appliances, equipment and building materials (see para. 60 above) remains central for the residential sector, Japan aims to further reduce energy consumption in both the residential and commercial sectors through the promotion of low-carbon buildings and the accelerated introduction of net zero energy buildings and houses. These buildings are more energy efficient than the standard and satisfy their remaining energy demand through solar PV power generation. During the review, Japan presented details on this policy, aimed at improving the energy standards of houses and buildings. Compliance with energy efficiency standards will gradually become mandatory for newly constructed housing and buildings by 2020. The aim is for more than half of newly constructed custom-built detached houses constructed by housing manufacturers to be net zero energy houses by 2020. Net zero energy houses should become standard for new residential construction by 2030. More than 42,000 net zero energy houses were built in FY2017. Newly constructed public buildings aim to be net zero energy by 2020, while for newly constructed buildings the aim is to achieve net zero energy as standard by 2030. The national Government supported the introduction of 40 or more net zero energy buildings by local governments and private sector companies in FY2017. Japan also provided the ERT with analyses of health benefits and cost savings of net zero energy houses.

66. Other PaMs targeting the energy efficiency of buildings include the introduction of energy management systems for homes and buildings, which make energy consumption visible to the consumer, and the development of low-carbon cities through, among other things, the improvement of the thermal environment (e.g. prevention of heat island effects) and the promotion of LEDs for street and security lighting. During the review, Japan presented the CO₂ reduction potential diagnostic project, an audit programme aimed at identifying additional emission reduction potential. The results so far show a 10 per cent or more emission reduction in factory and office buildings. The potential is greater in small and medium-sized facilities. The Party also provided detailed information, including installation costs, pay-back periods and energy savings that can be realized, on examples of further identified measures. Lastly, raising public awareness on how to reduce energy consumption is also an important instrument. This is discussed further in chapter II.G below.

67. **Transport sector.** The transport sector was responsible for 16 per cent of total GHG emissions in Japan in 2016. The trend for this sector is slightly downward since 2000, which is different from most other industrialized countries. In 2016, GHG emissions were 1.7 per cent higher than in 1990, while they were 13.3 per cent lower than in 2005. Several factors explain the downward trend since 2005, including improved fuel efficiency of cars, a modal shift in transport, reduced traffic volume and further improvement in public transportation.

68. Japan has a comprehensive approach to reducing emissions from the transport sector. The main focus is on: the improvement of fuel efficiency of cars; the promotion of modal shifts to more environmentally friendly modes and to combined transportation of goods; the increased use of public transport and cycling; the improvement of traffic flows by the promotion of autonomous vehicles; and the promotion of intelligent transport systems (e.g. centrally controlled signals).

69. Japan is a global car manufacturer and sets stringent fuel efficiency standards that affect not only its domestic car fleet but also the exported fleet. These standards have evolved from the 13.6 km/litre fuel set in 2010 to the 20.3 km/litre fuel set to be achieved in 2020. The fuel efficiency value in 2016 stood at 21.9 km/litre fuel; Japan is thus clearly on the way to overachieving the target for 2020. Japan is also among the world leaders in promoting hybrid and hydrogen-powered vehicles. The Government provides subsidies and infrastructure support and has set an ambitious vision of a “hydrogen society”. Biofuel use is very limited, and biofuels need to be imported.

70. **Industrial sector.** The industrial sector accounted for 21.4 per cent of the total energy-related GHG emissions in 2016. These emissions were 17 per cent lower in 2016 compared with the 2005 level and 20.6 per cent lower compared with the 1990 level. Energy consumption by the industrial sector in 2013 accounted for 43 per cent of the total energy consumption, which was a 12.5 per cent decrease compared with the 1990 level according to data provided by Japan during the review. The energy and emission decreases are mainly due to a reduction in economic activity in this sector.

71. Together with Keidanren (the Japanese Business Federation) the Government of Japan promotes and enhances the uptake of voluntary action plans. These plans complement the promotion of energy efficiency measures (see para. 62 above) and are supported by four pillars: (1) emission reduction targets (for 2020 and 2030) for domestic business operations; (2) contribution to emission reductions in other sectors through the development and diffusion of low-carbon products; (3) contribution at the international level through technology transfer; and (4) development and introduction of innovative technologies. The emission reduction targets set on a voluntary basis under the first pillar are expressed by various indicators chosen by each industry (e.g. CO₂ emissions, CO₂ emission intensity, energy consumption, energy intensity), in accordance with industry-specific characteristics and the potential for new technology uptake. In 2015, 94 major associations in the industrial sector and 17 associations in the transport sector had action plans. Together, these plans reduced CO₂ emissions by 4.7 per cent in 2015 compared with the 2013 level.

72. During the review, Japan informed the ERT of the new Science Based Targets initiative, which is aimed at enhancing Japanese industry's ambition level to bring it in line with the IPCC 2 °C scenario. MOE supports the setting of company-specific targets under this initiative. At present, 58 companies are engaged in the initiative and 20 of them have adopted a target. Even though such engagement concerns mainly business-to-consumer businesses, which have fewer emissions, the initiative is considered a source of inspiration and a role model for other businesses.

73. The NC7 does not include information on how Japan promotes and implements the decisions of ICAO and IMO to limit emissions from aviation and marine bunker fuels. Japan did report, however, on the active role it played in the introduction of the data-collection system for fuel consumption, an amendment introduced by IMO in 2016 of the International Convention for the Prevention of Pollution from Ships. This system should promote innovative technologies for low-emission ships. During the review, the Party informed the ERT that it is working under the framework of ICAO and IMO policies on reducing emissions from bunker fuels. It applies the International Convention for the Prevention of Pollution from Ships and ICAO policies.

(c) Policies and measures in other sectors

74. **Industrial processes.** Industrial process emissions amounted to 95,855.97 kt CO₂ eq in 2016 and accounted for 7.3 per cent of Japan's total GHG emissions (excluding LULUCF) in that year. F-gas emissions accounted for 50.9 per cent of the total emissions from industrial processes, followed by CO₂ process emissions by the mineral industry, with a 35.0 per cent share, and the GHG emissions by chemical and metal industries, with almost equal shares of 6.2 per cent and 6.4 per cent, respectively. Industrial process emissions were 13.2 per cent lower in 2016 than in 1990 but were 10.5 per cent above the level of 2005 emissions; the increase was mainly due to the increase in HFC emissions.

75. HFC emissions are the focus of mitigation efforts in this sector given that their share in total GHG emissions is high and growing, owing to their increased use in applications, mainly the replacement, since 2000, of chlorofluorocarbons and hydrochlorofluorocarbons controlled by the Montreal Protocol. Such control requires immediate action on the reduction of stock F-gases in the market, by converting to low-GWP HFCs and/or HFC replacements. PaMs addressing F-gas emissions include the replacement of fluorocarbons by natural refrigerants, the prevention of leakage from equipment and the promotion of recovery. The total effect of these measures is estimated to be 18,500 kt CO₂ eq in 2020 and 48,200 kt CO₂ eq in 2030. During the review, Japan clarified that the phase-down schedule for HFCs required by the Kigali Amendment to the Montreal Protocol will not have a direct impact on the 2020 ambition level of these PaMs because they are already in place.

76. Japan reported on the promotion of the use of blended cement, expected to have impacts of 44 kt CO₂ eq in 2020 and 388 kt CO₂ eq in 2030.

77. **Agriculture.** Emissions from the agriculture sector were 33,505.37 kt CO₂ eq in 2016 and accounted for only 2.6 per cent of Japan's total GHG emissions. The emissions from this sector have decreased by 10.9 per cent since 1990 and by 4.8 per cent since 2005. The main PaMs include the promotion of: the application of compost in paddy fields as an alternative to ploughing in rice straw with a view to reducing CH₄ emissions; and improved application techniques for chemical fertilizers with a view to reducing N₂O emissions from soils. The total mitigation impact of these measures is estimated to be in the range of 400–990 kt CO₂ eq in 2020 and 740–2,530 kt CO₂ eq in 2030, depending, among other factors, on temperature.

78. Japan also promotes carbon storage in cropland and grassland soils by promoting the incorporation of organic matter such as compost and green manure. The estimated mitigation effect is in the range of 7,080–8,280 kt CO₂ eq in 2020 and 6,960–8,900 kt CO₂ eq in 2030.

79. **LULUCF.** Japan's LULUCF sector is a net sink, but the trend has been decreasing since 2003 mainly owing to the changes in the age composition of the country's forests. Net removals were 56,771.18 kt CO₂ eq in 2016, which was a 9.1 per cent decrease since 1990 and a 37.8 per cent decrease since 2005.

80. Japan relies heavily on the LULUCF sector to achieve its 2020 and 2030 emission reduction targets. The impact of the forest sink activities it has elected (afforestation, reforestation, deforestation and forest management) are estimated on a gross-net basis compared with 1990, while the elected activities cropland management, grazing land management and revegetation are estimated on a net-net basis compared with 1990. Japan estimates, using activity-based accounting, net removals by forest carbon sinks to be approximately 38,000 kt CO₂ eq in 2020 and 27,800 kt CO₂ eq in 2030. Japan furthermore promotes urban greening (e.g. building parks in cities, increasing green areas around roads and harbours), with an estimated effect of net removals of 1,190 kt CO₂ eq in 2020 and 1,240 kt CO₂ eq in 2030. Accounted net removals by agricultural soils are estimated to amount to between 7,080 and 8,280 kt CO₂ eq in 2020.

81. **Waste management.** Emissions from the waste sector amounted to 21,639.74 kt CO₂ eq in 2016 and accounted for 1.7 per cent of Japan's total GHG emissions. These emissions have decreased by 26.0 per cent since 1990 and by 19.9 per cent since 2005, mainly owing to the decrease in CH₄ emissions from solid waste disposal on land. The most important sources of emissions in this sector in 2016 were CO₂ emissions from waste incineration (64.0 per cent), CH₄ emissions from solid waste disposal (15.0 per cent) and CH₄ and N₂O emissions from wastewater treatment and discharge (15.9 per cent).

82. During the review, Japan explained to the ERT that the key to the success of its waste management policy lies in: (1) further targeted reduction of the waste volume through taxation; (2) economic incentives and regulation that aim at introducing biomass plastics; and (3) the promotion of recycling and reuse in order to reduce the amount of waste to be incinerated or disposed of in landfills (in the case of organic waste). Local governments play an important role in recycling efforts.

83. Japan also aims to improve the power generation efficiency of waste incineration plants (from 19 per cent in 2018 to 21 per cent in 2022) and to increase the share of municipal waste treated in incineration plants with power generation facilities in the total amount of waste incinerated (from 66 per cent in 2012 to 69 per cent in 2020). Furthermore, it is working on reducing N₂O emissions from wastewater sludge incineration systems by supporting the upgrade of combustion technology. The total estimated mitigation effect of the PaMs for the waste sector reported in the NC7 amounts to 1,730 kt CO₂ eq in 2020 and 3,860 kt CO₂ eq in 2030.

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

84. In the NC7 Japan 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.

85. Further information on how Japan strives to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties was reported in the 2017 annual submission. Japan reported the information requested in decision 15/CMP.1, annex, section H, in its 2017 annual submission. During the review, the Party provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT considers the reported information to be complete and transparent.

86. The 2017 and previous national inventory reports and additional information provided by the Party to the ERT during the review described several initiatives by Japan aimed at minimizing adverse impacts, including: cooperating in the development of innovative technologies (CCS and carbon capture and utilization); promoting innovation in the fields of energy and environment; promoting greener tax systems; providing subsidies and other financial support for renewable energy and energy conservation equipment; promoting the diffusion of low-carbon technologies, products, systems, services and infrastructure; implementing mitigation actions in developing countries; and assisting developing country Parties that are highly dependent on the export of fossil fuels in diversifying their economies.

(e) Assessment of adherence to the reporting guidelines

87. The ERT assessed the information reported in the NC7 of Japan and identified issues relating to completeness and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 8.

Table 8

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 Japan

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
1	Reporting requirement ^a specified in paragraph 15 Issue type: completeness Assessment: encouragement	According to the UNFCCC reporting guidelines on NCs, the PaMs influencing international transport GHG emissions should be reported under the transport sector. In section 3.2.4 (for PaMs based on the Kyoto Protocol) of the NC7, Japan described the role it played in the international negotiations on bunker fuels, but it did not include information under the transport sector on PaMs influencing international transport GHG emissions. The ERT encourages Japan to include in its next NC reporting on PaMs influencing international transport GHG emissions under the transport sector.
2	Reporting requirement ^a specified in paragraph 17 Issue type: completeness Assessment: recommendation	Japan presented information on its PaMs by gas, subdivided by sector. This is not consistent with paragraph 17 of the UNFCCC reporting guidelines on NCs, which requires reporting by sector, subdivided by gas. The ERT understands that this is due to the fact that Japan's portfolio of PaMs and relevant reporting is dominated by PaMs that address energy-related CO ₂ emissions because they account for nearly 90 per cent of the total GHG emissions in the country, and hence understands the reasons the Party reports PaMs by gas, subdivided by sector. The ERT recommends that Japan present the reporting of PaMs by sector, subdivided by GHG or transparently explain the rationale for presenting the reporting on PaMs differently in its next NC.
3	Reporting requirement ^a specified in paragraph 22	In its NC7, Japan did not describe the objectives of its PaMs in quantitative terms.

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
	Issue type: completeness	During the review, Japan provided more detailed information for several PaMs, including quantitative goals (see chapter II.B above).
	Assessment: encouragement	The ERT encourages Japan to improve the completeness of its reporting by including in its next NC a description of the objective of each policy or measure in quantitative terms, to the extent possible.
4	Reporting requirement ^a specified in paragraph 23	Japan did not provide a brief description of the estimation methods used to assess the effects of PaMs.
	Issue type: completeness	During the review, Japan agreed to include this information in its next NC.
	Assessment: encouragement	The ERT encourages Japan to include in its next NC a brief description of the methods used for estimating the mitigation impact of its PaMs.
5	Reporting requirement ^b specified in paragraph 35	In its NC7, Japan did not identify the steps it has taken to promote and implement any decisions by ICAO and IMO in order to limit or reduce emissions of GHGs not controlled by the Montreal Protocol from aviation and marine bunker fuels.
	Issue type: completeness	During the review, Japan informed the ERT that it is working under the framework of ICAO and IMO policies on reducing emissions from bunker fuels. It applies the International Convention for the Prevention of Pollution from Ships and ICAO policies.
	Assessment: recommendation	The ERT recommends that Japan include in its next NC information on the steps it has taken to promote and implement any decisions by ICAO and IMO in order to limit or reduce emissions of GHGs not controlled by the Montreal Protocol from aviation and marine bunker fuels.

Note: The reporting on the requirements not included in this table is considered to be complete and 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

1. Projections overview, methodology and results

(a) Technical assessment of the reported information

88. Japan reported updated projections for 2020 and 2030 relative to actual inventory data for 2015 under the WEM scenario. The WEM scenario reported by Japan includes the full set of PaMs reported, all of which were implemented in 2016. Japan did not report a WAM or WOM scenario.

89. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions, and on a gas-by-gas basis for CO₂, CH₄, N₂O, PFCs, HFCs and SF₆ (treating PFCs and HFCs collectively in each case) as well as NF₃ for 1990–2030. The ERT noted that Japan, when determining its target, has taken into account the expected outcomes of concrete PaMs and individual technologies already in place for each sector. As a consequence, the target is closely linked to the projections of GHG emissions.

90. Japan's policy-oriented categorization of sectors (industrial, commercial, residential, transport and energy conversion) is well suited to providing an understanding of the relationship between policy outcomes and projected emissions in these sectors. This categorization is used for energy-related CO₂ emissions, which are by far the dominant contribution to total GHG emissions. For the other gases, Japan presents its projections by gas, not further subdividing them by sector. The projections are also provided in an

aggregated format for each CRF category as well as for a Party total using GWP values from the AR4.

91. Japan did not report emission projections for indirect CO₂, as the projected values have not been estimated yet, or for other indirect GHGs such as carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides.

92. Emission projections related to fuel sold to ships and aircraft engaged in international transport were not reported separately and were not included in the totals.

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

93. The methodology used for the preparation of the projections is identical to that used for the preparation of the emission projections for the BR2. Japan reported supporting information explaining the methodology. For the projections of energy-related CO₂ emissions, Japan uses an energy supply and demand model; for the other projections, spreadsheet-based estimates are used. Although the energy supply and demand model has been used already for the projections reported in the BR2, information regarding this model was only reported in the NC7 and the BR3 in response to a recommendation from the BR2 review.

94. The energy supply and demand model consists of five submodels: a macroeconomic model for the projection of economic activities; an energy price model for simulating the prices on international energy markets; a model for optimum energy generation based on minimizing system costs; a model for bottom-up aggregation of energy efficiency measures; and a model for sectoral estimates of energy consumption and emissions. The model seems to be a promising tool to produce robust projections and show the effect of PaMs.

95. To prepare its projections, Japan relied on the following key underlying assumptions reported in CTF table 5: (1) the growth of real GDP in Japan is projected to be 19.2 per cent from 2010 to 2020 and 16.4 per cent from 2020 to 2030, resulting in annual growth rates of 1.8 per cent and 1.5 per cent, respectively, in these periods; (2) population is projected to decrease from 128.1 million in 2010 to 124.1 million in 2020, a decrease of 3.1 per cent, and to 116.6 million in 2030, a decrease of 6.0 per cent in relation to 2020; (3) the number of households is projected to decrease too, but at a slightly lower rate; and (4) the assumed industrial production volumes are a continuation of the historic trends for 2030 but are not provided for 2020.

96. Regarding sensitivity analyses of projections, Japan reported that it performed an analysis of substitution elasticities of the consumption of different energy sources, but not of other key drivers such as GDP growth and population changes.

(c) Results of projections

97. The projected emission levels under the WEM scenario and information on the quantified economy-wide emission reduction target are presented in table 9 and the figure below.

Table 9

Summary of greenhouse gas emission projections for Japan

	<i>GHG emissions (kt CO₂ eq per year)</i>	<i>Changes in relation to base-year^a level (%)</i>	<i>Changes in relation to 1990 level (%)</i>
Quantified economy-wide emission reduction target under the Convention	1 343 443.15	-3.8	NA
Inventory data 1990 ^b	1 268 259.45	NA	NA
Base year 2005 ^b	1 396 510.55	NA	NA
Base year 2013 ^c	1 406 855.02	NA	NA
Inventory data 2015 ^b	1 322 567.81	-5.3	NA

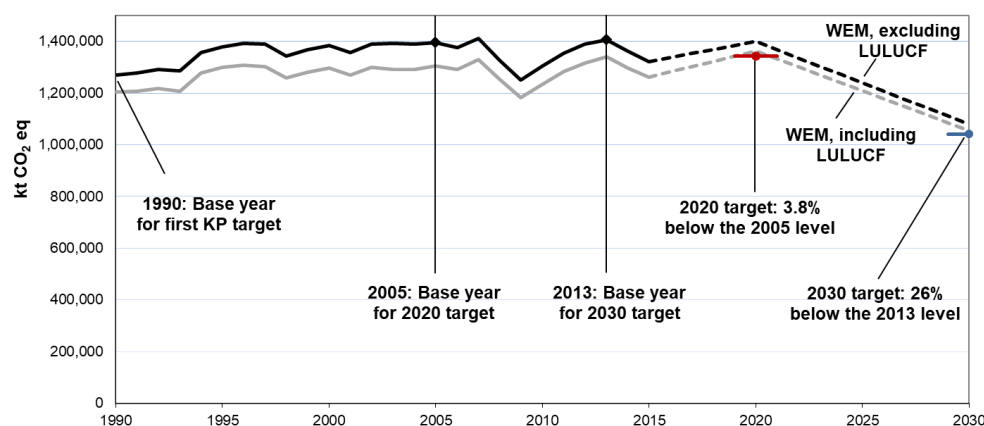
	GHG emissions (kt CO ₂ eq per year)	Changes in relation to base-year ^a level (%)	Changes in relation to 1990 level (%)
WEM projections for 2020 ^b	1 399 565.40	0.2	10.4
WEM projections for 2030 ^b	1 079 500.00	-23.3	-14.9

^a “Base year” in this column refers to the base year used for the target under the Convention.

^b From Japan’s BR3 CTF table 6.

^c From Japan’s BR3 CTF table 1s3.

Greenhouse gas emission projections reported by Japan



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

Notes: Solid black line, total GHG emissions excluding LULUCF for 1990–2015; solid grey line, total GHG emissions including LULUCF for 1990–2015; dashed black line, total GHG emissions excluding LULUCF for 2015–2020; dashed grey line, total GHG emissions including LULUCF for 2015–2030.

Abbreviation: KP = Kyoto Protocol.

98. Japan’s total GHG emissions excluding LULUCF are projected to be 1,399,565.40 and 1,079,500.00 kt CO₂ eq in 2020 and 2030, respectively, under the WEM scenario, which is an increase of 10.4 per cent and a decrease of 14.9 per cent, respectively, relative to the 1990 level. When relating the 2020 projected emissions to 2005, the base year chosen by Japan for its quantified economy-wide emission reduction target in 2020, the projections amount to an increase of 0.2 per cent. When relating the projected emissions in 2030 to 2013, the base year chosen by Japan for its 2030 target and also the year of highest emissions in Japan to date, this decrease is 23.3 per cent. When including removals from the LULUCF sector in the target year (but not in the base year), projected emissions in 2020 and 2030 in relation to the base year (2005 and 2013, respectively) show a decrease of 2.4 per cent and of 25.1 per cent, respectively.

99. The 2020 projections suggest that Japan may face challenges in achieving its 2020 target under the Convention, and in addition to the contribution of removals from LULUCF, additional mitigation measures will be necessary to achieve it. During the review, Japan explained that it does not intend to adopt additional measures but rather to strengthen the implementation of certain adopted PaMs. These include the reconnection of nuclear power plants to the grid, the further deployment of renewable energy, and overseas reduction through JCM.

100. Japan presented the WEM scenario by sector for 2020 and 2030, as summarized in table 10. Projections are by CRF category, and sector categorization for energy-related CO₂ emissions is not included.

Table 10
Summary of greenhouse gas emission projections for Japan presented by sector

Sector	GHG emissions and removals (kt CO ₂ eq)					Change (%)			
	1990	2005	2013	2020	2030	1990–2020	2005–2020	1990–2030	2013–2030
Energy (not including transport)	887 029.05	1 009 693.34	1 043 479.14	1 053 578.32	784 200.00	18.8	4.3	–11.6	–24.8
Transport	204 245.55	235 977.66	217 760.26	194 840.61	165 500.00	–4.6	–17.4	–19.0	–24.0
Industry/industrial processes	110 451.48	84 728.60	88 922.17	93 001.43	74 800.00	–15.8	9.8	–32.3	–15.9
Agriculture	37 635.95	40 015.02	34 762.88	38 723.08	37 500.00	2.9	–3.2	–0.4	7.9
LULUCF	–63 455.06	–89 643.58	–67 477.22	–36 404.03	–25 900.00	–42.6	–59.4	–59.2	–61.6
Waste	28 897.43	26 095.94	21 930.57	19 321.96	17 300.00	–33.1	–26.0	–40.1	–21.1
Total GHG emissions without LULUCF	1 268 259.45	1 396 510.55	1 406 855.02	1 399 565.40	1 079 500.00	10.4	0.2	–14.9	–23.3

Source: Japan's BR3 CTF table 6. For 2013 GHG emission data: Japan's 2017 annual submission, version 1.

101. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions are expected to occur in the transport sector, amounting to projected reductions of 4.6 and 17.4 per cent compared with the 1990 and 2005 levels, respectively. This reflects the effects from the diffusion of next-generation hybrid and electric vehicles and a further modal shift to environmentally friendly transport modes. Emissions from the energy sector (excluding transport) are projected to increase by 18.8 and 4.3 per cent compared with the 1990 and 2005 levels, respectively, driven by growth in economic activity and related increases in industrial and commercial energy use and by increased emissions from coal-based electricity generation as a substitution of nuclear power resulting from the GEJE. Although comparatively small in absolute terms, the projected decrease of emissions in the waste sector by 33.1 and 26.0 per cent compared with the 1990 and 2005 levels, respectively, is a clear indication of the success of Japan's rigorous waste management policy, which is expected to result in further decreasing the amounts of incinerated waste, final disposal and treated wastewater. The sink capacity of the LULUCF sector is projected to decrease by 42.6 and 59.4 per cent compared with the 1990 and 2005 levels, respectively, mainly as a result of the age structure of forests in Japan.

102. The pattern of projected emissions reported for 2030 in relation to 1990 and 2013 (the base year for the NDC) changes considerably compared with the projections for 2020. Emissions from all sectors are expected to decrease considerably, with the exception of agriculture, where emissions are expected to decrease by 0.4 per cent and increase by 7.9 per cent compared with the 1990 and 2013 levels, respectively, and LULUCF, which is expected to show a decrease in its sink capacity by 59.2 and 61.6 per cent compared with the 1990 and 2013 levels, respectively. The dominant drivers of these reductions are: the increase in the shares of nuclear- and RES-based electricity generation; reduced consumption of fossil fuels in transport and for residential and commercial heating; and the increase in energy efficiency in energy consumption sectors.

103. Japan presented the WEM scenario by gas for 2020 and 2030, as summarized in table 11.

Table 11
Summary of greenhouse gas emission projections for Japan presented by gas

Gas	GHG emissions and removals (kt CO ₂ eq)					Change (%)			
	1990	2005	2013	2020	2030	1990–2020	2005–2020	1990–2030	2013–2030
CO ₂	1 157 164.51	1 304 375.96	1 313 686.01	1 298 375.21	997 800.00	12.2	–0.5	–13.8	–24.0
H ₄	44 223.07	38 962.32	32 675.28	33 932.91	31 600.00	–23.3	–12.9	–28.5	–3.3
N ₂ O	31 517.58	25 510.95	21 400.06	21 557.28	21 100.00	–31.6	–15.5	–33.1	–1.4
HFCs	15 932.31	12 724.24	32 094.56	38 300.00	21 600.00	140.4	201.0	35.6	–32.7
PFCs	6 539.30	8 623.35	3 280.06	4 000.00	4 200.00	–38.8	–53.6	–35.8	28.0
SF ₆	12 850.07	5 063.86	2 101.81	2 400.00	2 700.00	–81.3	–52.6	–79.0	28.5
NF ₃	32.61	1 249.87	1 617.24	1 000.00	500.00	2 966.5	–20.0	1 433.3	–69.1
Total GHG emissions without LULUCF	1 268 259.45	1 396 510.55	1 406 855.02	1 399 565.40	1 079 500.00	10.4	0.2	–14.9	–23.3

Source: Japan's BR3 CTF tables 6 and 1s3.

104. For 2020, CO₂ emissions are projected to increase by 12.2 per cent and decrease by 0.5 per cent compared with the 1990 and 2005 levels, respectively. CH₄ emissions are projected to decrease by 23.3 and 12.9 per cent in 2020 compared with the 1990 and 2005 levels, respectively, while N₂O emissions are projected to decrease by 32.1 and 15.5 per cent in 2020 compared with the 1990 and 2005 levels, respectively. HFC emissions, in contrast, are projected to increase considerably by 2020 (by 140.4 and 201.0 per cent compared with the 1990 and 2005 levels, respectively), leading to an overall increase in emissions of F-gases.

105. For 2030, CO₂ emissions are projected to decrease by 13.8 and 24.0 per cent compared with the 1990 and 2013 levels, respectively. CH₄ emissions are projected to decrease by 28.5 and 3.3 per cent by 2030 and N₂O emissions by 33.1 and 1.4 per cent compared with the 1990 and 2013 levels, respectively. Compared with 2020, the trend in HFC emissions turns by 2030 – emissions are projected to increase by 35.6 per cent and decrease by 32.7 per cent compared with the 1990 and 2013 levels, respectively.

(d) Assessment of adherence to the reporting guidelines

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

Table 12

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

No.	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement ^a specified in paragraph 43 Issue type: transparency Assessment: encouragement	<p>In its NC7, Japan did not describe all models or approaches used in a way which allows the reader to obtain a basic understanding of them. Japan did not summarize the strengths and weaknesses of the models or approaches used and did not explain how the models or approaches used account for any overlaps or synergies that may exist between different PaMs.</p> <p>During the review, Japan provided further information on the methodologies used for the preparation of the emission projections. For instance, it explained the strengths and weaknesses of the models used and informed the ERT that a spreadsheet model was used to estimate non-CO₂ GHGs. With regard to the economic energy supply and demand model, the ERT noted that the transparency of the reporting would be enhanced by a clearer description of the interaction of the submodels. During the review, Japan explained the model in more detail; in particular, which parameters are assumed to be exogenous.</p> <p>To increase transparency, the ERT encourages Japan in its next NC to briefly describe each type of model or approach used and its characteristics, to summarize the strengths and weaknesses of the models or approaches used and to explain how the models or approaches used account for any overlaps or synergies that may exist between different PaMs.</p>
2	Reporting requirement ^a specified in paragraph 36 Issue type: completeness Assessment: recommendation	<p>In its NC7, Japan did not report emission projections related to fuel sold to ships and aircraft engaged in international transport separately and did not include them in the totals.</p> <p>During the review, Japan informed the ERT there were no estimates of future activity levels of international aviation and maritime transport, hence the projections could not be estimated.</p> <p>The ERT recommends that Japan report in its next NC, to the extent possible, emission projections related to fuel sold to ships and aircraft engaged in international transport separately and not included in the totals.</p>
3	Reporting requirement ^a specified in paragraph 38 Issue type: completeness Assessment: encouragement	<p>Japan did not provide diagrams illustrating the projections in accordance with paragraph 38 of the UNFCCC reporting guidelines on NCs.</p> <p>During the review, this issue was not discussed with Japan.</p> <p>The ERT encourages Japan to include in its next NC diagrams illustrating the projections in accordance with paragraph 38 of the UNFCCC reporting guidelines on NCs.</p>
4	Reporting requirement ^a specified in paragraph 28 Issue type: transparency Assessment: encouragement	<p>In the NC7, Japan reported that in order to reach its emission reduction target of 3.8 per cent or more in 2020, in addition to removals from LULUCF, it intends to implement additional mitigation measures. Japan did not, however, specify any measures and did not report a WAM scenario.</p> <p>During the review, Japan explained that it does not intend to adopt additional PaMs in order to meet the target but instead will enhance the implementation of existing PaMs.</p> <p>The ERT encourages Japan to include in its next NC a WAM scenario, or to transparently explain, in line with the scenario definitions of Japan, why it chose not to develop a WAM scenario.</p>

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

^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

107. In the NC7 Japan presented the estimated and expected total effect of implemented and adopted PaMs by gas (CH₄, N₂O and F-gases), but not for CO₂, and not by sector. Information is presented in terms of GHG emissions avoided or sequestered, by gas (on a CO₂ eq basis), in 2020 and 2030. Table 13 provides an overview of the effect of PaMs as reported by Japan.

Table 13

Projected effects of Japan's planned, implemented and adopted policies and measures by 2020 and 2030

Gas	2020		2030	
	<i>Effect of implemented and adopted measures (kt CO₂ eq)</i>	<i>Effect of planned measures (kt CO₂ eq)</i>	<i>Effect of implemented and adopted measures (kt CO₂ eq)</i>	<i>Effect of planned measures (kt CO₂ eq)</i>
CH ₄	800.00	NA	2 100.00	NA
N ₂ O	600.00	NA	900.00	NA
F-gases	18 500.00	NA	48 200.00	NA
CO ₂	NE	NA	NE	NA

Source: Japan's NC7 and BR3.

Note: The total effect of implemented and adopted PaMs has been calculated by a bottom-up approach, that is, as the sum of individual PaMs affecting the emissions of the gases.

(b) Assessment of adherence to the reporting guidelines

108. The ERT assessed the information reported in the NC7 of Japan and identified an issue relating to completeness and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 14.

Table 14

Findings on the assessment of the total effect of policies and measures from the review of the seventh national communication of Japan

<i>No.</i>	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement specified in paragraph 39 Issue type: completeness Assessment: recommendation	In the NC7, Japan provided estimates of the total effect of implemented and adopted PaMs for CH ₄ , N ₂ O and F-gases, but not for CO ₂ , which contributes the most to total GHG emissions in Japan. During the review, Japan explained the difficulty in quantifying the estimated mitigation impact for all PaMs and that the methods of estimation of mitigation effects differ among PaMs, which does not allow for aggregation of their mitigation impacts. The ERT reiterates the recommendation made in the previous review report that Japan include in its next NC an assessment of the total effect of implemented and adopted 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.

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

109. Japan 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.

110. Japan indicated what “new and additional” financial resources it provided in 2015–2016 and clarified how it determined such resources as being “new and additional”. Japan stated in the NC7 that all reported climate finance was “new and additional”. Climate finance is newly committed or disbursed by the National Diet on an annual basis and is therefore considered to be “new”. Moreover, the reported finance does not include previously committed or disbursed climate finance and is therefore considered to be “additional”.

111. Japan described how its resources address the adaptation and mitigation needs of non-Annex I Parties. It also described how those resources assist non-Annex I Parties to mitigate and adapt to the adverse effects of climate change and contribute to technology development and transfer and capacity-building related to mitigation and adaptation. The Party reported that it develops projects through close consultation with developing country Parties, taking into account their needs as conveyed to Japan’s embassies and the overseas offices of JICA located in a number of developing countries. Japan reported information on the assistance that it has provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them to meet the costs of adaptation to those adverse effects. In particular, the Party provided information on its financial support totalling USD 44.1 million to Pacific islands that are particularly vulnerable to the adverse impacts of climate change.

112. With regard to the most recent financial contributions aimed at enhancing the implementation of the Convention by developing countries, Japan reported that its climate finance has been allocated to support ACE 2.0. ACE 2.0 is an initiative announced at COP 21 that commits Japan to providing JPY 1.3 trillion (approximately USD 12 billion using the exchange rate as at 1 June 2018) in climate finance in the year 2020. ACE 2.0 succeeds ACE, a JPY 1.6 trillion climate finance goal covering the period 2013–2015. Japan achieved the goal within one and a half years. In response to a question from the ERT during the review, Japan clarified that it is on track to achieve the JPY 1.3 trillion climate finance goal contained in ACE 2.0. The ERT noted that ACE 2.0 is a major contributor towards the USD 100 billion collective climate finance goal. Table 15 includes some of the information reported by Japan on its provision of financial support.

Table 15

Summary of information on provision of financial support by Japan in 2015–2016

(Millions of United States dollars)

<i>Allocation channel of public financial support</i>	<i>Year of disbursement</i>	
	<i>2015</i>	<i>2016</i>
Official development assistance ^a	22 050	23 799
Climate-specific contributions through multilateral channels, including:	126	188
GEF	NE	NE
LDCF	0	1
SCCF	0	0

Allocation channel of public financial support	Year of disbursement	
	2015	2016
Adaptation Fund	0	0
GCF	90	157
Trust Fund for Supplementary Activities	1	1
Other multilateral climate funds	26	25
United Nations bodies	6	4
Climate-specific contributions through bilateral, regional and other channels	8 838	10 698

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

(b) Assessment of adherence to the reporting guidelines

113. The ERT assessed the information reported in the NC7 of Japan and identified issues relating to completeness and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 16.

Table 16

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

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: completeness Assessment: recommendation	In its NC7, Japan did not report financial contributions to the GEF in accordance with the format of table 3 of the UNFCCC reporting guidelines on NCs (i.e. for the past three years). During the review, Japan clarified that it uses the UNFCCC reporting guidelines on NCs but also the UNFCCC reporting guidelines on BRs, which call for two years to be reported. The ERT reiterates the recommendation made in the previous review report that Japan improve the completeness of its reporting by including in its next NC information on at least the past three years of funding to the GEF, preferably four years, in accordance with table 3 of the UNFCCC reporting guidelines on NCs.
2	Reporting requirement ^a specified in paragraph 53 Issue type: completeness Assessment: encouragement	In its NC7, Japan did not report financial contributions to multilateral institutions and programmes and bilateral and regional support in accordance with the format of tables 4 and 5 of the UNFCCC reporting guidelines on NCs (i.e. for the past three years). During the review, Japan clarified that it uses the UNFCCC reporting guidelines on NCs but also the UNFCCC reporting guidelines on BRs, which call for two years to be reported. The ERT reiterates the encouragement made in the previous review report for Japan to improve the completeness of its reporting by including in its next NC information on its past three years of contributions to multilateral institutions and programmes and bilateral and regional support, in accordance with tables 4 and 5 of the UNFCCC reporting guidelines on NCs.

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 numbers listed under reporting requirement refer to the relevant paragraphs 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

114. Japan 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. Japan provided examples of support provided for the deployment and enhancement of the endogenous capacities and technologies of non-Annex I Parties. Japan plays a global leadership role in the development and global diffusion of innovative technologies. In 2016, Japan adopted the National Energy and Environment Strategy for Technical Innovation towards 2050 to promote the development of innovative technology, such as fuel cell vehicles and CCS. Japan convenes the Innovation for Cool Earth Forum, a global platform to promote cooperation on innovative technologies. Further, Japan reported that it promotes the global diffusion of low-carbon technologies through co-innovation projects that meet the needs of developing countries, for example through the utilization of satellites for observation, support for formulating strategies to enhance developing countries' adaptive capabilities, and its JCM.

115. The ERT noted that Japan reported detailed information on a success story related to a demonstration project of "green hospitals" in Viet Nam, which installed 1,000 energy-efficient air conditioners at two State-owned hospitals. During the review, the Party clarified that it has not identified any failure stories owing to Japan's use of pilot projects, which, if not successful, are not funded for full implementation. The ERT suggests that Japan improve the transparency of its reporting by including in its next NC information on how it avoids failure stories.

116. Japan 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 (see para. 115 above).

117. Japan reported on the implementation of JCM projects. There are 17 JCM partner countries with 29 registered projects and 53 measurement, reporting and verification methodologies approved. Moreover, Japan reported that there are more than 120 projects in the pipeline, with an estimated GHG emission reduction potential of 7 Mt CO₂ in 2030. During the review, the Party clarified that nearly all JCM projects relate to the energy sector and utilize technology primarily from Japanese companies.

(b) Assessment of adherence to the reporting guidelines

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

E. Vulnerability assessment, climate change impacts and adaptation measures

1. Technical assessment of the reported information

119. In the NC7 Japan 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. Japan provided a description of climate change vulnerability and impacts and highlighted the adaptation response actions taken and planned at different levels of government. The information in the NC7 was drawn from the *Climate Change Impact Assessment Report* of March 2015⁴ and the National Plan for Adaptation to the Impacts of Climate Change of November 2015.⁵

⁴ Available at <https://www.env.go.jp/en/focus/docs/files/20150300-100.pdf>.

⁵ Available at <https://www.env.go.jp/en/focus/docs/files/20151127-101.pdf>.

120. The *Climate Change Impact Assessment Report* identifies impacts associated with climate change, including: an increase in temperature; an increase in the frequency of heavy rainfall; a decrease in the number of days with precipitation; and an increase in sea surface temperature. Knowledge of the present and projected impacts in Japan provided the basis for development of the National Plan for Adaptation to the Impacts of Climate Change, which contains the fundamental strategies for adaptation to the impacts of climate change and directions to be taken by each sector until 2025.

121. In 2016, the Climate Change Adaptation Platform was developed to provide information relating to projections of climate change impacts and good practices concerning adaptation measures. MOE supports local government efforts to project climate change and adapt to its impacts; this is one of the strategies in the National Plan for Adaptation to the Impacts of Climate Change. Another strategy focuses on promoting international cooperation through the provision of support to developing countries for the formulation of national adaptation plans and the implementation of adaptation measures and disaster risk reduction.

122. Japan provides support to Indonesia, the Philippines and several Pacific island nations for the development of country-specific climate change projections and adaptation plans, based on the needs of each country. Japan is coordinating with other countries in the Asia-Pacific region to implement, by 2020, the Asia-Pacific Adaptation Information Platform. Through the platform, developing countries in the region will have access to comprehensive adaptation information, based on scientific knowledge, relevant to the formulation and implementation of adaptation measures.

123. Japan included in its NC7 a detailed description of international adaptation activities, including flood control measures, irrigation facilities and capacity-building for irrigated agriculture, water supply planning and improvement in the capability to cope with natural disasters resulting from climate change. Information was also provided by the Party on bilateral cooperation with developing countries on adaptation, such as through grant aid and technical assistance for: the prevention of and rehabilitation from disasters (e.g. large-scale typhoons or cyclones) through the introduction of meteorological observing equipment and systems and structure for transmitting emergency information and through construction; and repair of water supply facilities in areas suffering from drought resulting from climate change. These efforts are concentrated mainly in the Asia-Pacific region. During the review, Japan informed the ERT that it intends to expand its efforts to developing countries outside the region, but acknowledged the complexities involved in doing so, given that adaptation needs are highly country- and region-specific. Japan provides financial support to the Asia Pacific Adaptation Network and the Global Adaptation Network to enhance collaboration and share knowledge on climate change adaptation among policymakers and practitioners in the Asia-Pacific region and in other parts of the world.

124. Japan acknowledged in the NC7 the complexity involved in developing approaches to track progress in the implementation of adaptation measures in the country and mentioned a monitoring trial conducted in 2016 that generated qualitative and quantitative criteria for basic adaptation measures. These criteria are reported in the *Trial Monitoring Report for the National Plan for Adaptation to the Impacts of Climate Change* (available only in Japanese; further information can be found in section 5.5 of the NC7). The ERT commends Japan for its progress in establishing criteria for tracking adaptation measures and the initiative to annually re-evaluate and change the adaptation measures, as appropriate.

125. During the review, in response to a question from the ERT related to the engagement of the national Government with regional and local governments to address their specific needs, Japan informed the ERT that a Regional Adaptation Consortium has been jointly formed since 2017 by MOE, MAFF, MLIT, local governments and research institutions to promote studies related to the future impacts of climate change in various sectors, including agriculture, fisheries, natural disasters, water resources, ecosystems and health. As part of this consortium, regional councils share information on the impacts of climate change and adaptation efforts in each region.

126. Since the NC6, an increasing number of initiatives have been undertaken by Japan to address the present and potential impacts of climate change and related adaptation measures, including concrete governmental policies and research programmes addressing national,

regional and local challenges. The enhanced efforts by Japan to provide support to countries in the Asia-Pacific region through, for instance, capacity-building, the creation of platforms to facilitate data and information exchange, and joint research, are aligned with promoting the capacity of developing countries to face the challenges of climate change and minimize its adverse effects.

127. Table 17 summarizes the information on vulnerability and adaptation to climate change presented in the NC7 of Japan. Information in the table was drawn from the *Climate Change Impact Assessment Report* and the National Plan for Adaptation to the Impacts of Climate Change. Observational results as well as projections for atmospheric temperature, precipitation, snow cover, snowfall, temperature and level of oceans, sea ice extent and number of typhoons are provided in the *Climate Change Impact Assessment Report*. The impacts were assessed using expert judgment based on scientific knowledge of the following criteria: social, economic and environmental significance; urgency (timing of occurrence of impacts and timing required to initiate adaptation measures and critical decision-making); and level of confidence. The metrics used for the assessment are similar to those applied by the IPCC in its AR5.

Table 17

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

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Agriculture and food security	<p><i>Vulnerability:</i> major crops are vulnerable to high temperatures and high solar radiation, as well as to large-scale disasters caused by record high temperatures, torrential rainfall and heavy snow. Examples include a declining ratio of first-grade to other grades of rice due to high temperature, and poor colouring of apples and other fruits due to high temperatures. This vulnerability could impact the production of major crops, particularly paddy rice and fruit trees.</p> <p><i>Adaptation:</i> development and diffusion of high temperature resistant varieties of rice; a switch to superior varieties (in terms of colour) of fruits; development of new crop varieties that are adaptive to climate change and of crops resistant to drought; improved cultivation management technologies.</p>
Coastal zones	<p><i>Vulnerability:</i> coastal zones are vulnerable to increasing frequency and intensity of water disasters such as floods, sediment-related disasters and storm-surge disasters, all owing to increasing heavy rainfall and typhoons.</p> <p><i>Adaptation:</i> restoration of ecosystems such as tidal flats; conservation and restoration of areas such as coastlines, tidal flats, salt marshes, seagrass beds and coral reefs; creation of ecosystem networks.</p>
Fisheries	<p><i>Vulnerability:</i> marine fisheries, marine aquaculture and inland water fisheries are vulnerable to changes in the marine environment, in particular to high water temperatures.</p> <p><i>Adaptation:</i> measures enabling adaptive fishery production activities; systems to promptly provide information to relevant institutions concerned with real-time monitoring.</p>
Forests	<p><i>Vulnerability:</i> forests are vulnerable to increases in the number of rainless days, decreases in snowfall, and droughts.</p> <p><i>Adaptation:</i> conservation and management of national forests; enhancement of the disaster prevention function of forests; maintenance and protection of forests that contain rich soil and have high infiltration and water-holding capacity.</p>
Human health	<p><i>Vulnerability:</i> populations are vulnerable to climate change induced temperature increases that facilitate the expansion of suitable habitat for vectors of infectious diseases.</p> <p><i>Adaptation:</i> cautionary alerts; awareness-raising regarding prevention and treatment of vector-borne disease.</p>
Infrastructure and economy	<p><i>Vulnerability:</i> infrastructure and the economy are vulnerable to natural disasters such as floods and droughts, which impair the functioning of critical services.</p> <p><i>Adaptation:</i> development of adaptation technologies to enhance disaster prevention functions of distribution/logistics, ports, harbours, railways, airports, roads, water supply infrastructure, waste treatment facilities and traffic safety facilities.</p>

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Water resources	<p><i>Vulnerability:</i> increase in the vulnerability of water bodies to changes in water temperature; changes in rainfall and increase in droughts owing to increases in the number of rainless days; decrease in the total amount of snowfall that can affect, among other things, water quality and availability.</p> <p><i>Adaptation:</i> measures to reduce the loads flowing into lakes and marshes; water quality conservation measures; drought preparedness through drought risk information.</p>

2. Assessment of adherence to the reporting guidelines

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

129. Japan provided information on its general policy relating to research and systematic observation and both domestic and international activities, including contributions to the World Climate Programme, the International Geosphere–Biosphere Programme, GCOS and the IPCC. Japan also provided, during the review, in response to a question from the ERT, information on the identification of opportunities for and barriers to free and open international exchange of data and information. Japan promotes free and open international exchange of data and information, for instance by connecting DIAS to GEOSS (see para. 137 below). Japan explained that there are currently some challenges related to collaboration with the private sector and that it has started tackling the issue through an interministerial approach. For example, MEXT is tasked with developing data policy for private sector use of public remotely sensed data.

130. Japan provided in the NC7 specific information on the funding of research and systematic observation but did not provide quantitative information that would allow a comparative evaluation of the investments made in recent years.

131. Japan has implemented international and domestic policies and programmes on climate change research, systematic observation and climate modelling that aim to advance capabilities to predict and observe the physical, chemical, biological and human components of the Earth's system over space and time. The National Plan for Adaptation to the Impacts of Climate Change and the Plan for Global Warming Countermeasures identify the promotion of research on climate change and observation and monitoring systems as fundamental to global warming countermeasures.

132. Japan's general policy on research is set out in its Fifth Science and Technology Basic Plan 2016–2020, launched in 2016. The plan identifies policy issues to be addressed by science, technology and innovation in a solution-oriented manner. The pillars of the plan are: (1) taking action to create new value for the development of future industry and social transformation; (2) addressing economic and social challenges; (3) reinforcing the “fundamentals” for science, technology and innovation; and (4) establishing a systemic virtuous cycle of human resources, knowledge and capital for innovation. The focus of the plan is on the identification of relevant, broad research areas and aspirations for system innovation. As described in the NC6, Japan's priority in science and technology continues to be sustainable growth, including issues around stable energy sources, the ageing population, and public safety and security in regard to both natural and anthropogenic-related disasters. During the review, Japan clarified that it is making concerted efforts in innovation, particularly in technologies for CO₂ emission reductions. The plan indicates that the Government aims to increase the amount of investment by commercial companies in university-based research projects (from JPY 39 billion in 2013 to JPY 80 billion in 2020).

Japan has the high-level goal of total public and private sector investment in research and technology of at least 4 per cent of GDP in 2020 (about JPY 26 trillion).

133. In order to identify innovative technologies for reducing emissions and to organize long-term research and development, Japan launched in 2016 the National Energy and Environment Strategy for Technological Innovation towards 2050. During the review, in response to a question from the ERT on the status of this strategy, Japan explained that a summary of future initiatives and specific actions has been compiled, including a technology road map to 2050 formulated for 10 technologies. Japan has high expectations that it will produce innovative technologies that will contribute to the large-scale reduction of GHGs, particularly CO₂, by leveraging industry, academic and government intelligence in research and development to produce innovation concentrated mainly in the energy sector.

134. In 2017, Japan launched the Integrated Research Program for Advancing Climate Models 2017–2021, which aims to advance research on the effects of global warming through global climate models run in the updated supercomputer system Earth Simulator. During the review, in response to a question from the ERT, Japan explained that projections obtained from this research programme are relevant for regional adaptation research in developing countries, including India, Indonesia, Malaysia, the Philippines, Thailand and Viet Nam, and particularly for sectors that would be impacted by natural disasters. The results will be valuable to the AR6 of the IPCC.

135. Japan provided in the NC7 information on its main research fields, which include: (1) climate processes and the climate system, including palaeoclimate; (2) climate change projection modelling and projections; (3) climate change impacts; (4) socioeconomic effects, including climate change impacts and response options; and (5) emission reduction and adaptation technology. Under these fields, research funds are provided through, for instance, the Strategic Research on Environment Research and Technology Development, which provides opportunities for collaborative research with research institutions in developed and developing countries. For instance, in 2017, researchers from Viet Nam and Thailand were invited to undertake research related to projected changes in local typhoons and monsoons.

136. In terms of activities related to systematic observation, Japan reported on national plans, programmes and support for ground- and space-based climate observing systems, including satellite and non-satellite climate observation. Under Japan's Enforcement Policy of Earth Observation in Next Decade launched in 2015, Japan seeks to ensure consistency with international observation and monitoring initiatives, as well as to contribute to GEOSS through, for example, connection of DIAS to GEOSS. DIAS is used to collect and store Earth observation data from multiple sources, such as satellites, aircraft, ships and ground-based installations. It provides analyses of the combined observation data together with socioeconomic data and generates information relevant to multiple applications worldwide. Japan's Basic Plan on Space Policy, launched in 2016, highlights the importance of promoting Earth observation satellites in coordination with other agencies worldwide through, for instance, Japan's participation in the activities of the Committee on Earth Observation Satellites.

137. Japan described in the NC7 its participation in GCOS, including its provision of meteorological and atmospheric observations through participation in the GCOS Surface Network, the GCOS Upper-Air Network, Global Atmosphere Watch and the Baseline Surface Radiation Network. Regarding oceanographic observation, Japan has been promoting the development of GOOS and its regional pilot project, the North-East Asian Regional GOOS, and continues to actively participate in other relevant initiatives (e.g. the World Meteorological Organization's Voluntary Observing Ship Scheme; the TRITON buoy network; and the ARGO project). The Party is involved in improving the marine observation system so as to continuously improve climate change projection models, and in monitoring changes in sea surface temperature and sea level due to global warming. Japan is making observations in Antarctica and the Arctic as part of the Cryosphere Observing System for Climate to enhance polar region research. Regarding terrestrial observations, the Party participates in the Global Terrestrial Network-Carbon (FLUXNET).

138. Regarding space-based observation, Japan provided in the NC7 information on the continuation of GOSAT-1, which was launched in 2009 to provide worldwide GHG data.

During the review, in response to a question from the ERT, Japan explained that the launch of GOSAT-2 is planned for 2018, and that this satellite has new functions, such as collecting data on carbon monoxide as a tracer for anthropogenic CO₂ emissions. In 2017, Japan launched the second Global Change Observation Mission, which provides continuity to long-term observations of changes in Earth’s environment; specifically, biomass, land use, land cover, ground moisture, snow and ice.

139. Japan provided detailed information in its NC7 on systems that support systematic observations. It participates and cooperates with international observation and monitoring programmes, including GCOS, Global Atmosphere Watch, GOOS and the World Meteorological Organization–UNESCO. Japan also facilitates the use of observation and monitoring data through joint research and knowledge networks, such as the Asia-Pacific Network for Global Change Research. Systematic observations are made through atmospheric, oceanographic, terrestrial and cryosphere climate observing systems. Japan provided in the NC7 detailed information on the long-term continuity of data, data availability, and the exchange and archiving of data in DIAS. The ERT commends Japan for its commitment to continuously strengthening its observation and monitoring systems, which are instrumental to the generation of climate-related data for various applications.

140. The NC7 includes some actions taken to support capacity-building and the establishment and maintenance of observation systems and related data and monitoring systems in developing countries, for instance the Asian Regional Network (AsiaFlux). One of the purposes of this network is to develop collaborative research and data sets on carbon, water and energy cycles in key ecosystems in Asia.

2. Assessment of adherence to the reporting guidelines

141. The ERT assessed the information reported in the NC7 of Japan and identified issues relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 18.

Table 18

Findings on research and systematic observation from the review of the seventh national communication of Japan

<i>No.</i>	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement specified in paragraph 61 Issue type: transparency Assessment: encouragement	Japan provided in the NC7 a description of some initiatives related to the funding of research but did not provide any quantitative information that would allow the ERT to assess the evolution of expenditure on research over time. During the review, Japan shared information on private and public investments in research contained in the Fifth Science and Technology Basic Plan (see para. 133 above) with the ERT. The ERT encourages Japan to increase the transparency of the information provided on the funding of research and systematic observation by including, for example, information on total annual expenditure, total spent on projects developed jointly with developing countries, and the private and public shares of research investments.
2	Reporting requirement specified in paragraph 62 Issue type: completeness Assessment: encouragement	In the NC7, Japan identified an opportunity for free and open international exchange of data and information by making DIAS under GEOSS, which provides free and open data, publicly available. Japan did not, however, report on the barriers for free and open international exchange of data and on actions taken to overcome such barriers. During the review, Japan explained that there are currently some challenges related to collaboration with the private sector and that it has started tackling the issue through an interministerial approach. For example, MEXT is tasked with developing data policy for private sector use of public remotely sensed data. The ERT encourages Japan to include in its next NC information on barriers to free and open international exchange of data and information and to report on actions taken to overcome these barriers.

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
3	Reporting requirement specified in paragraph 64 Issue type: transparency Assessment: encouragement	Japan did not provide in its NC7 information on the current status with regard to support for developing countries to establish and maintain observing systems, and related data and monitoring systems but rather provided the same information as in the NC6. During the review, Japan provided up-to-date information on support for capacity-building for the use of remotely sensed data, supported by JICA. The ERT encourages Japan to include in its next NC information on the current status of support for developing countries to establish and maintain observing systems, and related data and monitoring systems; for instance, countries for which support was provided and the type of support (technological, capacity-building or financial).

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.

G. Education, training and public awareness

1. Technical assessment of the reported information

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

143. Based on the Act on Promotion of Environmental Conservation Activities through Environmental Education (2003, amended in 2011, fully entered into force in 2012), the Government of Japan has formulated and implemented measures for the promotion of environment education in which citizens and private organizations are to make efforts to voluntarily undertake environmental conservation activities. The Act envisaged that environmental conservation efforts, the encouragement of citizens' willingness for environmental conservation, and environmental education would be performed by the appropriate sharing of roles and cooperation on an equal footing among various entities in order to construct a sustainable society. In accordance with the Act, environmental education in Japan is provided in schools and other educational facilities so that the public has many opportunities to deepen its understanding of environmental conservation from childhood onwards.

144. The Global Action Programme on Education and Sustainable Development was formulated in 2016 and efforts were made for its systematic implementation. MEXT promotes ESD at various educational sites and schools. An activity support centre has been established as a national hub for ESD. Regional hubs in project support centres have also been established to promote ESD in cooperation with regional and local stakeholders who work on initiatives related to ESD.

145. UNESCO Associated Schools (schools that practice international collaboration in order to realize ideals set forth in the Constitution of UNESCO) have been positioned as hubs for promoting ESD. As at November 2017, Japan had 1,034 UNESCO Associated Schools, a large increase from the 19 schools in 2005. The annual UNESCO-Japan Prize on Education for Sustainable Development, which honours three outstanding projects related to ESD all over the world, was established by the Government of Japan in cooperation with UNESCO.

146. Japan conducts environmental leadership training projects, designs GLOBE model schools (15 schools were established in the 2017–2018 educational year) and certifies “eco-schools” (environmentally friendly schools). In the period 1997–2017, 1,759 eco-schools were certified.

147. Japan promotes environmental education at youth educational facilities by providing opportunities for hands-on environmental education and experience in rich natural environments. It also promotes cooperation among community learning centres and relevant organizations in the regions so as to increase learning activities and opportunities for solving regional problems, including environmental issues.

148. Japan has also established “Forests for Students” – places in national forests for experience-based activities led by schools. This programme promotes initiatives for forest-related environmental education and provides opportunities for students to experience and learn about forests and forestry and activities, and the significance of wood use. The Regional and District Forest Office of the Forestry Agency implements experience-based activities for students and provides information and technical instruction.

149. The Green Consultation Centre established by the Government with the aim of improving awareness and encouraging urban greening provides opportunities and venues for the training of leaders in and practitioners of environmental education and environmental learning, works with users, local communities and schools, and promotes the development of urban parks.

150. In accordance with the Act Concerning the Promotion of the Measures to Cope with Global Warming (1999, revised in 2008), the Japan Center for Climate Change Actions and corresponding prefectural centres have been engaged in activities to help raise public awareness of global warming countermeasures. As at July 2017, 59 centres had been designated across Japan. They serve as promoters of global warming countermeasures in their respective regions. Advisers designated by prefectural governors across Japan provide advice and seek to improve public awareness on how to implement activities aimed at controlling the GHG emissions related to the daily life of the population.

151. To effectively develop the National Cool Choice Campaign, which encourages wisely choosing low-carbon products and services, the Cool Choice Promotion Team was established by MOE in 2016. The team members are from business associations, local public bodies, consumer groups, the mass media, non-profit organizations and concerned government agencies. The campaigns undertaken since April 2017 under the framework of the overall National Cool Choice Campaign include: (1) five-star home electronics (i.e. replacing old home electronics with energy saving ones, replacing old lights with LEDs); (2) energy saving homes (i.e. building zero emission houses, energy saving renovations of existing houses); (3) Cool Choice: Let’s Receive at the Time of Delivery (i.e. by receiving packages at the time of delivery, approximately 42 kt CO₂ of emission reductions may be achieved as result of packages not needing redelivery); and (4) eco-cars (i.e. by replacing old cars with eco-cars, using tax exemptions, up to 40 per cent higher fuel efficiency can be achieved).

152. A few other examples of national awareness campaigns promoted by the Government of Japan are: (1) COOL BIZ and WARM BIZ, which encourage people in offices to wear clothing that enables them to set the air conditioner to 28 °C in the summer and set the heating to 20 °C in the winter and to be comfortable at these room temperatures; (2) the “3R” awareness campaign, which promotes resources reduction, reuse, and recycling technologies and systems; (3) an energy conservation awareness campaign, which promotes energy saving in the industrial, residential and commercial, and transport sectors by informing the public of concrete energy saving behaviours in an easy to understand manner through advertisements, events, the Internet, brochures, etc.; (4) a fuel-efficient vehicles awareness campaign, which is promoted by preparing and distributing a list that shows the fuel efficiency of and CO₂ emissions from vehicles, and by providing the latest information through the Internet; and (5) an ethical consumption awareness campaign, which promotes sustainable consumer behaviour in buying and using products.

2. Assessment of adherence to the reporting guidelines

153. The ERT assessed the information reported in the NC7 of Japan and identified issues relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 19.

Table 19

Findings on education, training and public awareness from the review of the seventh national communication of Japan

No.	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement specified in paragraph 65 Issue type: transparency Assessment: encouragement	The NC7 states that Japan continuously promotes environmental education in schools and that MEXT periodically (once every 10 years) revises the curriculum for environmental education. The curriculum for elementary and junior high schools was revised most recently in 2017 and for high schools in 2018. The NC7 did not, however, report information on the contents of the revision to the environmental education curriculum. During the review, in response to a question from the ERT, Japan provided information on the revised environmental education curriculum. The ERT reiterates the encouragement made in the previous review report for Japan to improve the transparency of its reporting by including in its next NC the main contents of the curricula on environmental issues at all levels of education.
2	Reporting requirement specified in paragraph 65 Issue type: completeness Assessment: encouragement	In its NC7, Japan did not report on the extent of public participation in the preparation or domestic review of the NC. During the review, Japan provided information specifying that non-governmental organizations participate in the councils established by each ministry and agency as committee member representatives and, in addition, public comments are collected before the development of any policy, law or action plan. The ERT reiterates the encouragement made in the previous review report for Japan to include in its next NC information on public participation in the preparation or domestic review of the NC.

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.

III. Conclusions and recommendations

154. The ERT conducted a technical review of the information reported in the NC7 of Japan 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 Japan.

155. Japan is a Party to the Kyoto Protocol, but it did not assume commitments in the form of an economy-wide emission reduction target under Annex B to the Kyoto Protocol for the second commitment period (2013–2020). It continues, however, to adhere to the reporting obligations under the Kyoto Protocol. The information provided in the NC7 includes most of the elements of the supplementary information under Article 7 of the Kyoto Protocol.

156. Japan's total GHG emissions excluding LULUCF increased by 3.0 per cent between 1990 and 2016, whereas total GHG emissions including net emissions and removals from LULUCF increased by 3.6 per cent over the same period. The increase in total GHG emissions was driven primarily by an increase in CO₂ emissions resulting from energy demand to meet economic growth and from the replacement of nuclear power by fossil fuel-based electricity generation, in particular after the GEJE in 2011. The increase in total GHG emissions was also largely due to a major increase in HFC emissions following the replacement of ozone-depleting substances controlled by the Montreal Protocol with HFCs.

157. Under the Convention, Japan committed itself to achieving a quantified economy-wide emission reduction target of 3.8 per cent or more below the 2005 base-year level by 2020. The target covers CO₂, CH₄, N₂O, HFCs, PFCs, SF₆ and NF₃, expressed using GWP values from the AR4, and covers all sources and sectors included in the annual GHG inventory. Emissions and removals from the LULUCF sector are included in the target, using an activity-based accounting approach, as Japan relies heavily on this sector to achieve its

2020 target, but not in the base year. Japan reported that it plans to make use of market-based mechanisms (JCM credits) to achieve its target. In absolute terms, this means that under the Convention, using the inventory data for 2005 included in the NC, Japan has to reduce its emissions from 1,398,823.62 kt CO₂ eq in the 2005 base year to 1,354,061.26 kt CO₂ eq or less by 2020.

158. Japan adopted a midterm target of a GHG emission reduction of 26 per cent by 2030 compared with the 2013 level (or 25.4 per cent compared with the 2005 level). This target was submitted to the UNFCCC in 2016 as Japan's NDC under the Paris Agreement. Japan aims to achieve the midterm target through domestic emission reductions and through removals from elected LULUCF activities. Japan has also set a long-term goal to reduce GHG emissions by 80 per cent by 2050, while pursuing economic growth and socioeconomic objectives.

159. The 1998 Act on Promotion of Global Warming Countermeasures and plans prepared thereunder continue to provide the main legal framework for Japan's energy and climate change goals. The most recent (2016) Plan for Global Warming Countermeasures is the cornerstone of Japan's policy for achieving its NDC by 2030 as it introduces key measures to be implemented by the national Government and local governments, as well as by businesses and citizens. The plan allocates emission reductions by sector and outlines the policies to achieve the reductions. Other key legislation supporting Japan's climate change goals includes the Basic Environment Law (1993), the Act on Rational Use and Proper Management of Fluorocarbons (2013), the Act on the Rational Use of Energy (1979) and the Strategic Energy Plan.

160. The climate policy and to some extent the energy policy of Japan continues to be shaped on two pillars through which mitigation actions with the most significant mitigation impact are implemented. The first pillar is the renewed momentum for the improvement of energy efficiency by promoting highly energy-efficient equipment in final demand sectors and energy efficiency in buildings, which are expected to provide a sizeable contribution to the meeting of Japan's NDC. The second pillar is the maximum use of the potential of renewable energy for electricity and heat generation, further decarbonization of the electricity generation mix by reconnection to the grid of nuclear power plants that meet the increased safety standards, and CCS technology.

161. A highlight of the success of Japan's policy is its remarkable reversal of the trend in emissions from the transport sector, in which further mitigation gains are expected in the future, particularly from the deployment of hybrid and hydrogen vehicles at a large scale. Other highlights are the steep decline in emissions from waste, measures to reduce HFCs and the further enhancement of forest removals. An uncertainty that remains is about the future of Japan's plans to build new coal power plants; if materialized, these plants could offset a major share of the expected mitigation gains. During the review, Japan explained that a regulatory framework based on the Act on the Rational Use of Energy and the Sophisticated Methods of Energy Supply Structures has been introduced for utilizing coal-fired power and that the energy mix and CO₂ emission reduction target for 2030 will be achieved through these efforts. The key cross-sectoral PaMs with tangible impacts are the introduction of a domestic credit scheme to stimulate cost-efficient GHG emission reductions and the additional tax levied on all fossil fuels, the revenue of which is used for financing renewable energy and energy efficiency measures.

162. The GHG emission projections provided by Japan correspond to the WEM scenario. In this scenario, emissions (excluding LULUCF) are projected to be 10.4 per cent above the 1990 level in 2020. In relation to 2005, the base year chosen by Japan for its quantified economy-wide emission reduction target in 2020, emissions (excluding LULUCF) are projected to increase by 0.2 per cent. In 2030, emissions (without LULUCF) are projected to decrease by 14.9 per cent relative to the 1990 level. In relation to 2013, the base year chosen by Japan for its 2030 target, emissions (excluding LULUCF) are projected to decrease by 23.3 per cent. On the basis of the reported information, the ERT concludes that Japan may face challenges in achieving its 2020 target under the WEM scenario. In addition to the contribution of removals from LULUCF, enhancement of existing PaMs will be necessary to achieve the 2020 target. During the review, Japan explained that it does not intend to adopt additional measures but rather to strengthen the implementation of certain adopted PaMs.

These include the reconnection of nuclear power plants to the grid, the further deployment of renewable energy, and overseas reduction through JCM.

163. Japan continued to provide climate financing to developing countries in line with climate finance programmes such as ACE 2.0, for which Japan committed JPY 1.3 trillion in public and private climate finance by 2020. Its public financial support in 2015 and 2016 totalled USD 8.96 and 10.89 billion per year, respectively. These totals place Japan among the largest climate finance donors in the world. For those years, Japan's support provided for mitigation action was higher than its support for adaptation. Japan reported that private financial flows leveraged by bilateral climate finance totalled USD 3.8 billion in 2015 and 2016, through co-financing of JBIC projects and trade insurance provided by NEXI. The Party provided detailed information on support for technology development and transfer. Most of the reported activities addressed the mitigation sector and most were undertaken jointly by the public and private sectors.

164. Japan included in the NC7 information on the expected impacts of climate change and on actions taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. The *Climate Change Impact Assessment Report* and the National Plan for Adaptation to the Impacts of Climate Change provide the information on the required elements in the UNFCCC reporting guidelines on NCs. In addition, and consistent with the National Plan for Adaptation to the Impacts of Climate Change, Japan supports local government efforts to project climate change and adapt to its impacts. Japan implemented a monitoring trial to track progress in the implementation of individual measures. The results were presented in the *Trial Monitoring Report for the National Plan for Adaptation to the Impacts of Climate Change*. The National Plan for Adaptation to the Impacts of Climate Change includes a strategy to promote international cooperation through the provision of support to developing countries for the formulation of national adaptation plans and the implementation of adaptation measures and disaster risk reduction. The Party provides support to some countries in the Asia-Pacific region for the development of country-specific climate change projections and adaptation plans, based on their specific needs. Japan is coordinating with other countries in the Asia-Pacific region to implement, by 2020, the Asia-Pacific Adaptation Information Platform. Through the platform, developing countries in the region will have access to comprehensive adaptation information, based on scientific knowledge, relevant to the formulation and implementation of adaptation measures.

165. Japan provided information on its general policy related to research and systematic observation and both domestic and international activities. The NC7 includes information on the funding of research, without specifying the total funding available and the channels available to provide support. Japan has implemented international and domestic policies and programmes on climate change research and systematic observation. The National Plan for Adaptation to the Impacts of Climate Change and the Plan for Global Warming Countermeasures identify the promotion of research on climate change and observation and monitoring systems as fundamental to global warming countermeasures. The Party provided in the NC7 information on its main research fields, consistent with those indicated in the UNFCCC reporting guidelines on NCs. Japan is making concerted efforts in innovation and launched the National Energy and Environment Strategy for Technological Innovation towards 2050 with the expectation that it will enable the development of innovative technologies that will contribute to the large-scale reduction of GHGs, particularly CO₂. Regarding systematic observation, Japan provided detailed information on the current status of national plans, programmes and support for ground- and space-based atmospheric, terrestrial and oceanographic climate observing systems. The Party ensures the international exchange of data and information from multiple sources, such as satellites, aircraft, ships and ground-based installations through DIAS, which is connected to GEOSS.

166. Japan communicated information on its actions relating to education, training and public awareness. MEXT promotes ESD at various educational sites and schools. UNESCO Associated Schools have been positioned as hubs for promoting ESD; their number was 1,034 as at November 2017. Japan conducts environmental leadership training projects through GLOBE model schools (15 schools were established in the 2017–2018 educational year) and certifies “eco-schools” (1,759 in the period 1997–2017). The Japan Center for Climate Change Actions and corresponding prefectural centres have been engaged in

activities to help raise public awareness of global warming countermeasures. As at July 2017, 59 centres had been designated across Japan. They serve as promoters of global warming countermeasures in their respective regions. The National Cool Choice Campaign was effectively implemented in 2017, led by MOE, and encourages wisely choosing low-carbon products and services.

167. In the course of the review, the ERT formulated the following recommendations for Japan to improve its adherence to the UNFCCC reporting guidelines on NCs and its reporting of supplementary information under the Kyoto Protocol:⁶

To improve the completeness of its reporting by:

(a) Providing the contact information for the national entity and its designated representative with overall responsibility for the national inventory and a detailed description of the process for collecting activity data, or a cross reference to the NIR where the information can be found (see issue 1 in table 6);

(b) Organizing the reporting of PaMs by sector, subdivided by GHG or transparently explain the rationale for a different presentation of the reporting on PaMs (see issue 2 in table 8);

(c) Providing information on the steps it has taken to promote and implement any decisions by ICAO and IMO in order to limit or reduce emissions of GHGs not controlled by the Montreal Protocol from aviation and marine bunker fuels (see issue 5 in table 8);

(d) Providing projections related to fuel sold to ships and aircraft engaged in international transport or, if this is not possible, transparently explain the reasons why such projections could not be prepared (see issue 2 in table 12);

(e) Providing an assessment of the total effect of PaMs (see issue 1 in table 14);

(f) Providing information on at least the past three years of funding to the GEF (see issue 1 in table 16);

IV. Questions of implementation

168. During the review, the ERT assessed the NC7, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, and reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol with regard to timeliness, completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. No question of implementation was raised by the ERT during the review.

⁶ The recommendations are given in full in the relevant sections of this report.

Annex

Documents and information used during the review

A. Reference documents

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

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BR3 of Japan. Available at <https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/third-biennial-reports-annex-i>.

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“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>.

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NC7 of Japan. Available at <https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/seventh-national-communications-annex-i>.

Report on the individual review of the annual submission of Japan submitted in 2016. FCCC/ARR/2016/JPN. Available at <https://unfccc.int/documents/9730#beg>.

Report of the technical review of the second biennial report of Japan. FCCC/TRR.2/JPN. Available at <https://unfccc.int/node/66151>.

Report on the technical review of the sixth national communication of Japan. FCCC/IDR.6/JPN. Available at <https://unfccc.int/node/66151>.

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”. Annex I to decision 2/CP.17. Available at <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Takashi Morimoto (Mitsubishi UFJ Research & Consulting Co., Ltd.).
